

Charleston Regional Hazard Mitigation Plan



Annual Update
2019

**Jurisdictions Represented and Participating in
Charleston Regional Hazard Mitigation Plan
CRS Jurisdictions processed by Charleston County:**

Unincorporated Charleston County

the Town of Awendaw
Town of Hollywood
Town of James Island
Town of Lincolnville
Town of McClellanville
Town of Meggett
Town of Ravenel
Town of Rockville
Town of Seabrook Island

Other CRS Jurisdictions:

City of Charleston
City of Folly Beach
City of Isle of Palms
City of North Charleston
Town of Kiawah Island
Town of Mt. Pleasant
Town of Sullivan's Island

Other Government Entities and Partners Represented and Participating in This Plan:

Charleston County Parks & Recreation Commission
Charleston County School District
Charleston Water System
College of Charleston
Cooper River Parks & Playground Commission*
James Island Public Service District Commission
Mt. Pleasant Water Works Commission
North Charleston District*
North Charleston Sewer District
Roper St. Francis Healthcare
St. Andrews Parish Park & Recreation Commission
St. Andrews Public Service District
St. John's Fire District Commission
St. Paul's Fire District Commission

**These two partners are under contract with the City of North Charleston to provide services. Please see the attached letters in Sections 7.22 and 7.25.*

CONTACT US ABOUT THE PLAN:

The Charleston Regional Hazard Mitigation Plan involves all participating jurisdictions and partners but is maintained by Charleston County's Building Inspection Services Department. This plan is published on the Charleston County Building Inspection Services website and is available in the department's office.

Public comment on the Plan is always welcome and incorporated into the yearly updates. For any questions on the Plan or for information on how to be involved with the Plan, please contact Charleston County Building Inspection Services. Thank you for your interest.

Lonnie Hamilton, III Public Services Building
4045 Bridge View Drive, Room A311
North Charleston, SC 29405-7464

Email: buildingservices@charlestoncounty.org
Phone: 843-202-6940
Fax: 843-202-6954

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Section 1 Introduction

1.1 – Background

The *Charleston Regional Hazard Mitigation Plan* is the result of a community wide effort to determine appropriate mechanisms to address the various types of hazards facing the Charleston Region. The *Charleston Regional Hazard Mitigation Plan* was developed as a required element of *Project Impact*, an ongoing initiative sponsored by the Federal Emergency Management Agency (FEMA) to assist local communities in the Region to become more disaster resistant through cooperative efforts of the private, public and non-profit sectors.

The **goals** of the program include, but are not limited to:

1. Protecting the lives of our citizens to the best of our abilities from natural and man-made environmental hazards.
2. Assessing the extent of our vulnerability to natural and man-made environmental hazards.
3. Establishing cooperative relationships between the public, private and non-profit sectors to enhance our preparedness, response, recovery, and mitigation for hazard events.
4. Educating our citizens regarding their vulnerability to natural hazards and steps which may be taken to reduce that vulnerability.
5. Reducing vulnerability of our infrastructure and built environment to natural and man-made environmental hazards through specific mitigation projects that will also consider the historic and environmental resources of our area.

The *Charleston Regional Hazard Mitigation Plan* was developed as a required element of *Project Impact*, and in 1998 two committees were formed: the *Hazard Mitigation Plan Committee* and the *Project Impact Advisory Committee*.

The *Advisory Committee* is comprised of the following subcommittees: *Structural Projects, Natural Benefits, Emergency Services, Property Protection and Preventative Activities*.

In 2012, the *Public Information Committee* merged with the *Hazard Mitigation Plan Committee*, to form the *Hazard Mitigation Plan & Public Information Committee*. In 2013 the *Charleston Regional Hazard Mitigation Plan & Public Information Committee* refined the roles to comply with the *Program for Public Information (PPI)* requirements of the *2013 Community Rating System Manual*. Because public information is a key component in protecting the lives of our citizens, merging the two committees into one has proven to be the best way to have the most participation and input from all areas of interest.

As part of an ongoing effort to mitigate loss of life and property damage associated with flooding events, all jurisdictions in the County presently active in the National Flood Insurance Program (NFIP) - Community Rating System (CRS) have established a *Public Information Plan (PIP)*. The *Public Information Plan* is a stand-alone document that is Appendix A.1 at the end of this Plan. The purpose of the document is to collectively evaluate public information efforts across the different elements found throughout the Plan, from different types of hazards, to different outreach methods, topics and messages that should be addressed, and assessing the needs of the community, this document addresses all areas that incorporate public information activities. This *PIP* will serve all jurisdictions that have recognized the commonality of those natural disasters that pose the greatest threats to the Charleston County's *Project Impact* area.

Establishing a single multi-jurisdictional *PIP* eliminates duplicity of efforts and resources for each jurisdiction. Membership for this function has been established within the County's Project Impact initiative, with primary responsibilities placed within the *Hazard Mitigation & Public Information Plan Committee*. The other subcommittees of Project Impact offer assistance in the form of reviewing and providing recommendations on proposed and existing outreach projects. Attachment 1-A is the Project Impact Organization Chart. Twenty-five of the activities of the 2019-2020 *Charleston Regional Hazard Mitigation Plan* action plan are specific *PIP* initiatives.

The *Charleston Regional Hazard Mitigation Plan* is the result of a community-wide effort to determine appropriate mechanisms to address the various types of hazards facing the Charleston Region. The *Hazard Mitigation Plan & Public Information Committee*, which drafted this plan, consisted of members from each of the local government entities within Charleston County, State and Federal agencies with a focus on hazard mitigation, and from partners within the non-profit and private sectors.

The purpose of this plan update is to continue guiding hazard mitigation efforts to better protect the people and property in the County from the effects of hazard events. This plan demonstrates the community's commitment to reducing risks from hazards, and serves as a tool to help decision makers direct mitigation activities and resources. This plan was also developed to ensure Charleston County and participating partners' continued eligibility for certain federal disaster assistance. Maintenance of this plan also earns points for the National Flood Insurance Program's Community Rating System (CRS), which provides for lower flood insurance premiums in CRS communities.

Overview of Project Impact & the Charleston Regional Hazard Mitigation Plan

Project Impact was a Federal Emergency Management Agency (FEMA) sponsored initiative aimed at assisting communities in becoming more disaster resistant. Project Impact is intended to involve the public, private and non-profit sectors in forming partnerships to achieve the goal of reducing the amount of loss associated with a hazard event. This initiative began in 1997 with seven pilot communities, and ultimately expanded to approximately 250 communities nation-wide. Charleston County was selected as the 1999 Project Impact community for the State of South Carolina. All of the local jurisdictions within Charleston County have partnered together in the Project Impact initiative and still participate despite the defunding of the national project in 2002.

The four phases of the Project Impact initiative are to build community partnerships, assess risks, prioritize needs, build support and communicate on addressing hazard preparedness and response. The Project Impact initiative is intended to address any types of hazards, which may strike our community. The *Charleston Regional Hazard Mitigation Plan* addresses each of these types of hazards and serves as a mechanism for the assessing risks and prioritizing needs. This plan serves as the governing document for project selection associated with the Charleston County Project Impact initiative.

Project Impact and the *Charleston Regional Hazard Mitigation Plan*, fully complement each other and are therefore fully integrated with each other for the Charleston Region. Applicable efforts undertaken through either program are considered as activities for both programs. See Attachment 1-A: Project Impact Organization Chart.

1.2 – Community Profile

Charleston County's rich blend of culture, economic activity, environmental beauty, and immense historical preservation makes it one of the most distinguished counties in the nation. A recognized leader, Charleston County is a proud community that strives to protect both its

historic treasures and its environment, while still keeping an eye toward future development and citizens' needs.

The Land

Charleston County is located along the southeastern coast of South Carolina. It encompasses approximately 916 square miles of land, marshes, rivers, and wetlands with a coastline that stretches nearly 100 miles along the Atlantic Ocean. Charleston County contains vital protected areas, including the Francis Marion National Forest, Cape Romain National Wildlife Refuge, and ACE Basin National Wildlife Refuge.

The Climate

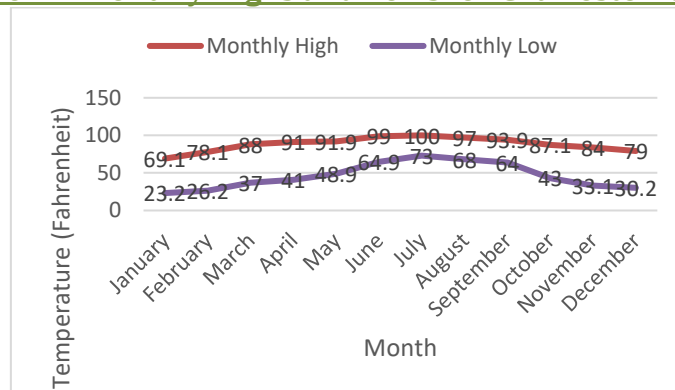
Nestled alongside the Ashley and Cooper rivers as they flow into the Atlantic Ocean, Charleston County enjoys a subtropical climate—with mild winters and warm, sunny summers. On average, July is our warmest month, January is our coldest, and August gets the most rainfall. In January, the average temperature is 48.5 degrees Fahrenheit; in July, the average temperature is 82 degrees Fahrenheit. The first frost usually occurs in December and the last frost usually occurs in February. Fluctuations in these trends happen every year. The year 2016 saw everything from three-digit temperatures to freezing conditions.

Figure 1.1 Charleston Weather Averages

Annual high temperature:	76.1°F
Annual low temperature:	55.6°F
Average temperature:	65.85°F
Average annual precipitation - rainfall:	51.06 inch
Days per year with precipitation - rainfall:	119 days
Annual hours of sunshine:	2993 hours

Source: US Climate Data

Figure 1.2 Monthly Highs and Lows for Charleston County



The People

Charleston County is home to an estimated 387,847 people¹. With a median age of 37.2, most of the county’s population is old enough to work and young enough to continue doing so for years to come. 65.1 percent of the county’s population is in the civilian labor force, earning a median household income of \$57,882. An estimated 15.3 percent of the population lives in poverty². Around 91.0 percent of Charleston County residents have a high school degree or higher level of education, while 41.9 percent hold a bachelor’s degree or higher.¹ Caucasian

¹ U.S. Census Bureau

² 2015 Small Area Income and Poverty Estimates (SAIPE)

³ U.S. BLS, Current Employment Statistics

and black races make up 67.8 percent and 27.8 percent of the population, respectively¹. Just over half of the county’s population is female.

Figure 1.3 Local, State, and National Population Growth¹

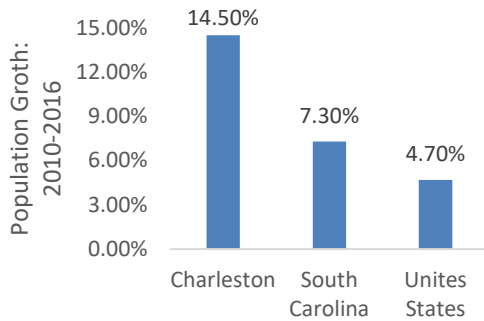


Figure 1.4 Charleston Age Profile¹

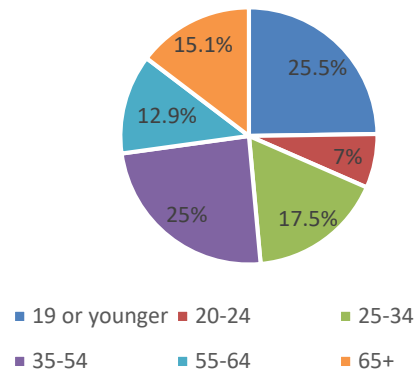
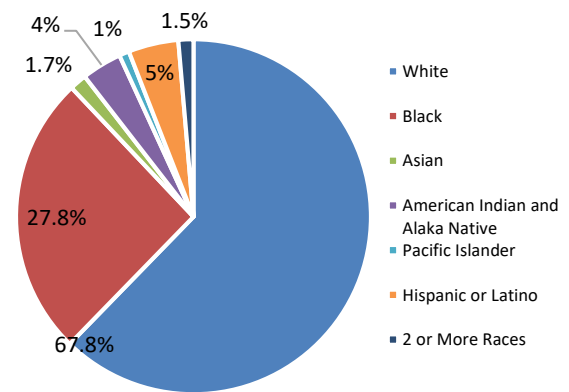


Figure 1.5 Charleston Employment from 2018-19³

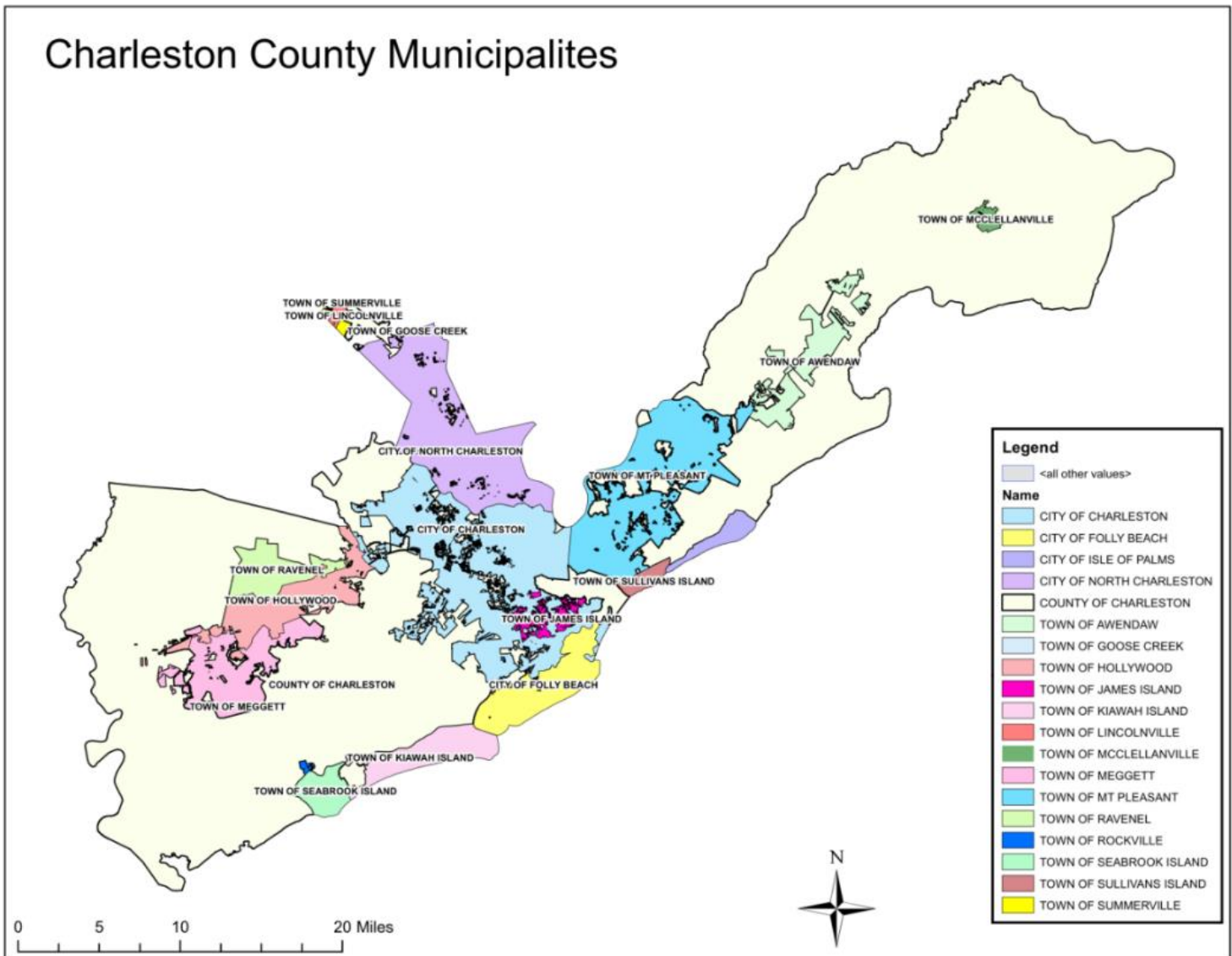
Charleston area employment (numbers in thousands)	May 2019	Change from May 2018 to May 2019	
		Number	Percent
Total nonfarm	374.8	8.6	2.3
Mining, logging, and construction	22.9	0.9	4.1
Manufacturing	27.7	0.7	2.6
Trade, transportation, and utilities	70.0	2.9	4.3
Information	6.6	0.3	4.8
Financial activities	16.2	0.4	2.5
Professional and business services	57.4	-0.5	-0.9
Education and health services	42.1	0.5	1.2
Leisure and hospitality	50.6	2.7	5.6
Other services	14.6	0.1	0.7
Government	66.7	0.6	0.9

Figure 1.6 Charleston Race Profile¹



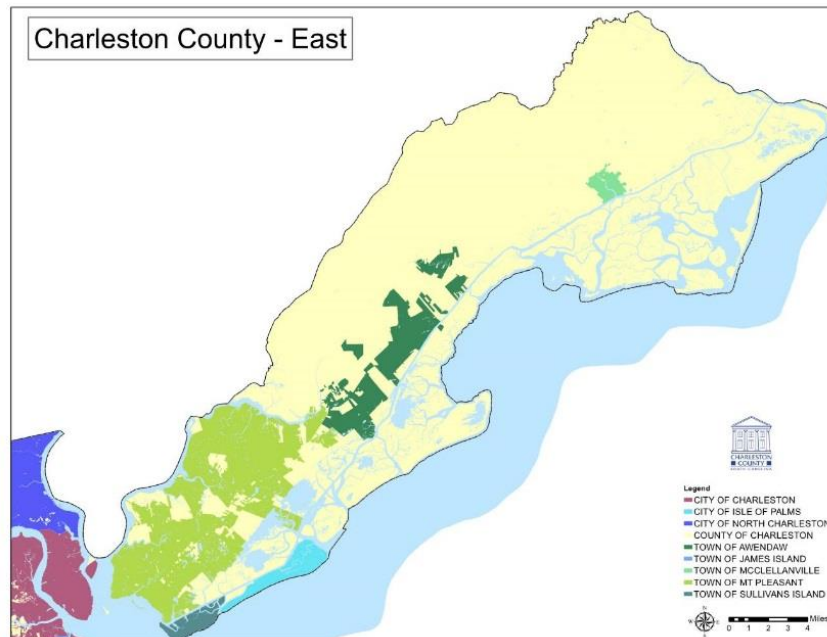
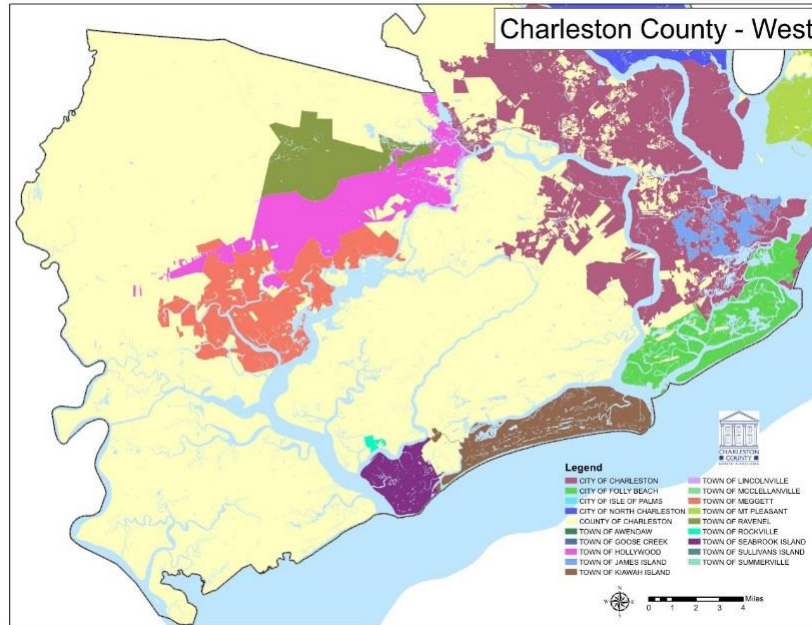
The Government

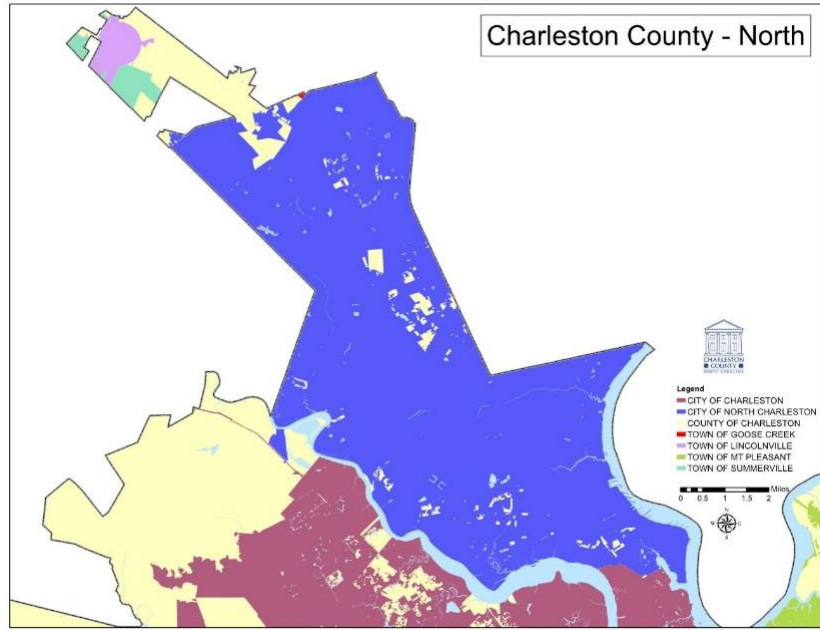
Charleston County uses the Council-Administrator form of local government. This form allows a board to hire an administrator to carry out council policy and personnel functions. The clerk of court, coroner and sheriff are constitutional officers that are elected countywide to four-year terms. Other officers elected countywide to four-year terms are auditor, treasurer and probate judge. South Carolina’s counties are granted enough authority to expand their services beyond traditional limited county purposes. With these enhanced powers, the counties are able to provide a diverse range of services such as water treatment, transportation, alcoholism and drug programs, and libraries. Charleston County consists of the unincorporated areas and the municipalities of the Town of Awendaw; Town of Hollywood; Town of James Island; Town of Lincolnville; Town of McClellanville; Town of Meggett; Town of Ravenel; Town of Rockville; Town of Seabrook Island; the City of Charleston; City of Folly Beach; City of Isle of Palms; Town of Kiawah Island; Town of Mount Pleasant; City of North Charleston; and Town of Sullivan’s Island. Charleston County Government acts as Unincorporated Charleston County – covering all the areas within the County that have not incorporated into a city or township. Unincorporated Charleston County provides full services for floodplain management and code enforcement for the following jurisdictions:



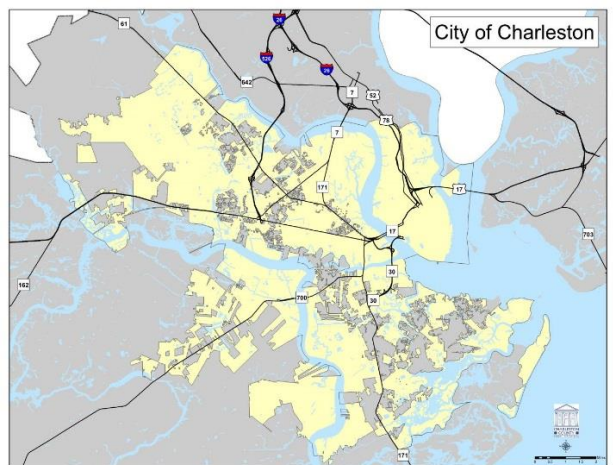
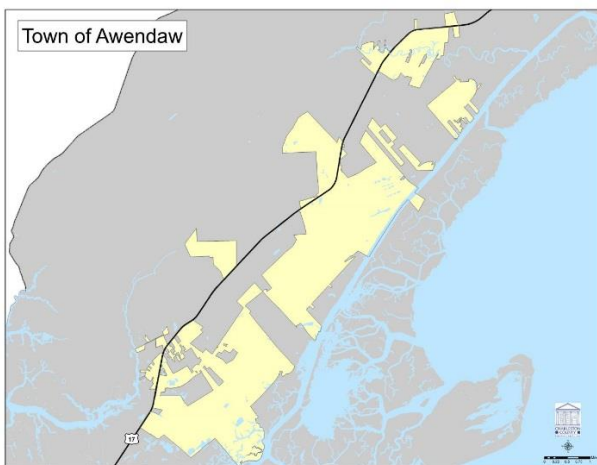
Town of Awendaw, Town of Hollywood, Town of James Island, Town of Lincolntonville, Town of McClellanville, Town of Meggett, Town of Ravenel, Town of Rockville, and Town of Seabrook Island. A detailed matrix for all participating jurisdictions in the Plan and the services provided and program participation is detailed at the end of this section. All jurisdictions participate in the NFIP except for Lincolntonville since their jurisdiction is so small and has no building that lie in a flood zone. All jurisdictions also participate in the CRS program except for Lincolntonville. Town of James Island is starting their CRS application process in Spring 2019.

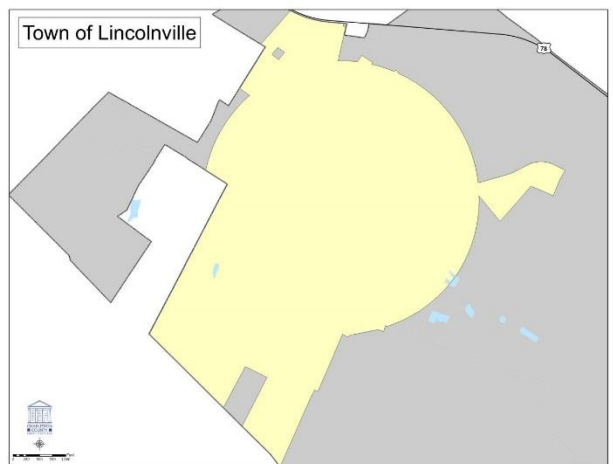
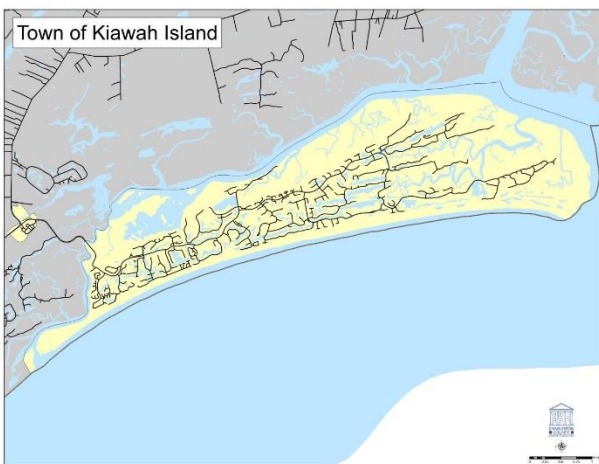
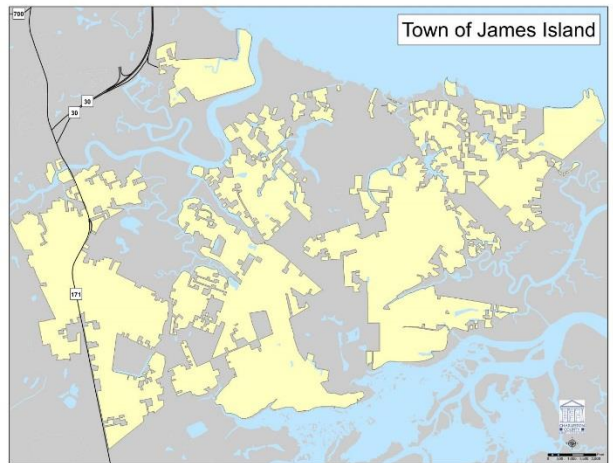
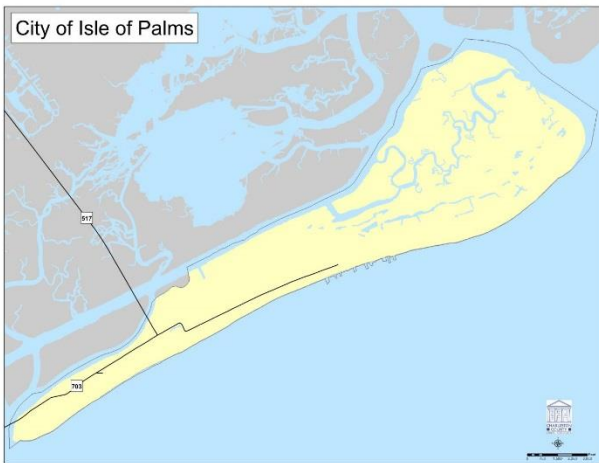
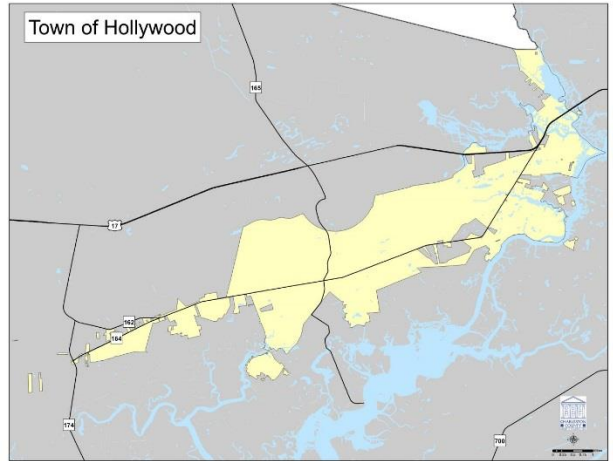
The following are area specific maps to show each participant in more detail.

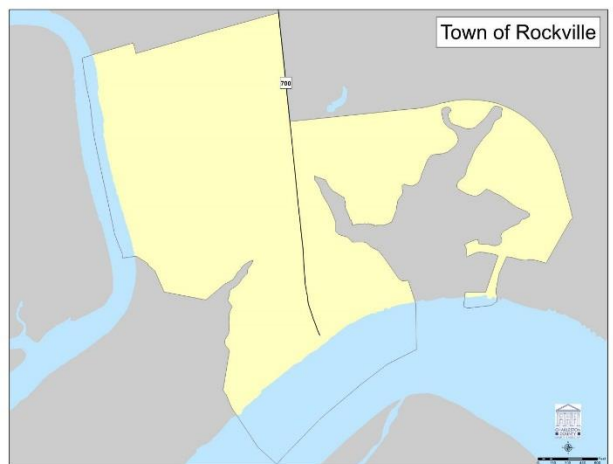
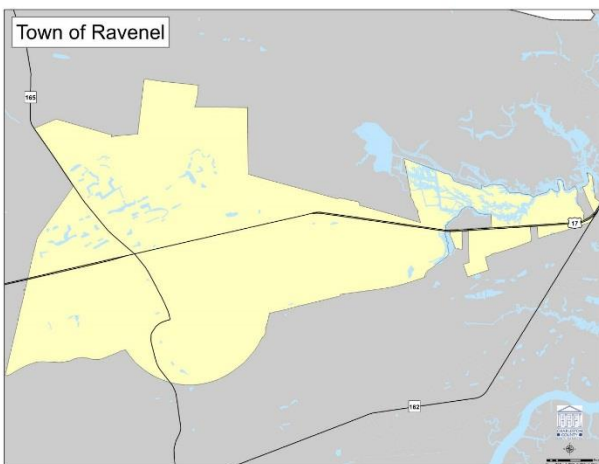
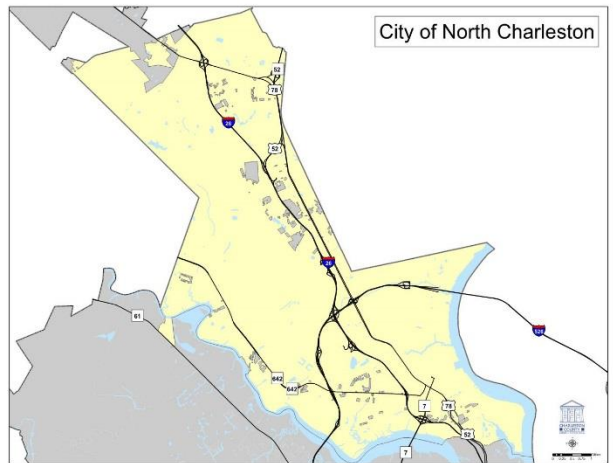
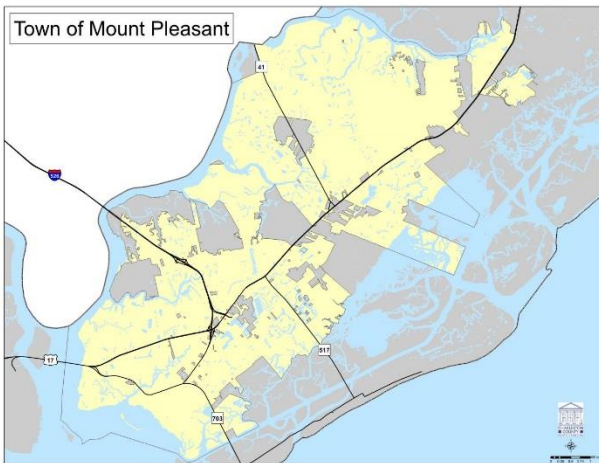
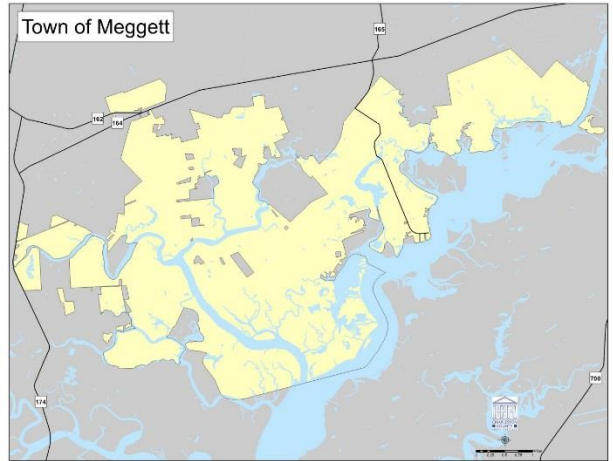
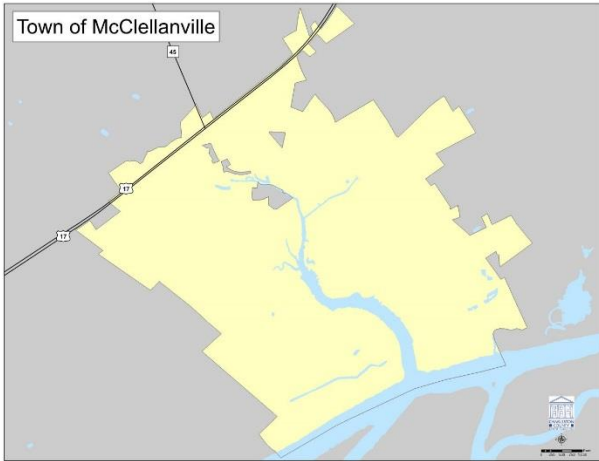


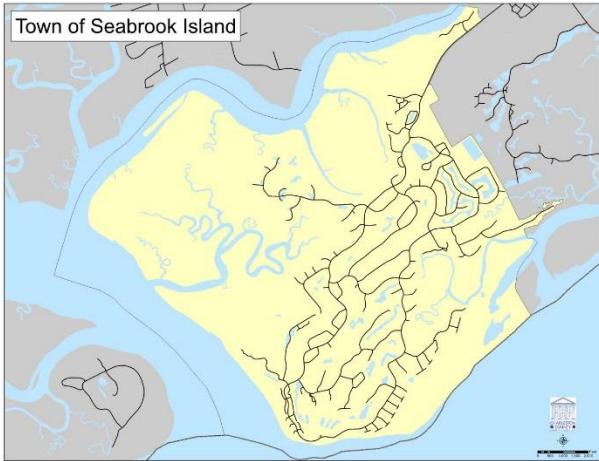


Each jurisdiction is detailed below:



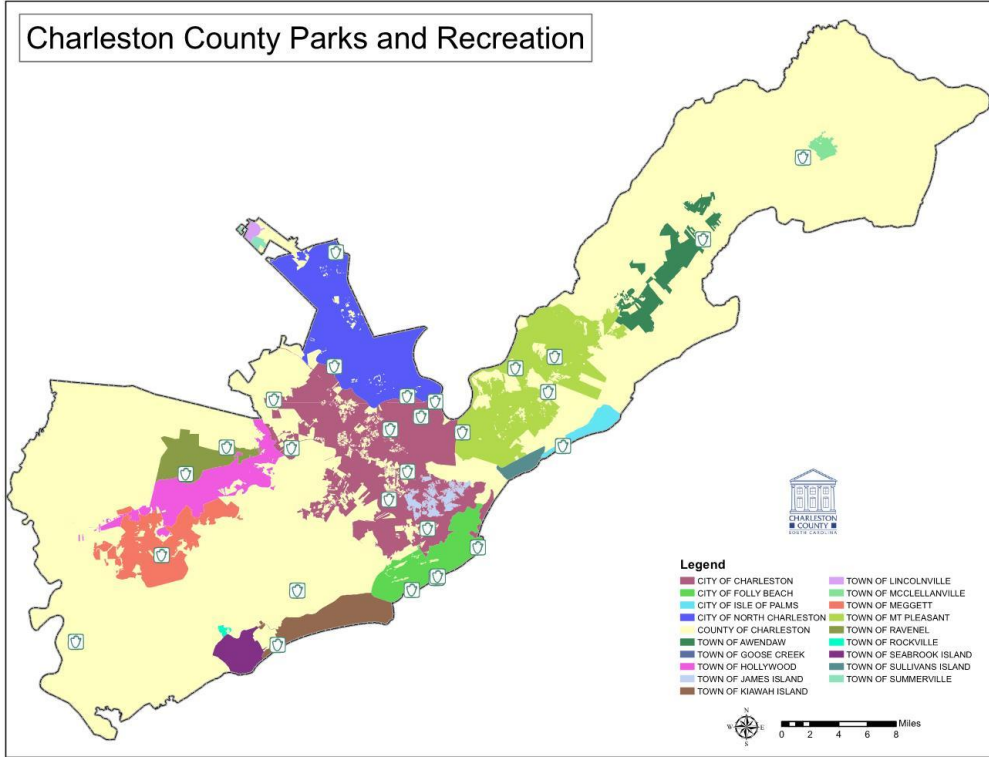




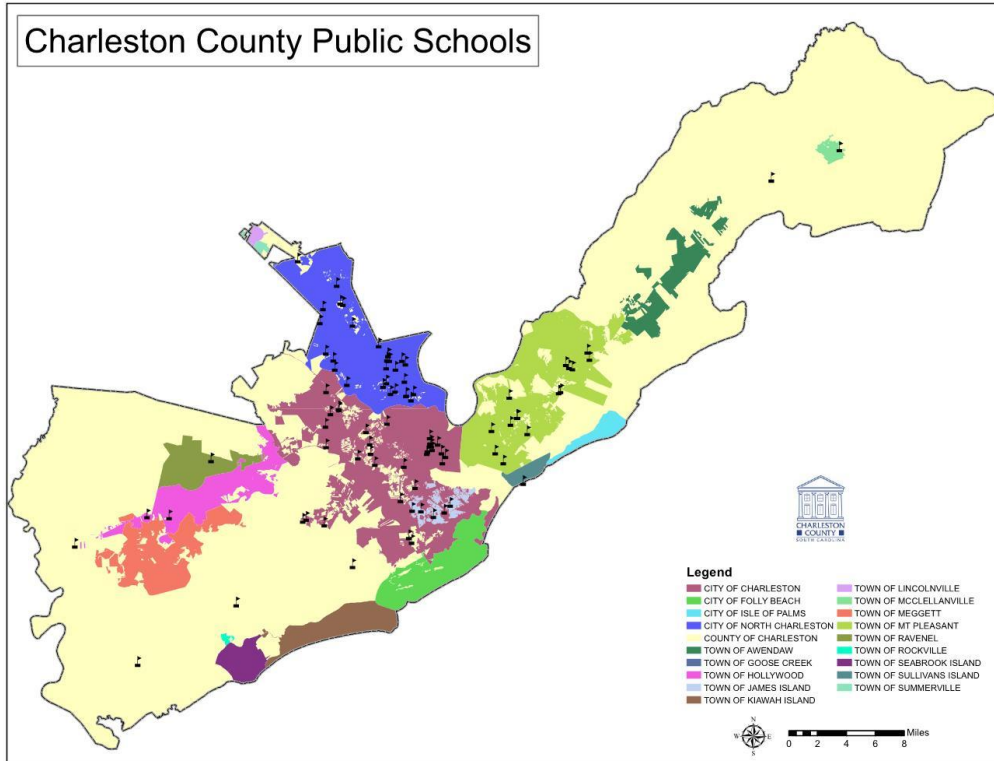


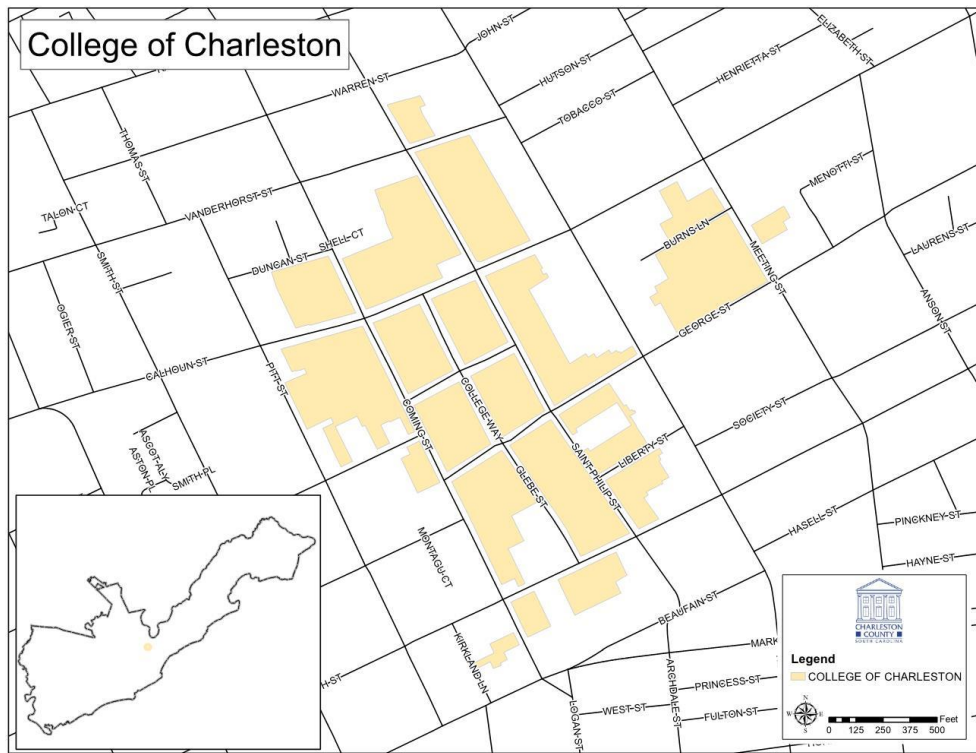
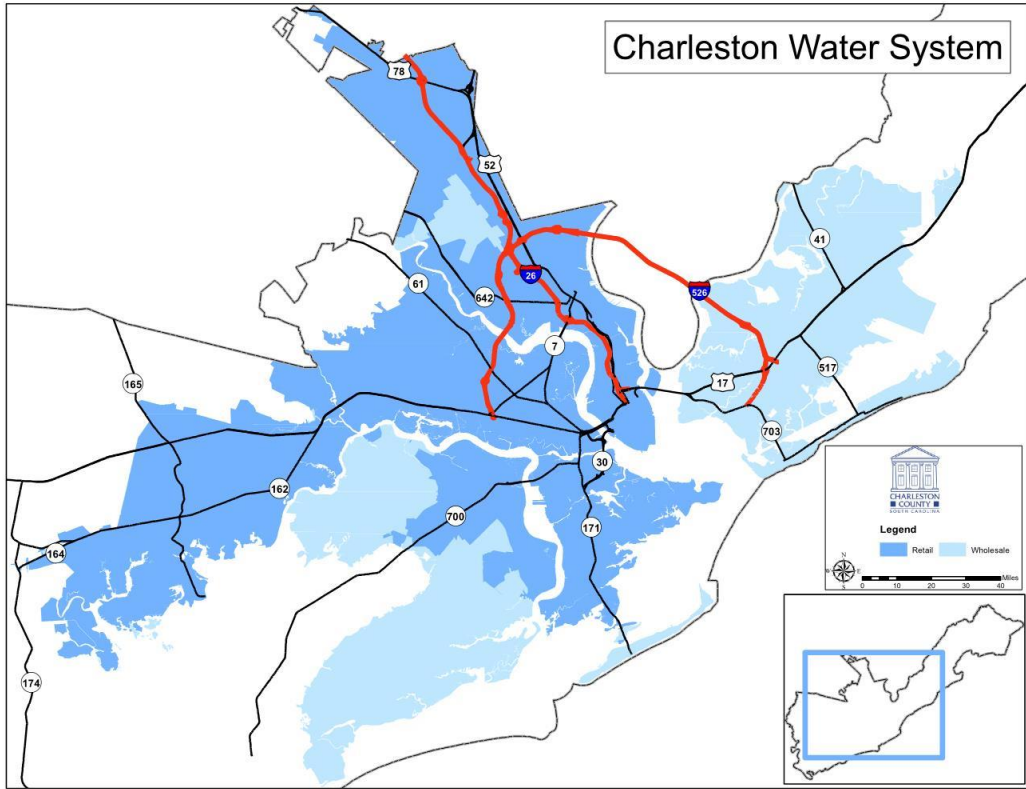
Non-jurisdictional Plan participants:

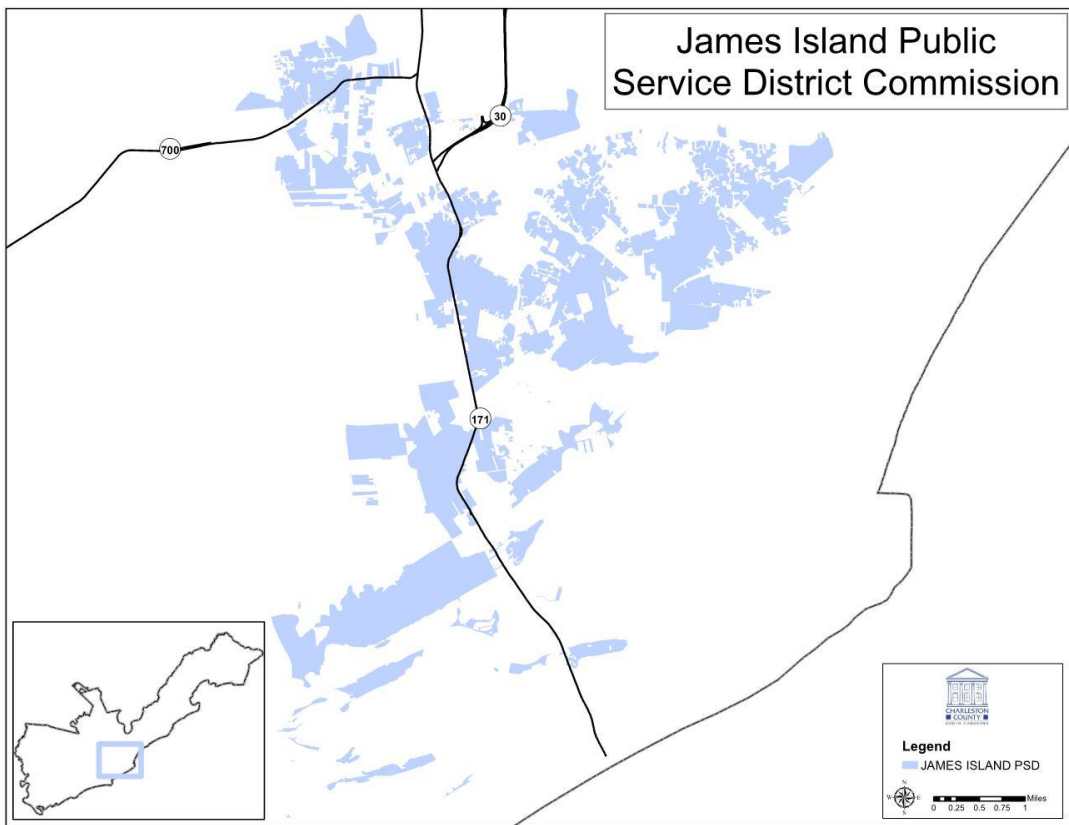
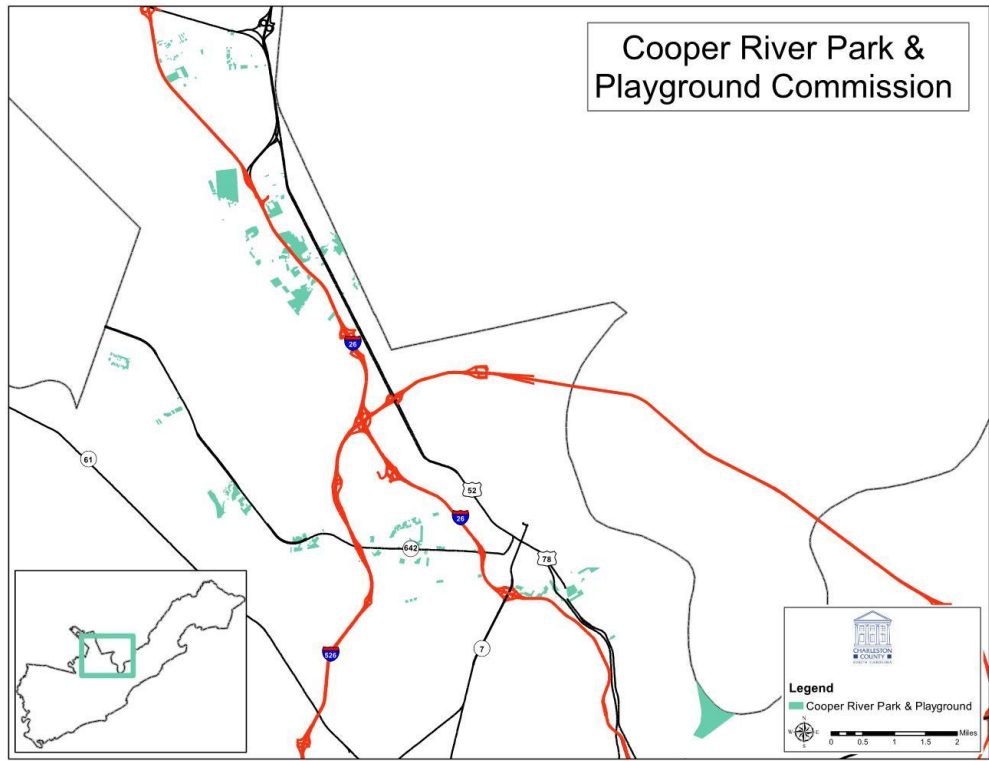
Charleston County Parks and Recreation

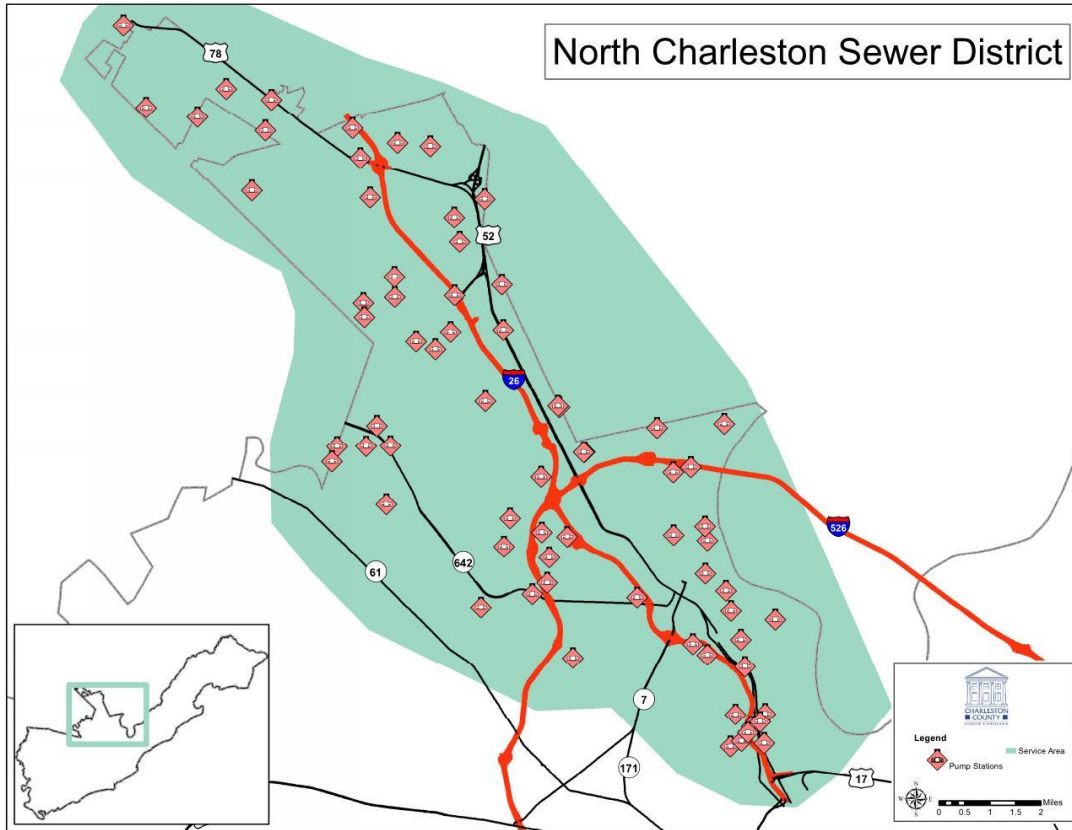
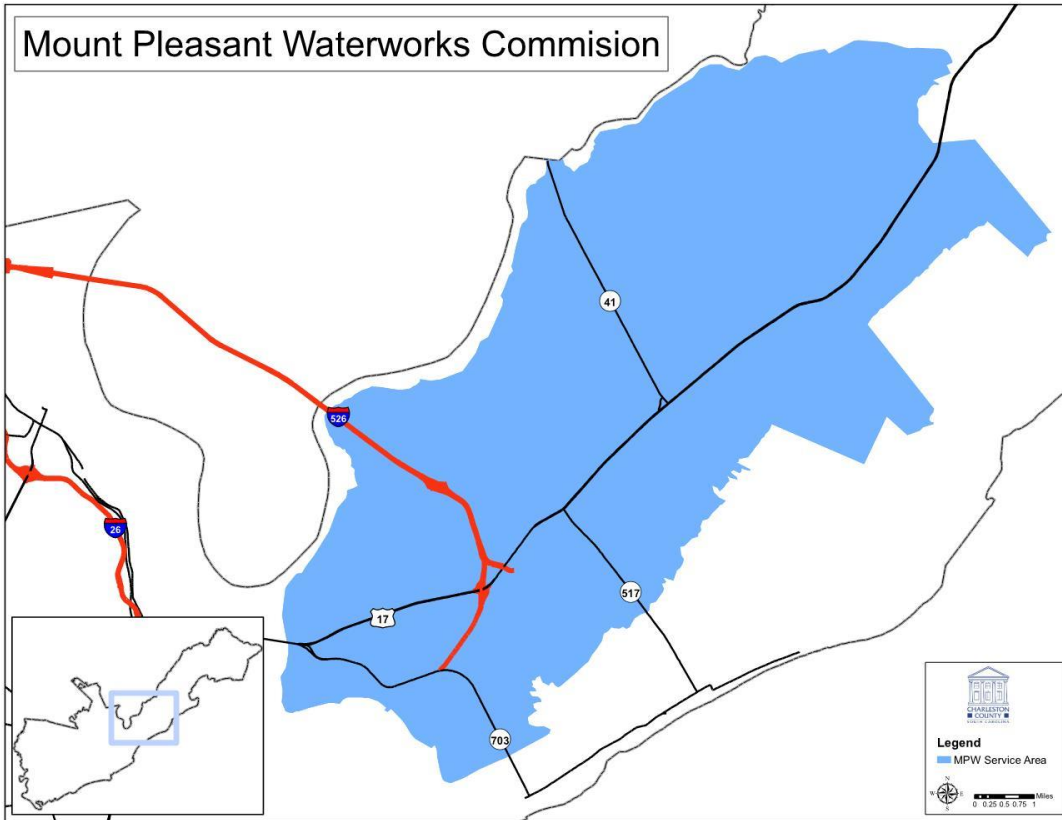


Charleston County Public Schools

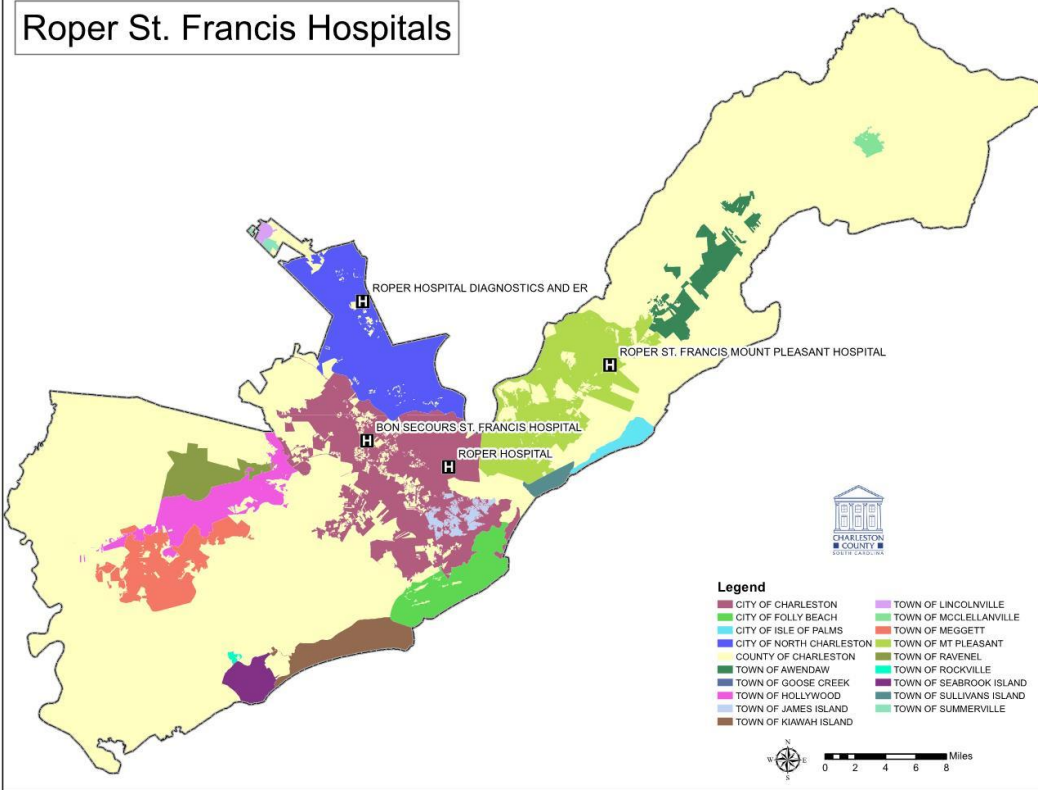




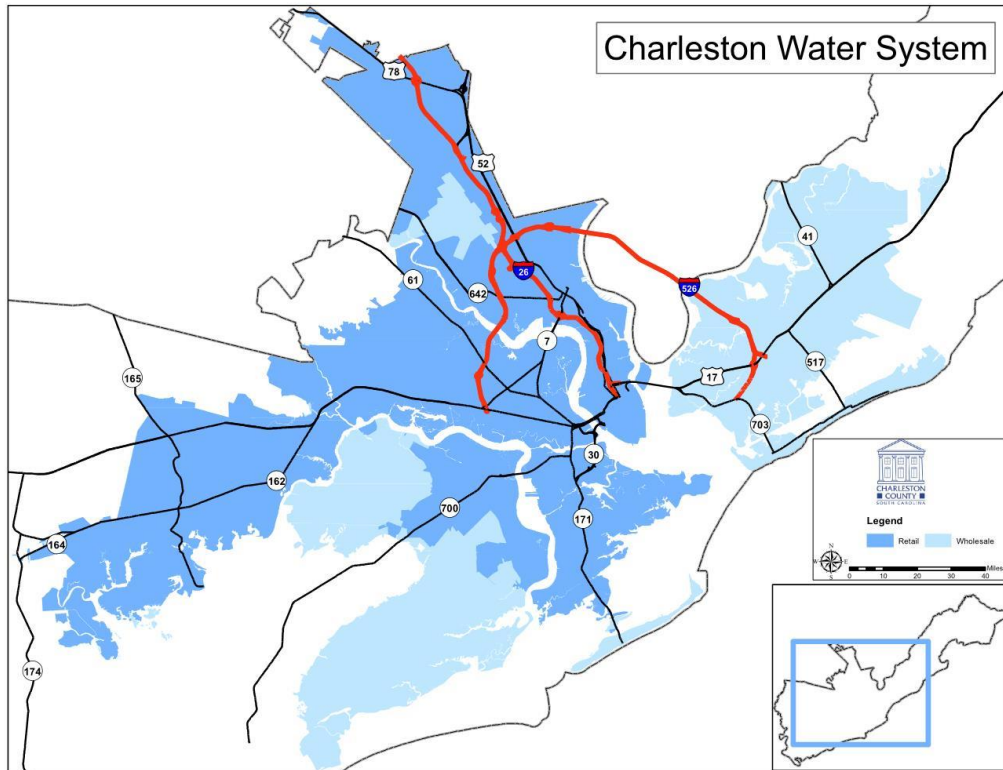


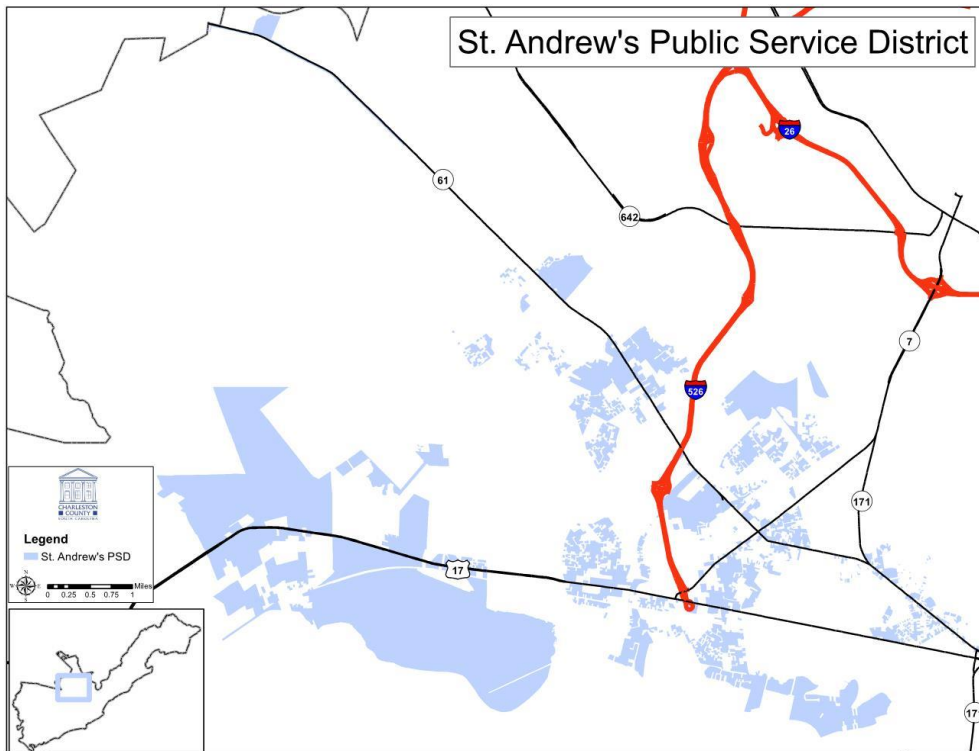
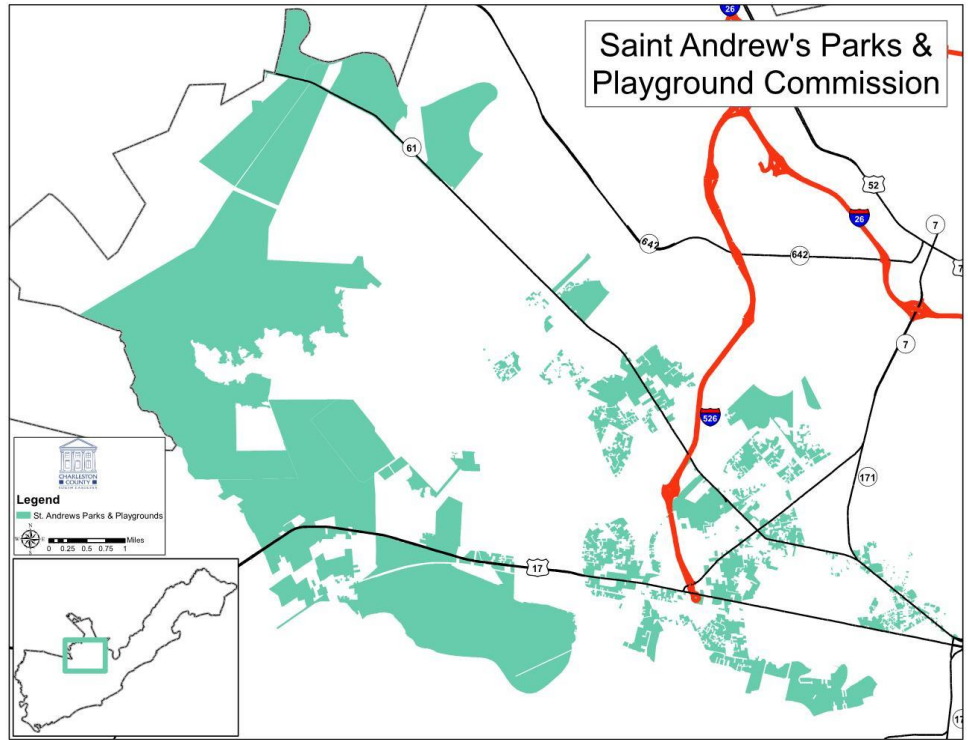


Roper St. Francis Hospitals



Charleston Water System





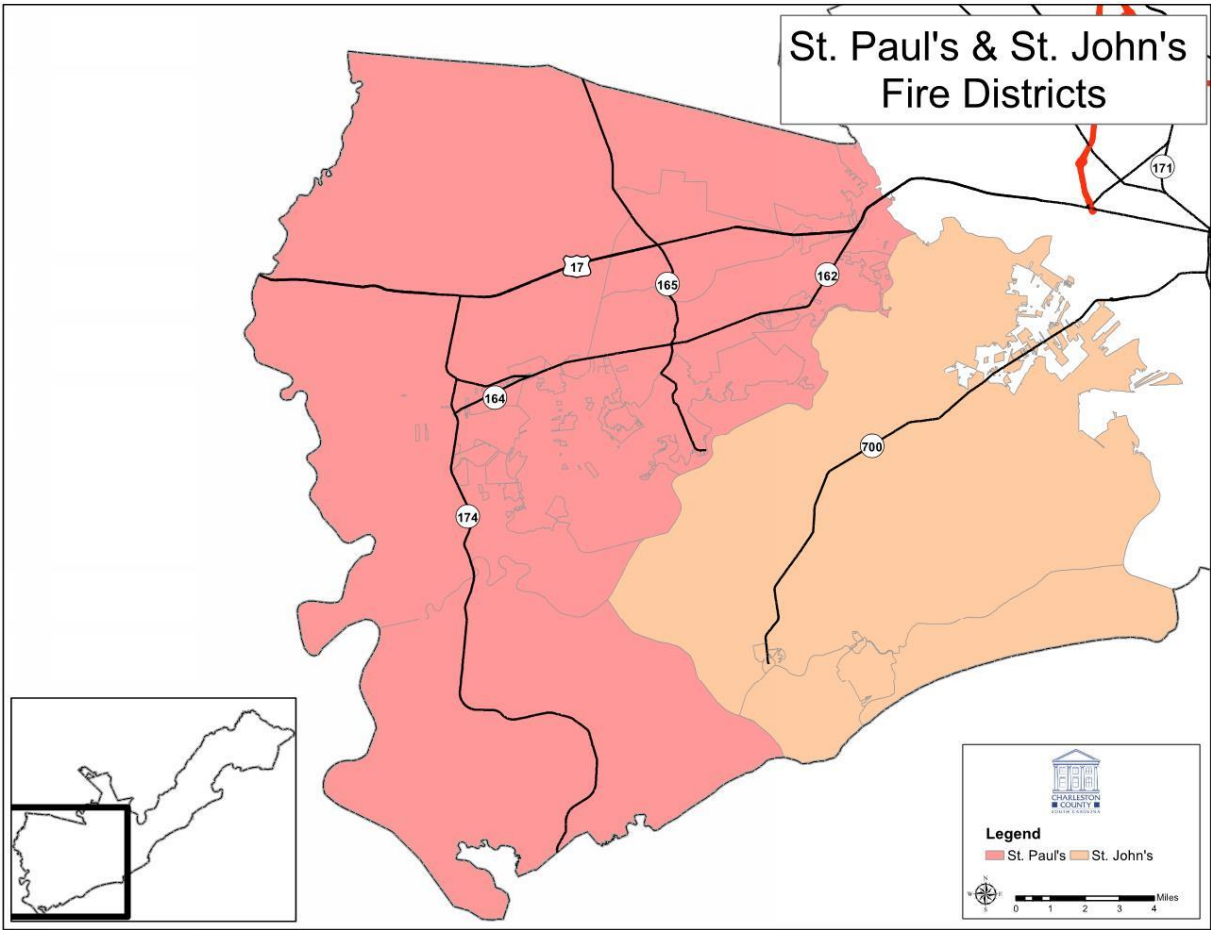


Figure 1.7 - Jurisdiction Demographics

Jurisdiction	Population	Area	Proximity to Water
Unincorporated Charleston County	undefined	700.7 mi ²	Throughout entire County
Town of Awendaw	1,424	9.7 mi ²	Coastal - Atlantic Ocean
Town of Hollywood	5,180	24.5 mi ²	Wadmalaw & Stono Rivers
Town of James Island	12,068	42.1 mi ²	Coastal, Wappoo Creek, James Island River, Schooner Creek
Town of Lincolnville	2,451	1.19 mi ²	Inland
Town of McClellanville	542	2.4 mi ²	Coastal - Atlantic Ocean
Town of Meggett	1,293	18.4 mi ²	Wadmalaw & Toogoodoo Rivers
Town of Ravenel	2,674	12.6 mi ²	Wallace Creek
Town of Rockville	138	.51 mi ²	Coastal
Town of Seabrook Island	1,855	7.0 mi ²	Coastal - Atlantic Ocean
City of Charleston	136,208	127.5 mi ²	Coastal, Ashley River, Cooper River, Stono River, Wando River
City of Folly Beach	2,641	18.9 mi ²	Coastal - Atlantic Ocean
City of Isle of Palms	4,340	5.4 mi ²	Coastal - Atlantic Ocean
City of North Charleston	113,237	76.6 mi ²	Ashley & Cooper Rivers
Town of Kiawah Island	1,762	13.4 mi ²	Coastal, Kiawah River
Town of Mt. Pleasant	89,338	52.6 mi ²	Coastal, Wando River
Town of Sullivan's Island	1,921	3.4 mi ²	Coastal - Atlantic Ocean

**DETAIL MATRIX
Services Provided by Unincorporated Charleston County to Municipalities**

	Average	City of Charleston	Folly Beach	Hollywood	Isle of Palms	James Island	Kawah Island	Litchfield	McClanville**	Myrtle	Mount Pleasant	North Charleston	Ravenel	Rockville	Seacroft Island	Sullivan's Island
Building Services																
Flood Plain Management	✎								✎							
Permit Issuance	✎								✎							
Plan Review	✎								✎							
Inspection Services	✎								✎							
Code Enforcement	✎								✎							
Contractor Licensing	✎								✎							
Community Rating Service Program	✎								✎							
Insurance Service Office Program	✎								✎							
Hazard Mitigation Plan Administration	✎								✎							
Project Impact	✎								✎							
Damage Assessment	✎								✎							
Damage Assessment Assistance As Requested	✎								✎							
Technical Assistance As Requested	✎								✎							

*Lincolntonville is not a participating community in the NFIP. All other jurisdictions participate.

1.3 – Goals

The Section 2 *Goals* of the *Charleston Regional Hazard Mitigation Plan* compliment the goals of the Charleston County area Project Impact initiative. In general, these goals are intended to minimize future losses of life and property associated with hazard events facing the Charleston Region. Since this plan is a regional plan intended for adoption by the local government entities, the *Charleston Regional Hazard Mitigation & Public Information Plan Committee* provided flexibility within this plan to enable local government and entities with specific goals to include those in this section as they deemed appropriate.

1.4 – The Planning Process

The *Charleston Regional Hazard Mitigation Plan* is unique in the fact the Plan is updated annually and is a joint effort of all local governmental jurisdictions. This allows a continual planning process to keep the *Plan* current and the history more dynamic.

Initially, the planning process utilized a questionnaire regarding hazard mitigation (assessment and emergency preparedness), project prioritization, and resiliency (coordinated with Resilient America) via online through Google Forms and email as well as through meetings with professional organizations to solicit input regarding the content of the *Plan*. Public meetings were also conducted in multiple areas in the Region to obtain additional input from citizens and create public awareness of the *Charleston Regional Hazard Mitigation Plan*. These efforts were repeated in the years 2004, 2008, and 2012, as well as 2017 to maintain an updated profile. The results of the latest questionnaire are included in this *Plan*.

The *Plan* has been drafted in such a manner that the local government entities within Charleston County are able to prepare an action plan for their respective entities and adopt this *Plan* for their use within their government entity. This cooperative approach enables the Region to have a more standardized way of addressing hazards, which face the entire County and avoids duplication of effort that would occur if all of the government entities individually undertook this type of planning initiative.

As a strengthening of this cooperation among the communities, a *Program for Public Information (PPI)* was established for the 2013 *Plan* as part of the Region's ongoing efforts to better inform its citizenry on proper preparedness and mitigation measures to be undertaken to make the Region more resilient to those natural hazards that pose the greatest threat of loss and damage. The *Program for Public Information (PPI)* was renamed the *Public Information Plan (PIP)*. The Public Information Plan is now a document that is both a part of the *Charleston Regional Hazard Mitigation Plan*, but can also serve as a stand-alone document. This allows the *Hazard Mitigation and Public Information Plan Committee* to enhance upon existing projects and add new projects as it sees fit annually. The Committee's project recommendations are an essential component of the planning process by integrating new ideas and projects that will ultimately fulfill the *Public Information Plan's* goal of educating the public.

1.5 – Hazard Identification and Risk Assessment

A *Hazard Identification and Risk Assessment Report* is a systematic way to identify and analyze hazards to determine their scope, impact, and the vulnerability of the built environment to such events. Through the yearly *Charleston Regional Hazard Mitigation Plan*, such a systematic process and assessment has already been put into place for the area. To avoid duplication, a separate hazard identification and risk assessment document is not included due to the fact each component is already addressed throughout this plan.

Each aspect of a typical report is discussed in the *Charleston Regional Hazard Mitigation Plan*, including identification of hazards and resource requirements, profiles of previous hazardous events, vulnerability assessments, estimates of potential losses by a variety of simulations, local outreach and education programs, emergency operations procedures, inventories, plans, and shortfalls.

In addition, due to the fact the *Charleston Regional Hazard Mitigation Plan* encompasses a regional perspective rather than a single municipality or organization, the effect is a more complete and coordinated plan to improve the safety of citizens against potential natural and manmade hazards. The *Charleston Regional Hazard Mitigation & Public Information Plan Committee* works with each government or adopting entity, and together this collaborative regional plan for hazard mitigation can also serve as a *Hazard Identification and Risk Assessment Report*. A resource for flood maps by jurisdiction is FEMA's Risk Map Service, which can be accessed at msc.fema.gov. As of February 2019, the adopted FIRM for Charleston County has a map effective date of November 17, 2004. Charleston County has maps in the revision/appeal process and are expected to be adopted mid-late 2019.

1.6 – Hazard Assessment

The *Charleston Regional Hazard Mitigation Plan* is based upon the results of the questionnaires and the comments received through both committee and public meetings. Section 4 *Hazard Assessment* of the *Plan* includes a ranking of the types of hazards facing the Charleston Region, with hurricanes being the most serious threat, followed by flooding, tornadoes, wildfires, hazardous materials, earthquakes and sea level rise. Additional hazards for which the possibility of occurrence is much more remote or non-existent, such as dam failures and tsunamis are now discussed in the *Plan* to meet the *Disaster Mitigation Act of 2000* requirements. The hazard description section of the *Plan* provides a brief description of the nature of each identified hazard within the Charleston Region. The discussion section of the *Plan* provides a more detailed description of the history of hazard event incidents in the Charleston Region. The Charleston Region has had numerous, mostly localized, hazard events and a few large-scale hazard events (e.g. Hurricane Hugo in 1989, the earthquake of 1886, Hurricane Matthew in 2016) throughout our history.

1.7 – Problem Assessment

The *Charleston Regional Hazard Mitigation Plan* also addresses the vulnerability of the Region to each of the major types of hazards facing the Region in Section 5 *Problem Assessment*. Each of the major hazard types are discussed in terms of:

- Types of buildings that are most vulnerable to particular hazards
- Estimation of the total number of buildings vulnerable to flood/hurricane damage
 - 80,390 buildings in the Region are vulnerable to such damage based on their location in *Special Flood Hazard Area*
 - 36,465 buildings of the total number listed above are also vulnerable due to their date of construction
- Estimated potential building/property losses due to earthquakes and tornadoes
- The types of hazards that pose a threat and in what manner
- known flood damages
- past flood impacts
- Emergency Warning Needs
- Critical Facilities

- Natural and Beneficial Functions of floodplains
- Development and Population Trends
- Economic Impact of hazard events

The overall determination from this section is that the Charleston Region is potentially vulnerable to loss as a result of a hazard event to a relatively high degree, particularly considering the increasing number of residents not necessarily familiar with the types of hazards facing the Region and how best to prepare and protect themselves from these hazards. Since tourism plays such a predominant role in the local economy and is often negatively affected by large-scale hazard events with national media coverage, the potential economic losses associated with a hazard event are potentially high.

1.8 – Review of Possible Activities

Section 6 *Possible Activities* of the *Charleston Regional Hazard Mitigation Plan* provides prioritization factors to be utilized in selecting projects to be performed, as well as a description of the ongoing activities currently being performed within the Region. This section also lists other suggested activities that possibly could be performed to enhance hazard mitigation efforts within the Charleston Region. This section discusses: Preventive Activities (e.g. primarily regulatory activities designed to provide improved resistance of development to hazard events); Property Protection Activities (e.g. activities designed to improve the ability of the citizens or the existing building stock/infrastructure to withstand hazard events); Natural and Beneficial Functions of Floodplains/Resource Preservation Activities (e.g. activities geared towards the preservation of the natural and historic resources of the Region); Emergency Services (e.g. activities geared towards hazard event warning and government response); Structural Projects (e.g. activities which are infrastructure improvements designed to enhance the hazard resistance of the Region); and Public Information Activities (e.g. activities geared towards educating the citizens of the Region regarding hazard preparation and response). The overall view provided within this section is that the Region is already doing many activities for the enhancement of our hazard mitigation; however, there are also additional activities which may be done to further prepare our residents for the hazard events to which the Region is vulnerable. The Public Information Activities portion of this section has been reduced as this information has been moved to its own plan, the *Public Information Plan* in Appendix A.1. This section has been utilized by the respective government entities to draft their individual action plans regarding which types of activities they intend to pursue in the future to reduce their hazard vulnerability. The prioritization factors within these sections also play a major role in additional project determination under Project Impact as new possible activities are considered.

1.9 – Adopting Resolution

This plan is intended to be a working document which may be subject to revision as the Community Rating System schedule changes or as Project Impact decision making committees request revisions that would enhance their ability to perform their functions. The adopting resolutions for the government entities therefore generally include a section recognizing the *Charleston Regional Hazard Mitigation & Public Information Plan Committee* as a continuing entity to be charged with maintaining and making annual revisions to this plan as needed, and making periodic reports regarding this plan to the respective governing councils or commissions for the adopting entities. The Plan now includes the *Public Information Plan* as Appendix A.1. This Plan is also intended to be a working document to be reevaluated and updated annually. The Committee is charged with maintain that the *Public Information Plan* continues to meet the requirements set forth for Community Rating System credit.

1.10 – Action Plan

Each government or other adopting entity has included within the Plan for their entity a specific action plan, regarding activities that they propose be undertaken or continued during each year. This action plan includes several projects reflecting all of the activities discussed within the Plan. While it is the intention of the entities to undertake the activities included within the action plan, it is also recognized that circumstances may change and the activities listed may not be able to be accomplished within the time frame indicated, depending upon the circumstances encountered. The action plan for each entity is periodically updated to reflect changes and to indicate activities for the time period for each year. Each entity that adopted the Plan has completed a status report on the action plan annually through 2017, indicating the progress towards the activities listed within the Plan. Status reports included in this update of the Plan report on the collective activity of the 4 years prior, and specific activity for the last year.

1.11 – Implementation Plan

The plan is intended to serve as the guiding document for prioritization of hazard mitigation projects undertaken within the Charleston Region. Actual project selection for any projects undertaken as Project Impact initiatives are carried out in accordance with this plan. As the Plan is utilized in this capacity, suggested revisions are considered and incorporated where appropriate into the Plan on an as needed basis. The *Charleston Regional Hazard Mitigation & Public Information Plan Committee* maintains the Plan and makes any necessary revisions as may be required to continue receiving Community Rating System credit for the Plan. A review of the Plan occurs at least annually. A progress report on the Plan is submitted to the governing councils of the adopting jurisdictions and the local media are notified of the availability of the latest edition of the Plan and progress reports on an annual basis.

Every five years, public hearings on the Plan, including its amendments, are conducted, and the local governing councils and commissions are asked to re-adopt the Plan as revised. The plan is also provided to applicable planning entities for potential use in updates to other applicable plans. Similarly, applicable updates to other plans are considered for inclusion in the *Charleston Regional Hazard Mitigation Plan*, as appropriate. Section 3 *Planning Process* Table 3-1 provides a list of other specific plans in use by the jurisdictions within Charleston County that are considered for updates to the *Charleston Regional Hazard Mitigation Plan*, and which include applicable provisions of the *Charleston Regional Hazard Mitigation Plan* by reference or through excerpts [this table indicates whether and how information from the indicated plan is included in the *Charleston Regional Hazard Mitigation Plan* and whether and how information from the *Charleston Regional Hazard Mitigation Plan* is included in the indicated plan, when appropriate].

1.12 – Conclusion

The *Charleston Regional Hazard Mitigation Plan* is the result of a cooperative effort of the public and private sectors and intended to enhance the ability of all of the local jurisdictions within the Charleston Region to prepare for and respond to hazard events. The plan is comprehensive and compliments other initiatives to help make the Region more resistant to disasters. Additional information regarding this plan is available through the local jurisdictions or Charleston County Building Inspection Services.

Attachment 1-A: Project Impact Organization Chart

Project Impact



Section 2 Goals

The *Charleston Regional Hazard Mitigation Plan* is intended to serve as a guiding document for project selection under Project Impact and *Public Information Plan (PIP)* initiatives. Charleston County's Project Impact initiative, which began in 1998, is a community-based partnership of all local governments in Charleston County, SC and multiple other partners from the private, public (Federal, State, Regional government entities) and non-profit sectors. There are 177 partners in Project Impact. As a guiding document, goals and hazard mitigation actions of individual jurisdictions will use the results of the hazard assessments, problem assessments and proposed activities to advise in the planning and implementation of their own action plans.

The mission of Charleston County's Project Impact initiative is to create a more disaster resistant community through cooperative efforts of the private, public and non-profit sectors.

Based upon the responses to the latest survey questionnaire, the following are the goals for this plan (listed in the order of importance):

1. Reduce potential flood damage
2. Improve storm drainage
3. Minimize future flood occurrence
4. Minimize future hurricane damage
5. Improve resistance of infrastructure to all hazards
6. Minimize future earthquake damage
7. Protect environmental resources/preserve open and green space
8. Minimize future terrorist incidents
9. Improve water quality
10. Preserve historic building inventory
11. Higher regulatory standard
12. Minimize future hazardous material incidents

In addition to the goals as ranked by the questionnaires, the *Hazard Mitigation & Public Information Plan Committee* determined that the following additional goals should be added to this plan (please note that no specific ranking for these goals was indicated):

1. To enhance the provision of emergency shelters for those areas in the Region that do not currently have an emergency shelter in close proximity.
2. To recognize that shelters in certain areas should not be provided, due to a lack of safe locations for such facilities.
3. Shelters that are not currently sanctioned by the American Red Cross are to be classified as "shelters of last resort".
4. Since these goals are tied into the Countywide Public Information Plan, it is the Committee's recommendation for an additional goal to be added to strive for at least 3 outreach projects per jurisdiction to communicate these messages to citizens so all are contributing to the furthering of these messages.

5. The Committee also determined that jurisdictions may have additional goals that they would like to pursue through this plan, and that these additional goals should be included in those jurisdictions action plans, as deemed appropriate.

The average ranking of these goals demonstrated the importance of all of them as it relates to this plan, since they all were rated between moderately important to very important, based on the average raw score, and all of the goals are within a maximum of (1) point of each other. Given this relative importance assigned by the survey respondents to these goals, these goals accurately reflect the overall vision for the hazard mitigation activities to be performed in the Region.

The goals for this plan are also consistent with the hazard vulnerabilities, as determined through the *State of South Carolina Hazards Assessment* and the frequency/severity of hazard events risk assessment methodologies for those hazards considered most likely to damage buildings and/or cause loss of life (e.g. hurricanes, floods, wildfires and earthquakes). Working towards achieving all of these goals is expected to minimize hazard-related losses associated with any of the hazards within the Charleston Region.

Section 3 Planning Process

3.1 – Pre Planning Request for Input

The sample questionnaires, included as Attachment 3-A1 and 3-A2 to this section, are distributed to jurisdictions or citizens, requesting their input at the beginning of the planning and update process. The recipients of the questionnaire were considered to be knowledgeable regarding hazards experienced in the Charleston Region and the potential vulnerabilities of the Region to these hazards.

Completing a questionnaire is considered to be one form of participation in the planning process. Alternate means of participation in the planning process include, but are not limited to, attendance at committee meetings, or having one or more representatives on a committee that develops or provides input into the Plan or the Plan website. The questionnaire asked the respondents to assess the hazards indigenous to the Charleston Region, the nature of the problem these hazards create, and to rate/provide potential goals for the Plan, possible activities for the Plan to address, and criteria for prioritizing projects under the Plan. The questionnaire also asked the respondents to provide copies of existing hazard-related mitigation plans, if available.

In addition to those questionnaires sent to prospective respondents, questionnaires were discussed at Project Impact presentations to community professional organizations/advisory groups (e.g. Contractor's Associations, Construction Specifications Institute, Charleston Chapter of the American Institute of Architects, etc.), and those interested in completing questionnaires were asked to do so. Questionnaires were also distributed to individuals who requested to provide their input.

The latest questionnaire was distributed in the summer of 2019. In an effort to reduce cost and increase response, the survey was digitized and responses were recorded in a Google poll.

A simplified version of the survey was also produced for the general public to increase the response rate. A link for this simplified public survey was placed on the Charleston County Building Inspection Services' webpage and sent to several citizens that had previously requested to be involved in mitigation planning. In addition, survey information was also made available at several public meetings, expos and hearings. The public survey asked participants to simply describe the area within the County that they lived, rank the natural and man-made hazards previously identified in order of severity and preparedness, and provided the participants an opportunity to leave an email address if they were interested in receiving additional communication regarding the Plan.

Responses received were consistent with previous surveys confirming the fact that the priorities previously established for outreach and mitigation are still appropriate. Hurricanes were perceived as the biggest threat to the Lowcountry, with flooding, earthquakes, and tornadoes earning very high marks as well. Sea level rise was a new addition this year ranking in the top spots in both the public and the jurisdiction/government surveys.

3.2 – Planning Committee

Based upon input received from the questionnaires, the *Hazard Mitigation & Public Information Plan Committee* established a draft for the Plan update. The local Community Rating System Jurisdiction members of this Committee are listed in Attachment 3-B to this section. If a member of the Committee was unable to attend a meeting, applicable drafts and/or information that were distributed and/or discussed at the planning committee meeting was mailed or hand delivered to the member to obtain any comments from the Committee member as an alternative form of participation in the planning process. Members and general public could also participate by telephone. Minutes and/or meeting notes, copies of meeting handouts, and attendance rosters for Committee meetings are maintained in the Charleston County Building Inspection Services Department. Attachment 3-C to this section lists the stakeholder members of the *Hazard Mitigation & Public Information Plan Committee* and Attachment 3-D to this section lists the Other Participating Partners. Because this is a joint committee serving to make recommendations on the *Charleston Regional Hazard Mitigation Plan* and the *Public Information Plan*, the makeup of the Committee meets the standards set for both functions.

The governing bodies of the local jurisdictions represented on the planning committee were provided with a list of the members of the Committee and a Project Impact organizational chart, in order for these governing bodies to recognize the Committee and approve the proposed organization for Project Impact. The Project Impact committees also routinely provide input into the Plan, as they discuss projects they recommend performing to make the community more resistant to disasters. A list of the governing bodies that have officially recognized the *Hazard Mitigation & Public Information Plan Committee* is included in Attachment 3-F of this section. Copies of the governing body actions are available at the local jurisdiction offices and the Charleston County Building Inspection Services office.

The *Hazard Mitigation & Public Information Plan Committee* meets to discuss the hazard assessment, problem assessment, goals, and possible activities addressed within this plan update. The Committee meets annually (typically at least two times per year), to update the Plan. Project Impact subcommittees meet quarterly. The annual update process includes County staff making routine updates that include, but are not limited to: changes to Committee membership to reflect personnel changes; additional hazard events that have occurred during the year; changes to building vulnerability based on revised building counts or valuations; and government entities providing updates to applicable sections of the Plan (drainage projects status, repetitive flood loss properties, changes to critical facilities, and so forth).

Project Impact Committee members also provide input throughout the year including activities to include on the action plans for the coming year, as they discuss projects they would recommend for hazard mitigation during their routine meetings throughout the year. Each signatory to the Plan develops an action plan for each year and provides a status report on the proposed activities in the previous year's action plan on an annual basis, and also provides their recommended revisions to any sections of the Plan, as applicable.

Changes are made to the *Goals* Section of the Plan on an as-needed basis, as determined by the multiple committees involved in the Plan update process. The *Summary of Changes* is an update of changes based on the revisions made to the Plan each year, as applicable. The criteria used for this update/evaluation is threefold: whether all hazards have been included, whether the Plan meets the needs of the signatory governments, and whether the updates are in accordance with FEMA planning guidelines. The *Hazard Mitigation & Public Information Plan Committee* meets as a group at least once a year to review the updates made to the Plan, to suggest any further updates and to approve the updates made to the Plan for that year. Details as to the changes made to the

Plan are provided to the Committee members in advance of the Committee meeting. The Committee also approves an annual report of plan changes for the governing councils/commissions during this meeting.

3.3 – Public Input

Public input into the Plan is obtained on a routine basis through the Project Impact committees as they determine projects to recommend. All meetings are open to the public and advertised through the local media. The notices for the public meetings exceed *Freedom of Information Act* requirements, since they are sent to six local newspapers, including the *Post and Courier*, which is the newspaper with the largest general circulation in the Region. These notices are also sent to four local television stations and to three radio station groups, which include most of the local radio stations. Notice is also included on the information board found in the lobby of the Public Services Building which advertises public meeting information. Additional opportunities for public input is available since most local governmental entities in Charleston County with websites are linked to Charleston County’s website, where the Plan is easily accessible to their residents and they have the ability to provide comments or suggested revisions to the Plan. Additional public hearings on the Plan are also conducted on a five-year cycle to obtain further public comments on the Plan, including any revisions that have been made or are proposed for the Plan. For 2019, there were three public meetings held for public and jurisdictional input, revisions and suggestions, and approval of the Plan.

Yearly update meetings, which when combined represent the foundation for the 5-year formal plan, are publicized and the public is invited. Furthermore, the *Hazard Mitigation & Public Information Plan Committee* is comprised of both local governments and non-governmental groups, ensuring that representation from all areas and aspects of the County are present.

Public input into the Plan continues as the *Project Impact Committee* and *Hazard Mitigation & Public Information Plan Committee* meetings are public meetings, advertised as indicated above through the local media outlets. The version of the Plan posted on the Charleston County’s website is also updated as revisions to the Plan are done annually, so that those who do not attend Committee meetings or public hearings have an opportunity to comment on the latest edition of the Plan. (An e-mail address for comments is provided on the website.)

In 2014, a separate and simplified version of the hazard assessment survey was created to be distributed publically. This new survey was established online and utilized Google polling. A link to the survey was forwarded to all partners who were participants in the Plan so that they could share it with active citizens or anyone else they wished to distribute it to. A printed version of the same survey was made available in the Charleston County Building Inspection Services Department, in the hopes of capturing contractors, builders, and citizens as they waited on permits or other building related issues. In 2017, this survey was redistributed in the same manner with the addition of questions on emergency preparedness for hazards and resiliency of communities in the area. Any additional feedback recorded will be included in future meetings and editions of this plan. This updated survey was re-issued in 2019 for the Plan’s annual update with additional questions asking citizens to provide verbal narratives of the region’s hazard history.

3.4 – Local Jurisdiction Adoption

The plan was adopted by the local government entities listed in Attachment 3-F by the respective governing councils or commissions for these entities. The local government entities were able to

modify the Plan to fit their individual needs if desired. The plan was also re-adopted by the participating local governments in the Charleston Region in 2004, as a part of the five-year cycle process and again in 2008. The five-year plan for 2012-2013 submitted in 2012 was approved by FEMA on September 10, 2013. The most recent formal five-year *Charleston Regional Hazard Mitigation Plan* approval was given by FEMA on March 28, 2019 (See Attachment 3-F).

3.5 – Implementation Plan

The plan is intended to serve as the guiding document for prioritization of hazard mitigation projects undertaken within the Charleston Region. Actual project selection for any projects undertaken as Project Impact initiatives are carried out in accordance with this plan by the Committees that correspond to the activity classifications of this plan (e.g. preventive activities, property protection activities, natural and beneficial function-related activities, emergency service-related activities, structural projects, and public information activities). As the Plan is utilized in this capacity, suggested revisions are considered and incorporated where appropriate into the Plan on an as needed basis. The *Hazard Mitigation & Public Information Plan Committee* maintains the Plan and makes any necessary revisions as may be required to continue receiving Community Rating System credit. A review of the Plan occurs at least annually. A progress report on the Plan is submitted to the governing councils of the adopting jurisdictions at least annually. The local media are notified of the availability of the latest edition of the Plan and progress reports.

Every five years, public hearings on the Plan, including its amendments, are conducted, and the local governing councils and commissions are asked to re-adopt the Plan as revised. The plan is also provided to applicable planning entities for potential use in updates to other plans, including but not limited to the *Charleston County Comprehensive Plan*, *Emergency Operations Plan*, or other applicable plans. Similarly, applicable updates to other plans are considered for inclusion in the *Charleston Regional Hazard Mitigation Plan*, as appropriate. Table 3-1 attached provides a list of other specific plans in use by the jurisdictions within Charleston County that are considered for updates to the *Charleston Regional Hazard Mitigation Plan*, and which include applicable provisions of the *Charleston Regional Hazard Mitigation Plan* by reference or through excerpts. This table indicates whether and how information from the indicated plan is included in the *Charleston Regional Hazard Mitigation Plan*, and whether and how information from the *Charleston Regional Hazard Mitigation Plan* is included in the respective indicated plans, when appropriate. Other resources used or referenced to update the plan includes but not limited to Census data, SC DNR, SC DHEC, NOAA, SC Forestry commission, Us Drought Monitor, Charleston County Consolidated 911, Repetitive loss reports, various FEMA publications, and National Weather service data.

Table 3-1: Hazard-Related, Land Use and/or Development Plans in the Charleston Region

Hazard-Related, Land Use and/or Development Plans in the Charleston Region			
Jurisdiction	Name of Plan(s)	Information from this plan in the Charleston Regional Hazard Mitigation Plan (CRHMP)	Charleston Regional Hazard Mitigation Plan (CRHMP) included in this plan
Town of Awendaw	Town of Awendaw Comprehensive Plan	Not applicable	Applicable excerpts from CRHMP included in this plan.
City of Charleston	Charleston Century V City Plan	Not applicable	Preservation of open space is a mutual goal of both plans – no need for cross-referencing.
Charleston County (Unincorporated)	Charleston County Comprehensive Plan; Charleston County Emergency Operations Plan; Beach Management Plan; Flood Ordinance; Building Ordinance; Stormwater Management Plan; Flood Analyses; Charleston County Watershed Master Plan; Greenbelt Plan; Repetitive Loss Area Analysis (RLAA)	Applicable excerpts included in CRHMP.	Applicable excerpts from CRHMP included in these plans.
City of Folly Beach	Not applicable	Not applicable	Not applicable
Town of Hollywood	Not applicable	Not applicable	Not applicable
City of Isle of Palms	Updated Comprehensive Plan for the City of Isle of Palms	Not applicable	Entire CRHMP included by reference, CRHMP is referenced on the City's web site (www.iop.net) with a link to the plan.
Town of Kiawah Island	Town of Kiawah Island Emergency Preparedness Plan, Comprehensive Plan, Municipal Code, Article 12, Land Use and Zoning	Not applicable	Entire CRHMP included in some plans by reference; applicable excerpts from the CRHMP included in others.
Town of Lincolnville	Town of Lincolnville Comprehensive Plan	Not applicable	Applicable excerpts from CRHMP included in plan.
Town of McClellanville	Comprehensive Plan for the Town of McClellanville	Not applicable	Entire CRHMP included by reference, and applicable excerpts from the CRHMP in this plan.
Town of Meggett	Not applicable	Not applicable	Not applicable

Town of Mt. Pleasant	Community Rating System, Comprehensive Land Use Plan, NPDES Phase II	Applicable excerpts included in CRHMP.	Entire CRHMP included by reference.
City of North Charleston	North Charleston Comprehensive Development Plan, North Charleston Emergency Operations Plan	Not applicable	References to CRHMP included in other plans.
Town of Ravenel	Town of Ravenel Comprehensive Plan, 1999	Not applicable	Entire CRHMP included by reference.
Town of Rockville	Not applicable	Not applicable	Not applicable
Town of Seabrook Island	Not applicable	Not applicable	Not applicable
Town of Sullivan's Island	Town of Sullivan's Island Comprehensive Plan 1998, revised June 19, 2000	Not applicable	Entire CRHMP included by reference.
Charleston County Parks & Recreation Commission	CCPRC Mission Statement; CCPRC Comprehensive Development Plan; CCPRC Hurricane Plan	Not applicable	Entire CRHMP included by reference.
Charleston CPW	Not applicable	Not applicable	Not applicable
Cooper River Parks & Playground Commission	North Charleston Comprehensive Development Plan; North Charleston Emergency Operations Plan	Not applicable	Include reference to CRHMP in other plans.
James Island Public Service District	Not applicable	Not applicable	Not applicable
Mt. Pleasant Water Works	Mt. Pleasant Waterworks Emergency Plan	Not applicable	Entire CRHMP included by reference.
North Charleston District	Not applicable	Not applicable	Not applicable
North Charleston Sewer District	Not applicable	Not applicable	Not applicable
St. Andrews Parish Parks & Recreation	Not applicable	Not applicable	Not applicable
St. Andrews Public Service District	Not applicable	Not applicable	Not applicable
St. John's Fire District	St. John's Fire District Strategic Plan	Goals & Objectives and Risk Assessment information included in CRHMP.	Entire CRHMP included by reference, and applicable excerpts from the CRHMP in this plan.
St. Paul's Fire District	St. Paul's Fire District Emergency Operations Plan	Not applicable	Entire CRHMP included by reference.

3.6 – Planning Process Summary

The public is invited to participate in the mitigation planning process through yearly planning meetings that involve all participating jurisdictions and entities. All planning meetings are open to the public. Each municipality or entity's representative in the yearly planning and update meeting conveys the public input they have received within their district. Public feedback is encouraged through Project Impact outreach activities that are held throughout the tri-county Region. During the 2013-2017 plan update, there were more than 155 Project Impact events, including hurricane awareness expos, school science fair partnerships, educator and classroom grants, neighborhood presentations, industry meetings, emergency planning sessions, and more. Additionally, three public meetings were held to plan the 2019 annual update in addition to routine Project Impact events outlined in each jurisdiction's Action Report. Hundreds of thousands of residents are impacted continuously by televisions messages, targeted mailings, radio interviews, and emergency preparedness billboards, just to name a few. (See Appendix A.4 for the minutes from the planning committee meetings).

To keep the information in the Plan current and up to date, the *Hazard Mitigation & Public Information Plan Committee* performs a plan update each year, addressing any changes in hazard events, drainage improvement projects, repetitive loss areas, etc. Each of the participating jurisdictions and other entities submits an annual status report, which is compiled to reflect the formal five-year update cycle. Each jurisdiction also has the opportunity to clarify and add items to their action plan. All annual changes are reviewed and approved at a public meeting with representatives from all jurisdictions, media, and the public is invited to attend and provide input. The yearly meetings and yearly updates ensure the Plan is continually being monitored, evaluated and updated to reflect the most current hazard information possible.

Public meetings during 2019 to update this plan were held on:

- June 13th, 2019
- July 17th, 2019
- August 20th, 2019

The plan will continue to be updated annually, involving all jurisdictions, partners, and the public. A variety of stakeholders outside of Charleston County have the opportunity to be involved in the planning process and Project Impact outreach activities. In addition to the fact that all municipalities within Charleston County participate in Project Impact and other county-wide initiatives, several municipalities have physical borders that extend beyond Charleston County. The City of North Charleston, for instance, is located within Charleston County, Berkeley County and Dorchester County. Additionally, many residents of neighboring communities, like Summerville, commute into Charleston County for work, shopping, services, etc.

Project Impact and Charleston County also work with the Local Emergency Planning Committee (LEPC) which, in addition to meeting monthly, has a quarterly meeting with neighboring Berkeley and Dorchester County's Emergency Management Departments to discuss preparedness and hazard mitigation. Many of the events where Project Impact outreach activities take place also includes local businesses, insurance agents, and non-profits, all of which have impacts beyond Charleston County. Project Impact's outreach activities and messages affect the Region, reaching the public from Beaufort, south of Charleston County, to Georgetown, north of Charleston County. The public and all stakeholders are invited to attend and participate in the public meetings. All planning meetings are open to the public. Each municipality/entity's representative in the yearly planning and update meeting speaks for the public based on input they have received within their jurisdiction. Public feedback is incited through Project Impact outreach activities that are held

throughout the Tri-County Region including activities such as regular seminars, lectures, expos and meetings. In addition to public meetings and events, the current update of the Plan is always available on Charleston County's website for public review and comment.

Project Impact has a presence on social media to further connect with the public. Twitter and Facebook both help raise awareness for hazard vulnerability, risk, and mitigation, and encourage public participation. All publications and events have contact information available for public feedback or specific questions.

Charleston County engages the public through professional and trade organizations as well, speaking monthly with the Tri-County Homebuilders Association and is regularly involved with specific trade groups. These interactions are not only educational opportunities, but provide valuable feedback. Public input is regularly reviewed and incorporated into the document. To continue to include public participation in the planning process for the upcoming five-year cycle, a new expanded questionnaire will be distributed to the public, local jurisdictions, regional partners, state and federal agencies, and interested parties through a targeted email survey campaign. Charleston County and Project Impact outreach events, websites, and social media networks will also provide access to the questionnaire, extending the access and increasing public feedback.

Charleston County's Floodplain Manager is in charge of maintaining the Plan, serves as the principal contact for public questions concerning local hazards, and is responsible for coordinating the yearly update and the formal five-year full update cycle. While the Plan is not formally approved annually by FEMA, Charleston County and all other local Councils and governing boards receive notice of changes on an annual basis to have the most current information.

The most recent formal five-year *Charleston Regional Hazard Mitigation Plan* approval was given by FEMA on March 28, 2019.

Charleston Regional Hazard Mitigation Plan Citizen Survey

The Charleston Regional Hazard Mitigation Plan, originally adopted in 1999, is a community-wide effort consisting of input from 31 local entities. These organizations include 16 local government jurisdictions working alongside major stakeholders in the community, including private, non-profit and State agencies, in addition to smaller community commissions and districts. The combined effort of all of these entities composes a regional, multi-jurisdictional mitigation plan that takes into account all visions of what concentrated efforts should be placed on specific hazards and mitigation measures. The Plan is updated annually to address specific needs and changes in the area and it is adopted by all participating jurisdictions on a 5-year cycle.

Your input is appreciated and needed.

[NEXT](#)



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Never submit passwords through Google Forms.

Hazard Assessment

The Charleston Region is affected by several types of hazards each year. The purpose of this survey is to identify a priority list of hazards to address in the Charleston Regional Hazard Mitigation Plan.

Please rank each of the hazards based on the threat level to your community. *
(1=Most Threatening; 5=Least Threatening)

	1 (Most Threaten...	2	3	4	5 (Least Threate...
DAM FAILURE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
DROUGHT	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
EARTHQUAKES	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
FLOODING	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
HAZARDOUS MAT...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
HURRICANES	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
SEA LEVEL RISE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
TERRORIST INCID...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
TORNADOES	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
TSUNAMIS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
WILDFIRES	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
WINTER WEATHER	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Are there any other hazards that you feel are pressing to your community? Please rank (1=Most Threatening; 5=Least Threatening).

Long answer text

To the best of your knowledge, to what extent has your community experienced any of the hazards listed above? Please include dates and any associated damages if possible.

Long answer text

Emergency Preparedness

Description (optional)

On a scale of 1-5, how prepared (survival kit, evacuation plan, awareness, etc.) are you for the following situations if they were to occur? Please give a rating of 1-5 for each hazard below (1 =Most Prepared, 5= Least Prepared). *

	1 (Most Prepared)	2	3	4	5 (Least Prepared)
DAM FAILURE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
DROUGHT	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
EARTHQUAKES	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
FLOODING	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
HAZARDOUS MAT...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
HURRICANES	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
SEA LEVEL RISE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
TERRORIST INCID...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
TORNADOES	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
TSUNAMIS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
WILDFIRES	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
WINTER WEATHER	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

If there are any other hazards that you feel are pressing to your community, what are they and how prepared to you feel you are for the hazard(s)? Please rank (1=Most Prepared; 5=Least Prepared).

Long answer text

Charleston County Area Project Impact Initiative

Charleston County Area Project Impact is an on-going initiative that performs outreach projects which help make our communities more prepared and resistant to damages caused by hazards or events, such as natural disasters.

Are there any public shorelines in parks or by the road that are in need of restoration or suffering from erosion?

Yes

No

If yes, where are they located?

Short answer text
.....

Would you be interested in helping to protect your community from dangerous hazards? If yes, please provide your name and contact information below to receive more information on how you can become involved. *

Yes

No

Name:

Short answer text
.....

Phone Number:

Short answer text
.....

Email Address:

Short answer text
.....

Please indicate if there is a special area of interest (check as many as you want).

- Structural Projects Committee (Engineers)
- Natural Benefits Committee (Environmentalist)
- Emergency Services Committee (First Responders)
- Property Protection/Preventative Activities Committee (Construction/Regulatory)

Demographic Information

We need one last piece of information before this survey is complete. Let us know what area of Charleston you live in. Thank you for participating in the survey.

In what area of Charleston are you located? *

1. City of Charleston
2. City of North Charleston
3. City of Folly Beach
4. City of Isle of Palms
5. Town of Mt. Pleasant
6. Town of James Island
7. Town of Sullivan's Island
8. Town of Awendaw
9. Town of Hollywood
10. Town of Lincolnville
11. Town of McClellanville
12. Town of Meggett
13. Town of Rockville
14. Town of Seabrook Island
15. Town of Kiawah Island
16. Unincorporated Charleston County
17. Other

What is the zip code of your mailing address? (e.g. 29401, 29412) *

Long answer text

Hazard Assessment Rankings

Description (optional)

Please rank each of the following hazards based on the threat level to your community, on a scale of 1 to 5 (1=Most Threatening and 5=Least Threatening).

	1 (Most)	2	3	4	5 (Least)
DAM FAILURE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
DROUGHT	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
EARTHQUAKES	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
FLOODING	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
HAZARDOUS MAT...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
HURRICANES	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
SEA LEVEL RISE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
TERRORIST INCID...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
TORNADOES	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
TSUNAMIS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
WILDFIRES	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
WINTER WEATHER	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Are there any other hazards that you feel are pressing to your community? Please rank (1=Most Threatening; 5=Least Threatening).

Long answer text

Emergency Preparedness

Description (optional)

On a scale of 1-5, how prepared (evacuation plan, awareness, etc.) is your jurisdiction/organization for the following situations if they were to occur? Please give a rating of 1-5 for each hazard below (1 =Most Prepared, 5= Least Prepared).

	1 (Most)	2	3	4	5 (Least)
DAM FAILURE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
DROUGHT	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
EARTHQUAKES	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
FLOODING	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
HAZARDOUS MAT...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
HURRICANES	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
SEA LEVEL RISE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
TERRORIST INCID...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
TORNADOES	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
TSUNAMIS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
WILDFIRES	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
WINTER WEATHER	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

If there are any other hazards that you feel are pressing to your community, what are they and how prepared to you believe your jurisdiction/organization is for the hazard(s)? Please rank (1=Most Prepared; 5=Least Prepared).

Long answer text

STRUCTURES - Vulnerability Assessment Rankings

Description (optional)

How vulnerable to damage are the structures within your jurisdiction/organization in the event that the following hazards were to occur? (1=Most Vulnerable and 5=Least Vulnerable)

	1 (Most)	2	3	4	5 (Least)
DAM FAILURE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
DROUGHT	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
EARTHQUAKES	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
FLOODING	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
HAZARDOUS MAT...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
HURRICANES	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
SEA LEVEL RISE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
TORNADOES	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
TERRORIST INCID...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
TSUNAMIS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
WILDFIRES	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
WINTER WEATHER	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

If there are any other hazards that you feel are pressing to your community, what are they and how vulnerable to do believe the structures within your jurisdiction are to these hazards? Please rank (1=Most Vulnerable; 5=Least Vulnerable).

Long answer text

CRITICAL FACILITIES - Vulnerability Assessment Rankings

Description (optional)

How vulnerable to damage are the critical facilities within your jurisdiction (e.g. police stations, fire stations, emergency operation centers, hazardous material storage facilities, etc.) if one of the following hazards were to occur? (1=Most Vulnerable; 5=Least Vulnerable)

	1 (Most)	2	3	4	5 (Least)
DAM FAILURE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
DROUGHT	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
EARTHQUAKES	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
FLOODING	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
HAZARDOUS MAT...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
HURRICANES	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
SEA LEVEL RISE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
TERRORIST INCID...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
TORNADOES	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
TSUNAMIS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
WILDFIRES	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
WINTER WEATHER	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

If there are there any other hazards that you feel are pressing to your community, what are they and how vulnerable to you believe the structures within your jurisdiction/organization are to these hazards? Please rank (1=Most Vulnerable; 5=Least Vulnerable).

Long answer text

INFRASTRUCTURE - Vulnerability Assessment Rankings

Description (optional)

How vulnerable to damage is the infrastructure within your community (roads, bridges, etc.) if one of the following hazards were to occur? (1=Most Vulnerable and 5=Least Vulnerable)

	1 (Most)	2	3	4	5 (Least)
DAM FAILURE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
DROUGHT	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
EARTHQUAKES	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
FLOODING	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
HAZARDOUS MAT...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
HURRICANES	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
SEA LEVEL RISE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
TERRORIST INCID...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
TORNADOES	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
TSUNAMIS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
WILDFIRES	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
WINTER WEATHER	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

If there are any other hazards that you feel are pressing to your jurisdiction/organization, what are they and how vulnerable is the infrastructure to these hazards? Please rank (1=Most Vulnerable; 5=Least Vulnerable).

Long answer text

Please utilize this space to provide any specific comments regarding the vulnerability of your jurisdiction/organization to hazard events. What is your assessment of the overall vulnerability of the Charleston region to these hazards?

Goals

Description (optional)

Please rate the following potential goals for the regional plan according to the needs of your jurisdiction or organization (1=Most Important and 5=Least Important).

	1 (Most)	2	3	4	5 (Least)
Higher regulatory ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improve hazard re...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improve storm dra...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improve water qu...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Minimize future e...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Minimize future fl...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Minimize future h...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Minimize future h...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Minimize future te...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Protect environme...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Preserve historic ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reduce potential ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Are there any other goals that you feel are pressing to your jurisdiction/organization? Please rank (1=Most Important; 5=Least Important).

Long answer text

Existing Plans/Interest in Participation

Description (optional)

Does your jurisdiction/organization have any hazard-related mitigation plans other than the Charleston Regional Hazard Mitigation Plan?

Yes (If Yes, please provide a copy of your plan via email or standard mail)

No

Hazard Resilience Survey Questions

The Resilient America program of the National Academies of Sciences, Engineering, and Medicine asks for your input on a few additional questions to help assist the community as a whole in resiliency efforts.

Does your organization include issues of resiliency (e.g. preparedness, adaptation, mitigation, response & recovery) in your planning documents, such as the Comprehensive Plan, or in other planning efforts? If so, what are some examples of these policies?

Long answer text

Reflecting upon recent hurricane threats and flooding events, what has your jurisdiction/organization learned from a hazard preparedness standpoint from these events? Are some areas of preparedness weaker than others in your jurisdiction?

Long answer text

What challenges does your organization face when it comes to incorporating disaster resiliency into your planning or implementation efforts?

Long answer text

Does your jurisdiction/organization participate in emergency operations center activities or command? Please explain your participation level.

Long answer text

What could be done at the regional scale to mitigate impacts to disasters and disruptions? This could include providing technical assistance, setting regional policies, providing a forum for peer sharing, etc. Is your organization currently involved in any regional efforts?

Long answer text

Please share information about relevant projects related to building resilience to hazards (e.g. preparedness, adaptation, mitigation, response, and recovery efforts) that your community is undertaking (e.g. educational programs, risks programs, increased freeboard requirements, etc.).

Long answer text

Point of Contact

23. **Name:** *

24. **Title:**

25. **Mailing Address:**

26. **Telephone Number:** *

27. **Fax Number:**

28. **E-Mail Address:** *

Thank You!

Thank you for participating in the Charleston Regional Hazard Mitigation Plan Jurisdiction/Organization Survey.

Contact Us

Charleston County Floodplain Management
Niki Grimball, Public Services Building
4045 Bridge View Drive, Room A311
North Charleston, SC 29405-7464
(P) 843.202.6940
buildingservices@charlestoncounty.org

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**Attachment 3-B: Jurisdiction Members of the Charleston Regional Hazard Mitigation
& Public Information Plan Committee**

Jurisdiction	CEO	Designated Member
Town of Awendaw	Miriam Green, Mayor	D. William Wallace, Town Administrator
Town of Hollywood	John Dunmyer, III, Mayor	Edward Holton, Zoning Administrator
Town of James Island	Bill Woolsey, Mayor	Ashley Kellahan, Town Administrator
Town of Lincolnville	Charles Duberry, Mayor	Charles B. Duberry, Mayor
Town of McClellanville	Rutledge B. Leland, III, Mayor	Michelle McClellan, Town Clerk
Town of Meggett	Harry V. Herrington, Mayor	Stephanie Smith, Town Administrator
Town of Ravenel	Opal N. Baldwin, Mayor	Mark Bloomer, Planning Administrator
Town of Rockville	Riley A. Bradham, Mayor	Carl H. Simmons, Director, Building Inspection
Town of Seabrook Island	Ronald Ciancio, Mayor	Randy Pierce, Town & Zoning Administrator
City of Charleston	John Tecklenberg, Mayor	Laura Cabiness, Director, Public Service Dept.
City of Folly Beach	Tim Goodwin, Mayor	Eric Lutz, Building Official
Town of Kiawah Island	Craig Weaver, Mayor	Stephanie Tillerson, Town Administrator
City of Isle of Palms	Dick Cronin, Mayor	Douglas Kerr, Director, Building, Planning, & Zoning
Town of Mt. Pleasant	Linda Page, Mayor	Hillary Repik, Stormwater Manager
City of North Charleston	R. Keith Summey, Mayor	James Whittaker
Town of Sullivan's Island	Patrick O'Neal, Mayor	Randy Robinson, Building Official
Unincorporated Charleston County	Jennifer Miller, Administrator	Carl H. Simmons, Director, Building Inspection

Attachment 3-C: Stakeholder Members of the Hazard Mitigation & Public Information Plan Committee

<u>Name</u>	<u>Representing</u>
Shawn Engelman, Deputy Chief of Administration	James Island PSD
Chris Seabolt, Fire Chief	James Island PSD
Gary Alford, Assistant District Manager of Operations	North Charleston District and Sewer District
Ken Fischer, Manager	St. Andrews PSD
Christie Holderness, District Manager	St. Andrews PSD
Gavin Gilcrease, Administrative Assistant Chief	St. John's Fire District
Mike Rakoske, Assistant Chief of Administration	St. Paul's Fire District
Kent Scarborough, Safety Director	Charleston Water System
Ronnie Freeman, Safety Director	Mt. Pleasant Water Works
Ryan Henderson, Safety Compliance Director	Charleston Co Parks & Recreation Commission
Susan Klugman, CFO	St. Andrews Park & Playground Commission
Gary McJunkin, Director	Cooper River Parks & Playground Commission
Angela McJunkin, Director Code Enforcement	Cooper River Parks & Playground Commission
Michael Reidenbach, Security & Emergency Management	Charleston County School District
Sean Hughes, Facility Director	Charleston County School District
Woody Doossche, Safety Manager	Charleston County School District
Dana Henderson, Director of Risk Management	Charleston County School District
Randy Beaver, Dir. Envir Health & Safety	College of Charleston
Jordan Bradway, Emergency Manager	Roper St. Francis
Anne Sass, Grants Director	Roper St. Francis
Peter DiNicola, Director of Plant Operations	Roper St. Francis
Scott Cave, Certified Business Continuity Consultant	Atlantic Business Continuity Services
Mike Horton	Davis and Floyd
Robert George, Director of Conservation	SC Aquarium
Justin Healy, Owner	Shutter Services & Sales
William Salters, Coastal Services Project Manager, Planning	SC DHEC - OCRM
Amanda Ritsema, Hospital Preparedness Program Coordinator	SC DHEC
Aleta Riesberg, Real Estate Agent	Anchorline Properties
Chris Silcox, Insurance Agent	C.T. Lowndes & Co.
Debbie Eckard, District Manager, Education Coordinator	Charleston Soil & Water Conservation District
Cedric Green, Vice President	SCANA
Tim Mobley, VP, Engineering and Operations	Berkeley Electric Cooperative
Stewart Weinberg	Floodplain Resident
Bill West	Floodplain Resident
Thomas Payne	Floodplain Resident
Aleen Kinter	Floodplain Resident
Julie Hensley	Floodplain Resident
Nicole Elko	Floodplain Resident
Robert Cochran	Floodplain Resident
Henry Dingle	Floodplain Resident

Attachment 3-D: Other Participating Partners of the Hazard Mitigation & Public Information Plan Committee

Name	Representing
*Jody Muldrow, Planning Administrator	Town of Awendaw
*John Porcelli, Building Official	Town of James Island
Mark Johnson, Public Works	Town of James Island
James Hackett, Code and Safety Officer	Town of James Island
*Larry Brown, Town Council	Town of Lincolnville
Charles Gannt, Fire Chief	Town of Lincolnville
*Henry Holst, Town Council	Town of Rockville
*John Gregg, Mayor Pro-Tem	Town of Seabrook Island
John Turner, Town Council	Town of Seabrook Island
Tom O'Brien, Deput Director Public Service	City of Charleston
*Mark Wilbert, Emergency Management	City of Charleston
*Aaron Pope, Zoning Administrator	City of Folly Beach
Bob Maibach, (Fire) Training Officer	City of Isle of Palms
*Linda Tucker, Town Administrator	City of Isle of Palms
Desiree Fragoso, Assistant Administrator	City of Isle of Palms
*Bruce Spicher, Building Official	Town of Kiawah Island
*Rob Rogerson, Floodplain Manager	Town of Mt. Pleasant
Emily Raby, Stormwater	Town of Mt. Pleasant
Michael Hardy, Staff Engineer	City of North Charleston
Eyda Arroyave, Planning and Zoning Assistant	City of North Charleston
*Darbis Briggman, Chief Building Official	City of North Charleston
Benjamin Brown, Inspector	City of North Charleston
*William Barfield, Emergency Preparedness Coordina	City of North Charleston
*Joe Henderson, Zoning Administrator	Town of Sullivan's Island
*William Horne	Charleston County Building Inspection Services
Cindy Cahill	Charleston County Building Inspection Services
Niki Grimball	Charleston County Building Inspection Services
Eric Adams	Charleston County Transportation
Taylor Hall	Charleston County Transportation
*Brock Clary	Charleston County EMD
Chris Wannamaker	Charleston County Public Works
Shawn Smetana	Charleston County Public Informaiton Officer
* Denotes other participating partners that are considered alternative voting members in the absence of the designated member.	

Attachment 3-E: Project Impact Committee Members Contact List

Project Impact Committee Members Contact List	
Heads	
Name	Organization
Simmons, Carl	Charleston County Building Department
Horne, William	Charleston County Building Department
Faith, Katie	Charleston County Building Department
Advisory Committee	
Name	Organization
Bramblett, Jared	Davis & Floyd
Healy, Justin	Shutter Services Inc.
Horton, Michael	Davis & Floyd
Kearns, Mark	
Mitchum, Ron	
Muldrow, Jody	Town of Awendaw
Silcox, Chris	Insurance Agent
Property Protection/Preventive Activities Committee	
Name	Organization
Chambers, Bob	Low Country Walls, LLC
Healy, Justin	Shutter Services Inc.
Howe, William	Hugo Power Supply
Jacques, Bill	American Inspection Services, Inc.
Kent, David	The Real Buyers Agent
LeVene, Paul	
Pierce, Randy	Town of Seabrook Island
Porcelli, John	Town of James Island
Rogerson, Rob	Town of Mount Pleasant
Sass, Anne	Roper St. Francis
Silcox, Chris	Insurance Agent
Structural Projects Committee	
Name	Organization
Bramblett, Jared	Davis & Floyd
Fontenot, Daryle	SC Dept of Natural Resources
Horton, Michael	Davis & Floyd
Johnson, Marc	Town of James Island
Marcy, Douglas	US Army Corps of Engineers
Raby, Emily	Town of Mount Pleasant
Riesberg, Alexa	The Carolina Agent Group--Lowcountry
Emergency Services Committee	
Name	Organization

Krantz, Rick	College of Charleston
Natural Benefits Committee	
Name	Organization
Anderson, Michael	Dial Cordy and Associates, Inc.
Barfield, William (Ed)	City of North Charleston
Gordon, David	US Fish & Wildlife Service
Hengst, Robert	US Coast Guard
Julka, Stephen	City of Charleston
Muldrow, Jody	Town of Awendaw
Salters, Will	SC DHEC
Whittaker, James	City of North Charleston
Public Information Committee	
Name	Organization
Barrickman, Cheryl	Charleston County Building Department
Hamburger, Stacy	Barnes & Noble Bookseller
Lutz, Eric	Town of Folly Beach
Pierce, Randy	Town of Seabrook Island
Pope, Aaron	City of Charleston Citizen
Rankin, Andy	Charleston Area Convention & Visitor's Bureau
Strong, Willard	Santee Cooper
Toomes, Nickie	US Dept of Agriculture - Rural Development
Miscellaneous Attendees	
Name	Organization
Bloomer, Mark	Town of Ravenel
Burnup, Brian	
Cahill, Cindy	Charleston County
Cave, Scott	Atlantic Business Continuity Services
Cave, Steve	
Champagne, Kristine	
Clary, Broch	Charleston County EMD
Engelman, Shawn	James Island PSD
Freeman, Ronnie	Mount Pleasant Waterworks
Gilcrease, Vonie	
Green, Cedric	
Grimball, Niki	Charleston County
Henson, Chris	Town of Mount Pleasant
Holton, Ed	Town of Hollywood
Holton, Edward	Town of Hollywood
Hughes, Sean	Charleston County School District
Kent, David	
Knight, Amanada	Town of Mount Pleasant
Manigault, Rose	

Matthews, Doc	
McClellan, Michele	Town of McClellanville
Mobley, Tim	
O'Brien, Tom	City of Charleston
Racine, Kim	
Robinson, Randy	Town of Sullivan's Island
Smith, Buddy	Town of Awendaw
Spicher, Bruce	Town of Kiawah Island
Weinberg, Stewart	City of Charleston Citizen
Wetmore, Spencer	City of Folly Beach Citizen
Widdon, Jack	
Wilbert, Mark	City of Charleston
Wolfe-Miller, Matine	Town of Mount Pleasant Citizen

Attachment 3-E: Project Impact Committee Members Contact List (cont.)

Members of the Project Impact committees also provide input into the planning process as they determine projects to perform under this initiative. These committees have broad-scale representation from multiple public, private, and non-profit organizations with an interest in hazard mitigation in the Charleston County Area.

Attachment 3-F: Charleston Area Local Governments/Entities Adopting Records

**Note: Table will be updated with new dates for plan adoption will be added as they occur.*

Charleston Area Local Governments/Entities Adopting the Charleston Regional Hazard Mitigation Plan					
Name of Jurisdiction/Entity	Date Adopted by Governing Council				
Town of Lincolnville	June 2, 1999	March 3, 2004	September 30, 2008		
Town of Awendaw	June 3, 1999	February 5, 2004	August 7, 2008	November 7, 2013	August 3, 2017
Town of McClellanville	June 7, 1999	February 2, 2004	August 4, 2008	October 7, 2013	December 4, 2017
Town of Mt. Pleasant	June 8, 1999	February 10, 2004	September 10, 2008	September 11, 2013	December 12, 2017
Unincorporated Charleston County	June 15, 1999	February 17, 2004	September 2, 2008	November 7, 2013	September 19, 2017
Town of Rockville	June 21, 1999	January 19, 2004	August 18, 2008	November 18, 2013	
Town of Kiawah Island	June 22, 1999	January 13, 2004	August 27, 2008	December 3, 2013	May 7, 2019
Town of Seabrook Island	June 22, 1999	January 27, 2004	August 26, 2008	October 22, 2013	November 28, 2017
Town of Ravenel	June 29, 1999	March 16, 2004	September 4, 2008	October 29, 2013	November 28, 2017
Town of Meggett	July 15, 1999	March 22, 2004	August 25, 2008	October 28, 2013	July 22, 2019

Town of Sullivan's Island	July 20, 1999	February 17, 2004	August 19, 2008	November 19, 2013	February 20, 2018
City of North Charleston	September 9, 1999	January 22, 2004	August 14, 2008	October 24, 2013	December 21, 2017
City of Charleston	September 20, 1999	February 13, 2004	September 23, 2008	October 22, 2013	January 23, 2018
City of Folly Beach	August 22, 2000	September 23, 2004	August 26, 2008	October 8, 2013	December 12, 2017
City of Isle of Palms	June 22, 1999	January 27, 2004	August 26, 2008	September 24, 2013	November 28, 2017
Commissioners of Waterworks - Town of Mt. Pleasant	May 19, 2003	February 16, 2004	August 18, 2008	November 18, 2013	December 17, 2018
Town of James Island		January 20, 2004	August 5, 2008	October 16, 2014	April 25, 2019
North Charleston District Commission		January 12, 2004	August 11, 2008	October 14, 2013	N/A
North Charleston Sewer District Commission		January 12, 2004	August 11, 2008	October 14, 2013	May 13, 2019
Cooper River Park & Playground Commission		January 19, 2004	August 19, 2008	November 18, 2013	July 29, 2015
St. John's Fire District Commission		February 4, 2004	September 8, 2008		May 13, 2019
St. Paul's Fire District Commission		February 5, 2004	September 11, 2008	November 18, 2013	April 18, 2019
James Island Public Service District		March 8, 2004	September 22, 2008	October 28, 2013	December 11, 2017
Charleston County Park & Recreation Commission		March 29, 2004	August 27, 2008	October 18, 2013	
St. Andrews Public Service District		April 1, 2004	September 2, 2008	November 4, 2013	December 4, 2017
Town of Hollywood		April 7, 2004	September 22, 2008	December 16, 2013	
Charleston Commissioners of Public Wks. (now known as Charleston Water System)		April 27, 2004	September 22, 2008		July 23, 2019
College of Charleston		July 12, 2006	September 10, 2008	October 21, 2013	April 16, 2019
Charleston County School District			August 11, 2008		
St. Andrews Parish Park & Recreation Commission		March 18, 2004	August 28, 2008	October 24, 2013	April 25, 2019
Roper St. Francis				August 19, 2015	May 15, 2019

Section 4 Hazard Introduction

4.1 - Prioritization

The following data is taken directly from the responses of the 2017 Charleston Regional Hazard Mitigation Plan jurisdiction/organization and citizen questionnaires. The data also includes local newspaper accounts, National Weather Service data, and/or academic research conducted regarding hazard-related events that have occurred in the Charleston County area or have been studied as potential hazards for this area. Hazard priorities from the questionnaires were rated in severity from 1 to 5, five being the least priority. Responses came from a cross section of various organizations, governmental and private sector, in and around the Charleston Region.

The highest priority hazard per the questionnaires was the threat of a hurricane. The next highest concern was flooding. Local concern over sea level rise led to the addition of this hazard to the surveys this year. The community reflected this concern by ranking sea level rise as the third highest priority. Earthquakes were considered the next most serious threat. The threat of tornadoes, the next most serious hazard, appeared to be a significant concern particularly among the private sector respondents. Hazardous materials, terrorism, and wildfires sequentially followed. Other hazards, such as tsunamis and dam failures were the lowest priority hazards. Since 1999, each major survey has confirmed the general ranking of hazards with hurricanes topping list of concerns, followed closely by similarly ranked flooding, earthquakes, and tornadoes.

The Disaster Mitigation Act of 2000 added hazards to the survey and is also evaluated in the hazard mitigation plan.

Following is the hazard ranking as determined from the most recent survey: 1. Hurricane; 2. Flood; 3. Sea Level Rise; 4. Earthquake; 5. Tornado; 6. Hazardous Materials Incident; 7. Terrorist Incident; 8. Wildfire; 9. Tsunami; and 10. Dam Failure. Other hazards indicated on this questionnaire were environmental/water and air quality. In this Plan, environmental hazards such as water pollution/contamination are included in the hazardous materials release discussion, as are highway accidents that result in a release of a hazardous material or involve mass transit. Miscellaneous hazards also included in this Plan are winter weather, severe storm, drought, and rip currents as they are hazardous and quantifiable in the area, but not a top priority.

In the 2017 survey, hurricanes again topped the list as the most dangerous and hazardous on both the public surveys as well as the government/organization survey. Flooding followed as a close second on both surveys. The significance of the newest listed hazard, sea level rise, was validated with its ranking as the third most threatening hazard. Earthquakes, tornadoes, and wildfire trailed closely for both surveys, but had very similar average scores.

These results are in line with the anecdotal evidence from dozens of public Project Impact community events, disaster expos, and neighborhood association meetings. Hurricane and flooding mitigation questions comprise most of the questions directed at the Charleston County Building Inspections Department. Charleston County borders the Atlantic Ocean for nearly 100 miles and the ocean is a defining characteristic for the Region, both economically and certainly from a hazardous perspective.

Social Vulnerability

Social Vulnerability is considered in this document to analyze the underlying characteristics of the population that either attenuate or exacerbate the effects of hazard events. The Social Vulnerability

Index (SoVI), provides a peer reviewed methodology for creating a standardized comparative metric aimed at understanding differences in socio-economic and demographic information between places. SoVI includes those population characteristics known to influence the ability of social groups and communities to prepare for, respond to, and recover from disasters. Key social indicators that consistently appear in the literature as influencing pre-impact preparedness and post-event response and recovery include attributes such as socioeconomic status (wealth, education, occupation), age (elderly populations and young children are more vulnerable); gender, race and ethnicity; employment and employment sector; and special needs populations. However, it is not just the proportion of the residents in these broad categories that is important, but instead how race, socioeconomic status and gender interact to produce socially vulnerable populations. Selecting one variable does not adequately capture communities that are described as below the poverty level, all people in poverty are in one element.

Based on the SoVI methodology, the scores use a three-class standard deviation model where greater than 0.5 standard deviation means elevated; 0.5 to -0.5 means moderate; and less than -0.5 mean limited. Charleston County has a SoVI of -1.93 on limited impact based on U.S. Census Data 2010, Hazards and Vulnerability Research Institute calculation.

Emergency Preparedness

In the 2017 survey, a series of questions were asked about emergency preparedness concerning different hazards discussed in this Plan to two audiences: jurisdiction/organization representatives and citizens. Analysis of the jurisdiction and citizen surveys show discrepancies between how governing bodies and individual citizens rank hazards and how well prepared the community is to face these hazards. Below are two tables showing the rankings on emergency preparedness: one for jurisdictions and the other for citizens. From these tables, it is evident that both jurisdiction representatives and citizens feel prepared for hurricanes, flooding and tornadoes. This is beneficial as these among the top hazards when asked about threat level in the hazard assessment questions. The most notable hazard is sea level rise, as it is perceived as the third most threatening hazard but jurisdictions and citizens are 8th and 5th most prepared, respectively, for this hazard among all ten hazards in the survey.

Impact of Hazards

Please see the appendices for a description of the hazards' impact on the jurisdictions for more detailed information.

Rankings for Emergency Preparedness: based on <i>Citizen Survey</i>	
Rank	Hazard
1	Hurricane
2	Flooding
3	Sea Level Rise
4	Drought
5	Earthquakes
6	Hazardous Materials
7	Tornadoes
8	Terrorist Incident
9	Wildfires
10	Winter Weather
11	Tsunami
12	Dam Failure

Rankings for Emergency Preparedness: based on <i>Jurisdiction Survey</i>	
Rank	Hazard
1	Hurricanes
2	Flooding
3	Sea Level Rise
4	Earthquakes
5	Wildfires
6	Tornadoes
7	Tsunami
8	Drought
9	Dam Failure
10	Hazardous Materials
11	Winter Weather
12	Terrorist Incident

Below is a table of all of the hazard events for the 2018-2019 year.

Hazard Events May 1, 2018-April 30, 2019		
Event	Incidents	Description and Information
Flooding	11	Includes flash flooding and coastal flooding.
Rip Current	2	
Hurricane, Tropical Storm, Tropical Depression	2	Hurricanes Florence and Michael impacted Charleston County with heavy rainfall and storm force winds.
Severe Weather	9	Includes strong wind, thunderstorms, hail, and lightning strikes.
Winter Weather	0	
Fire	704	Includes aircraft fire, explosion, marine fire, outside fire, wildfire, vehicle fire, and train or rail fire.
Tornado	0	
Earthquake	0	
Drought	-	26 weeks were spent in a drought event with 10 weeks at D1 moderate drought and 16 at D0 abnormally dry.
Water Rescue	67	Includes flood water rescue, inland and coastal rescue, oceanic rescue
Train and Rail	0	
Hazardous Material	445	Includes fuel spill, gas leak, and hazmat incidents.
Suspicious Packages	92	10 ordinances/explosives found
Bomb Threat	24	
Pandemic	0	
King Tide (Sea Level Rise) 2018	72	

4.2 - Hurricane

Background

Hurricanes and tropical storms are classified as cyclones, and defined as any closed circulation developing around a low-pressure center in which the winds rotate counter-clockwise in the Northern Hemisphere with a diameter averaging 10 to 30 miles across. When maximum sustained winds reach or exceed 39 miles per hour, the system is designated a tropical storm, given a name, and is closely monitored by the National Hurricane Center. When sustained winds reach or exceed 74 miles per hour the storm is deemed a hurricane. Tropical cyclones maintain intact by extracting heat energy from the ocean at high temperatures and releasing heat at the low temperatures of the upper troposphere. The majority of hurricanes and tropical storms form in the Atlantic Ocean, Caribbean Sea and Gulf of Mexico during the official Atlantic hurricane season, which extends from June through November.

The primary damaging forces associated with these storms are high-level sustained winds, heavy precipitation, tornadoes and flooding. Coastal areas are also vulnerable to the additional forces of storm surge, wind-driven waves, tidal flooding and beach erosion. Storm surge is often the greatest hurricane-related hazard. Storm surge is water that is pushed toward the shore by the force of the winds swirling around the storm. This advancing surge combines with the normal tides to create the hurricane storm tide, which can increase the water level twenty (20) feet or more. In addition, wind driven waves are superimposed on the storm tide. This rise in water level can cause severe inundation in coastal areas, particularly when the storm tide coincides with the normal high tides.

Classification

The National Weather Service's National Hurricane Center uses the Saffir-Simpson Scale to classify hurricane severity. The scale categorizes a hurricane's present intensity on a one (1) to five (5) rating and provides an estimate of property damage and coastal flooding upon landfall. Wind speed determines a hurricane's Saffir-Simpson Scale rating since storm surge is greatly dependent on the coastline shape and slope of the continental shelf.

Saffir-Simpson Hurricane Scale					
Category	Winds (mph)	Storm Surge (ft)	Minimum Surface Pressure (Millibars)	Damage	Damage Description
1	74 - 96	3 - 5	Greater than 980	Moderate	No real damage to building structures. Damage primarily to unanchored mobile homes, shrubbery, and trees. Also, some coastal flooding and minor pier damage.
2	97 - 111	6 - 8	979 - 965	Severe	Some roofing material, door, and window damage. Considerable damage to vegetation, mobile homes, etc. Flooding damages piers and small craft in unprotected moorings may break their moorings.
3	112 - 131	9 - 12	964 - 945	Extensive	Some structural damage to small residences and utility buildings, with a minor amount of curtainwall failures. Mobile homes are destroyed. Flooding near the coast destroys smaller structures, with larger structures damaged by floating debris. Terrain may be flooded well inland.
4	132 - 155	13 - 18	944 - 920	Extreme	More extensive curtainwall failures with some complete roof structure failure on small residences. Major erosion of beach areas. Terrain may be flooded well inland.
5	>155	19+	Less than 920	Catastrophic	Complete roof failure on many residences and industrial buildings. Some complete building failures with small utility buildings blown over or away. Flooding causes major damage to lower floors of all structures near the shoreline. Massive evacuation of residential areas may be required.

Source: National Hurricane Center

Storm Surge: Storm Surge is elevated water level that is pushed towards the shore by the force of strong winds that result in the piling up of water. The advancing surge combines with the normal tides, which in extreme cases can increase the normal water height to rise over 20 feet. The storm surge arrives ahead of the storm's actual landfall and the more intense the hurricane is; the sooner the surge arrives. Water rise can be very rapid and can move far inland, posing a serious threat to those who have not yet evacuated any flood-prone areas especially since about 68% of the Charleston Region rests within a floodplain and some jurisdictions are located 100% in the floodplain. Debris carried by the waves can also contribute to the devastation. A surge of high water topped by waves driven by hurricane force winds can be devastating to coastal regions, causing severe beach erosion and property damage along the immediate coast.

Wind: The Saffir-Simpson Hurricane Wind Scale is a 1 to 5 rating based on a hurricane's sustained wind speed. 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. A tropical storm becomes a hurricane when the winds meet or exceed speeds of 74mph. The strongest, and subsequently most threatening, hurricanes can exceed speeds of 157mph. The strong winds of a hurricane can cause dangerous waves, posing a significant hazard to mariners and coastal residents and visitors as waves overwhelm sea walls and flooding occurs. Such high winds can pick up debris and turn them into dangerous missile-like objects, knocking down trees and buildings.

Heavy Rain: Hurricanes are capable of generating great amounts of rainfall. Rainfall rates are related to the size and strength of the hurricane; slower moving and large storms tend to generate more rain. Hurricane Isaac in 2012, being both large and slow-moving, produced 1 to 2 inches of rain per hour in some locations.

Tornadoes: Hurricanes and tropical storms may spawn tornadoes that are typically further out from the center of the system; generally embedded in the rain bands. Hurricane-spawned tornadoes also generally have a shorter lifespan but can still cause great damage.

Erosion: Erosion is the process that wears away land due to chemical or physical activity of wind, water, or other meteorological conditions. The two major leading forces to erosion are wind and water. Major storms can cause erosion by picking up soil, sand or vegetation from the combination of high winds, heavy surf and storm surge. Human interactions, such as new development or construction in coastal regions can influence erosion as well.

Hurricanes often threaten the Charleston Region in the summer and early fall seasons. The most devastating hurricane to the Charleston Region in terms of dollars of property damage was Hurricane Hugo (Category 4), which struck on September 21, 1989 and was the 11th most damaging hurricane in the history of the United States as of September 2005. Charleston also had a brush with Hurricane Floyd (Category 2) on September 15, 1999. The most recent events to strike the Charleston Region include Hurricane Matthew on Oct. 8, 2016, Hurricane Irma on September 10-11, 2017, and Hurricanes Florence (September 14, 2018) and Michael (October 11, 2018). All recent events except Hurricane Michael warranted a mandatory evacuation from the Governor.

Location

Hurricanes and tropical storms threaten the entire Atlantic and Gulf coast of the United States, as well as the Pacific coast. Hurricanes that originate in the Gulf of Mexico can still impact the Charleston Region. With about 68% of the Charleston Region in the floodplain and some jurisdictions located 100% in the floodplain and with the community being a coastal community, the Region is vulnerable to hurricanes and tropical storms and their aftermaths. Since hurricane landing patterns are unpredictable until the storm has formed and is within a short time from landing, the Region can not presume that past strike history will continue into the future, and all areas within the Region are subject to these types of events.

Probability

From August 11th, 1940 to October 11, 2018, Charleston County experienced 39 hurricane type events, from named hurricanes to tropical storms/depressions. Hurricane Hugo is known to be the Region's 100-year storm since it hit the area directly and was the most devastating hurricane event for the Region. A 100-year storm has a 1% probability of occurring at that location in any given year. Encountering a "100-year storm" on one day does not decrease the chance of a second 100-year storm occurring in that same year or any year to follow. The most recent hurricane event was Hurricane Irma in September 2017. The entire Region is highly likely during each year of being affected by hurricane type events, either directly or by the remnants of a hurricane, tropical storm or a tropical depression (National Weather Service). Given the records and historical data, the chance of a storm to affect overall Charleston County is 49%. Oceanfront jurisdictions (Folly Beach, Isle of Palms, Seabrook Island, Kiawah Island and Sullivan's Island) have an increased risk of some elements of a hurricane (storm surge and erosion) but all jurisdictions have an equal risk of being affected by a hurricane. The vulnerability and impact of the hazard is discussed later in the Plan.

Likelihood of Event Any Year
1. 0-25% chance
2. 26-50% chance
3. 51-75% chance

4. 76-100% chance

Hurricane Probability for each Jurisdiction	
Jurisdiction	Probability
Unincorporated Charleston County	2
Town of Awendaw	2
Town of Hollywood	2
Town of James Island	2
Town of Lincolnton	2
Town of McClellanville	2
Town of Meggett	2
Town of Ravenel	2
Town of Rockville	2
Town of Seabrook Island	2
City of Charleston	2
City of Folly Beach	3
City of Isle of Palms	2
City of North Charleston	2
Town of Kiawah Island	2
Town of Mt. Pleasant	2
Town of Sullivan’s Island	2
Charleston County Parks & Recreation Commission	2
Charleston County School District	4
Charleston Water System	2
College of Charleston	2
Cooper River Parks & Playground Commission	2
James Island Public Service District Commission	2
Mt. Pleasant Water Works Commission	2
North Charleston District	2
North Charleston Sewer District	2
Roper St. Francis Healthcare	2
St. Andrews Parish Park & Recreation Commission	2
St. Andrews Public Service District	2
St. John’s Fire District Commission	2
St. Paul’s Fire District Commission	2

4.3 – Flooding

Background

Flooding is the most frequent and costly natural hazard in the United States and are a potential threat for most areas in the U.S. every day. The National Flood Insurance Program defines a flood as a general and temporary condition of partial or complete inundation of normally dry land.

Flooding is simply the overflow of water that submerges land which is usually dry. The National Weather Service monitors conditions around the clock that may lead to flooding. Flooding can occur around the United States and the Charleston Region due to heavy precipitation, tropical storms/hurricanes, stream and river basin topography problems, dam failure, and drainage problems. According to the National Oceanic and Atmospheric Administration (NOAA), about three fourths of all presidential disaster declarations are due to flooding. Non-hurricane related flooding events occur each year with variation in intensity and are usually classified in the following three categories: coastal flooding, flash flooding, and general flooding. The National Weather Service also categorizes flooding in relation to their potential damage in three categories: Minor, Moderate and Major. As of February 2019, the adopted FIRM for Charleston County has a map effective date of November 17, 2004. Charleston County has maps in the revision/appeal process and are expected to be adopted mid-late 2019.

Classification

Classifying floods is often very diverse in their meaning and are always broadly classified into different categories. Most of the flooding that occurs in the Charleston Region can be labeled as Coastal Flood, Flash Flood, and the general term Flood according to the National Oceanic and Atmospheric Administration (NOAA).

Coastal Flood: Flooding of coastal areas are due to the vertical rise above normal water level caused by strong, persistent onshore wind, high astronomical tide, and/or low atmospheric pressure, resulting in damage, erosion, flooding, fatalities, or injuries. Coastal areas are defined as those portions of coastal land zones (coastal county/parish) adjacent to the waters and bays of the oceans. Farther inland, the Storm Data preparer must determine when and where to encode a flood event as Flash Flood or Flood.

Flash Flood: A rapid and extreme flow of high water into a normally dry area, or a rapid water level rise in a stream or creek above a predetermined flood level, beginning within six hours of the causative event (e.g., intense rainfall, dam failure, ice jam-related), on a widespread or localized basis. Ongoing flooding can intensify to flash flooding in cases where intense rainfall results in a rapid surge of rising flood waters. Flash floods do not exist for two or three consecutive days.

Flood: A flood is any high flow, overflow, or inundation by water which causes or threatens damage. In general, this would mean the inundation of a normally dry area caused by an increased water level in an established watercourse, or ponding of water, generally occurring more than 6 hours after the causative event, and posing a threat to life or property. This can be on a widespread or localized basis.

National Weather Service Flood Categories	
Category	Damage Description
Minor	Minimal or no property damage but with some public inconvenience.
Moderate	Inundation of secondary roads, some evacuation may be required, and higher elevation necessary to save property.
Major	Extensive inundation and property damage. Evacuation of people and closure of both primary and secondary roads.

Source: National Weather Service

A Flood hazard is a serious threat to everyone in the Charleston Region because of its low elevation and frequency of storms. The Charleston Region’s worst experience with flooding came when Hurricane Hugo hit with a storm surge that reached 19.3 feet which flooded both coastal and inland areas. Flooding events occur each year with great variation throughout the Charleston Region but the impact of such flooding events is completely dependent upon the area.

Location

Flooding can occur throughout most of the Charleston Region since around 68% resides within a floodplain. Floodplains are designated by the frequency of the flood that is large enough to cover them. Flood frequencies are determined by plotting a graph of the size of all known floods for an area and calculating how often floods occur. The Federal Emergency Management Agency (FEMA) identifies floodplain areas by producing Flood Insurance Rate Maps (FIRM). These maps show all locations near major bodies of water, and show base flood elevations and floodplain boundaries like the 100-year floodplain boundaries. 100-year flood event is a 1% probability of occurring in any given year. The roughly 68% of the areas located in the floodplain are exposed to the threat of floods but that does not mean the other areas are not vulnerable to a flash flood or flooding events. Damaged infrastructure and roadways can limit mobility for citizens. All areas can experience flooding hazards.

Probability

Since about 68% of the Region is within the floodplain, those areas are highly likely to experience a flood event at any given point in a given year. Given the 158 events over the years of 2009 to April 30, 2019, there is a 90% chance of a flooding event to occur. However, with the Region located on the coast, low elevation, and the unpredictability of severe weather, any jurisdiction in Charleston County may be affected by a flooding event. There are specific jurisdictions that are higher risk for flooding events, including those located closer to waterways and beaches, like Town of Sullivan’s Island or Town of Kiawah Island; those located at lower elevations like the City of Charleston; and those jurisdictions who have more VE/AE (special flood hazard zones). This can be check at the Charleston County website and utilize the FEMA floodplain maps to determine a property’s flood zone. More specifically, oceanfront jurisdictions have a higher probability to coastal flooding (Folly Beach, Isle of Palms, Seabrook Island, Kiawah Island, Sullivan’s Island), as do island areas (James Island, Rockville, McClellanville, Seabrook Island, Meggett and City of Charleston). Some portions of all other jurisdictions (City of North Charleston, Hollywood, Mt. Pleasant) except for Lincolnville have some areas that would experience coastal flooding. Areas that are inland and/or have less area that is coastal, have a high probability of flooding. The vulnerability and impact of the hazard is discussed later in the Plan.

Likelihood of Event Any Year
1. 0-25% chance
2. 26-50% chance
3. 51-75% chance
4. 76-100% chance

Flooding Probability for each Jurisdiction	
Jurisdiction	Probability
Unincorporated Charleston County	3

Town of Awendaw	3
Town of Hollywood	3
Town of James Island	4
Town of Lincolnton	1
Town of McClellanville	4
Town of Meggett	2
Town of Ravenel	2
Town of Rockville	3
Town of Seabrook Island	4
City of Charleston	4
City of Folly Beach	4
City of Isle of Palms	4
City of North Charleston	3
Town of Kiawah Island	4
Town of Mt. Pleasant	3
Town of Sullivan's Island	4
Charleston County Parks & Recreation Commission	3
Charleston County School District	4
Charleston Water System	3
College of Charleston	3
Cooper River Parks & Playground Commission	3
James Island Public Service District Commission	4
Mt. Pleasant Water Works Commission	3
North Charleston District	3
North Charleston Sewer District	2
Roper St. Francis Healthcare	4
St. Andrews Parish Park & Recreation Commission	3
St. Andrews Public Service District	3
St. John's Fire District Commission	3
St. Paul's Fire District Commission	3

4.4 - Sea Level Rise

Background

Over the years, sea level rise has threatened the world and coastal communities as more water is added to the ocean and more development occurs at the coast. With the addition of other climate driven events such as storms and flooding, irreversible change is predicted to occur in the coastal regions, especially Charleston County. There are two main causes of sea level rise: the melting of land ice and the expansion of warm seawater. Both of these phenomena add water to the overall Global Mean Sea Level (GMSL). Even small amounts of sea level rise drastically affect flooding incidences and can make rare floods more common. The current rate of sea level rise is 3.2 mm per year. A century ago the rate was about half the amount. This shows that over time the sea level

is rising faster as time goes on. Over the past century sea level has risen 10 to 20 centimeters overall. These data measurements and predictions come from core samples, tide gauge readings and satellite imagery. Tides and storm surge are two indicating factors that demonstrate how a community will be affected by sea level rise in the future. Tides are the daily submergence and reemergence of land due to the rising and falling of the sea based on the lunar cycle. Tides are good indicators of sea level as they are predictable. Tides are rising and flooding coastal zones more frequently and at previously unaffected areas as sea level rises. King tides which are higher than normal high tides coinciding with the alignment of the earth, moon and sun. These tides bring an additional amount of water on land, and in the future these king tides will be the normal high tides. Storm surge is also increasing to become higher than normal as sea level rises with storms becoming more severe and affect areas further inland. Sea level rise can be categorized into two types: eustatic and isostatic, and communities can be ranked based on their coastal vulnerability index.

Classification

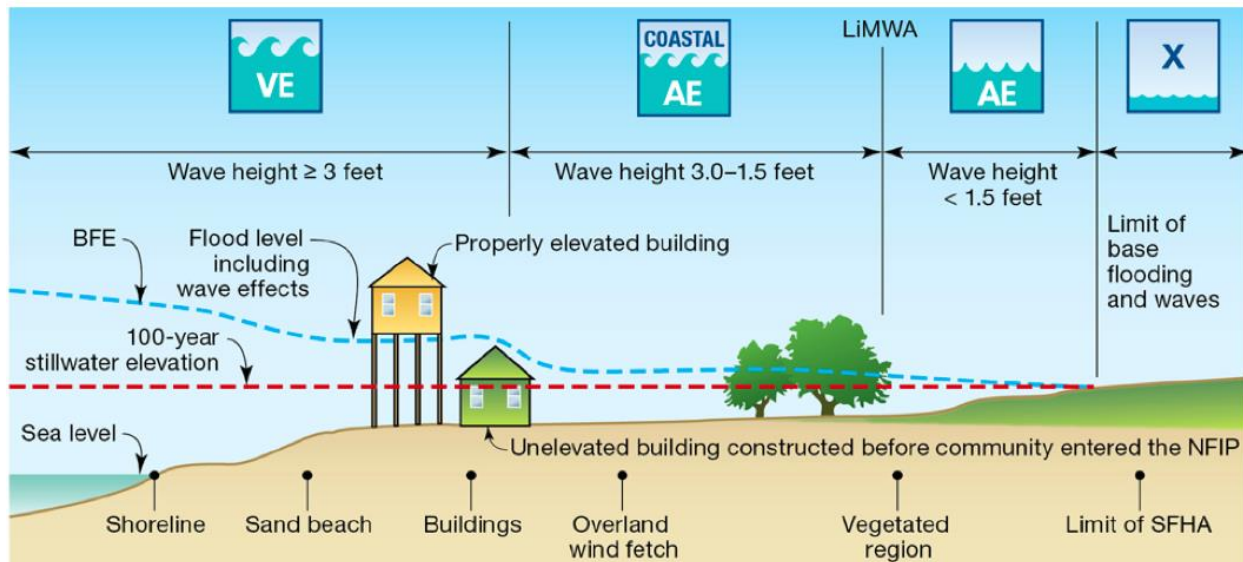
Classifying sea level rise is broad in nature, and case studies of individual areas take a closer look at the effects of sea level rise. There are two types of sea level rise: eustatic and isostatic. Eustatic refers to the global sea level rise and major trends being observed. Isostatic refers to the local sea level rise based on shoreline changes in the area. Sea level rise is occurring globally, but at different scales. Some areas are affected more than others due to their coastal vulnerability, if land is sinking or rising, amount of urbanization and development, and proximity to glaciers. The topography and landforms of Charleston consists of barrier islands and wetlands, which tend to be low lying areas more susceptible to sea level rise. According to the following tables, the Charleston County area would be classified as “very high” on the coastal vulnerability index.

VARIABLE	Ranking of coastal vulnerability index				
	Very low 1	Low 2	Moderate 3	High 4	Very high 5
Geomorphology	Rocky, cliffed coasts Fiords Fiords	Medium cliffs Indented coasts	Low cliffs Glacial drift Alluvial plains	Cobble beaches Estuary Lagoon	Barrier beaches Sand Beaches Salt marsh Mud flats Deltas Mangrove Coral reefs
Coastal Slope (%)	>0.115	0.115 – 0.055	0.055 – 0.035	0.035 – 0.022	< 0.022
Relative sea-level change (mm/yr)	< 1.8	1.8 – 2.5	2.5 – 3.0	3.0 – 3.4	> 3.4
Shoreline erosion/ accretion (m/yr)	>2.0 Accretion	1.0 – 2.0	-1.0 – +1.0 Stable	-1.1 – -2.0	< - 2.0 Erosion
Mean tide range (m)	> 6.0	4.1 – 6.0	2.0 – 4.0	1.0 – 1.9	< 1.0
Mean wave height (m)	<0.55	0.55 – 0.85	0.85 – 1.05	1.05 – 1.25	>1.25

Source: US Department of Interior & US Geological Survey

Location

Flooding and tidal flooding is a good indicator of what areas are most at risk for sea level rise and the stressors that accompany it: nuisance flooding, increased storm surge, loss of property. Land in the most susceptible flood zones (AE and VE) will be most affected as sea level continues to rise. Areas of the most susceptibility include Eastern Folly Beach and Morris Island, the tips of Sullivan’s Island, the northeastern coast of James Island near SC-30 and Harbor View Rd., all of Kiawah Island, especially laterally along the banks of the Kiawah River, all of Seabrook and Edisto’s coastline, eastern Isle of Palms and Caper’s Island, all of Awendaw’s coastline, and the northeastern coastline of Murphy Island and the coast of the Dunes West Golf and Resort Club. Below is an illustration of the definitions of the different flood zones:



Amount of Land Area of Charleston County Above Sea Level

Elevation above spring high water (m)	0.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00
Area of Land (sq. km)	108.6	175.5	223	305.5	344.2	421.8	464.9	587.2	684.4	858.2
Percent of Total Land Cover	4.6%	7.4%	9.4%	12.9%	14.5%	17.8%	19.6%	24.8%	28.9%	36.2%

Probability

While sea level rise predictions vary on how much the sea level will rise, there is a general consensus that sea level will continue to rise. According to the Intergovernmental Panel on Climate Change (IPCC), the ocean is expected to rise 11 to 38 inches by the year 2100. This would have dramatic effects on Charleston County and other coastal communities across the East Coast.

It is also predicted that the number of king tides will increase in 2019, as well. Below is a list of the predicted dates of king tides from SC Department of Health and Environmental Control. There is a 100% that all jurisdictions will feel the effects of sea level rise though the same effects may not be felt everywhere in the County. The vulnerability and impact of the hazard is discussed later in the Plan. Those areas located in flood zones will experience more of the effects, namely water damage to existing infrastructure, road damage, traffic hazards, personal property damage, etc. The vulnerability and impact of the hazard is discussed later in the Plan.

2019 Predicted King Tides
January 21-22
April 19-20
July 3-4
July 30-August 3
August 28-September 1
September 25-October 2
October 26-31
November 25-28

Likelihood of Event Any Year
1. 0-25% chance
2. 26-50% chance
3. 51-75% chance
4. 76-100% chance

Sea Level Rise/King Tide Probability for each Jurisdiction	
Jurisdiction	Probability
Unincorporated Charleston County	3
Town of Awendaw	4
Town of Hollywood	3
Town of James Island	3
Town of Lincolnville	1
Town of McClellanville	3
Town of Meggett	2
Town of Ravenel	2
Town of Rockville	2
Town of Seabrook Island	4
City of Charleston	4
City of Folly Beach	4
City of Isle of Palms	4
City of North Charleston	2
Town of Kiawah Island	4
Town of Mt. Pleasant	3
Town of Sullivan's Island	4
Charleston County Parks & Recreation Commission	3
Charleston County School District	2
Charleston Water System	3
College of Charleston	3
Cooper River Parks & Playground Commission	2
James Island Public Service District Commission	4
Mt. Pleasant Water Works Commission	3
North Charleston District	2
North Charleston Sewer District	2
Roper St. Francis Healthcare	3
St. Andrews Parish Park & Recreation Commission	3
St. Andrews Public Service District	3
St. John's Fire District Commission	4
St. Paul's Fire District Commission	4

4.5 - Earthquake

Background

An earthquake is a sudden, rapid shaking of the earth caused by the breaking and shifting of rock beneath the earth's surface. Most earthquakes are caused by the release of stresses accumulated as a result of the rupture of rocks along opposing fault planes in the Earth's outer crust. These fault planes are typically found along borders of the Earth's 10 tectonic plates. The areas of greatest tectonic instability occur at the perimeters of the slowly moving plates, as these locations are subjected to the greatest strains from plates traveling in opposite directions and at different speeds. Deformation along plate boundaries causes strain in the rock and the consequent buildup of stored energy. When the built-up stress exceeds the rocks' strength, a rupture occurs. The rock on both sides of the fracture is snapped, releasing the stored energy and producing seismic waves, generating an earthquake. Ground acceleration caused by earthquakes has the potential to destroy buildings and infrastructure and cause loss of life. Aftershocks are typically smaller than the main shock, and can continue over a period of weeks, months, or years after the initial earthquake is felt. In addition to the effects of ground acceleration, earthquakes can also cause landslides, and liquefaction under certain conditions. Liquefaction occurs when unconsolidated, saturated soils exhibit fluid-like properties due to intense shaking and vibrations experienced during an earthquake. Together, ground shaking, landslides, and liquefaction can damage and destroy buildings, disrupt utilities (i.e. gas, electric, phone, water), and trigger fires.

Classification

Earthquakes are measured in terms of intensity and magnitude. Magnitude is measured with the Richter Scale, which is an open-ended logarithmic scale that describes the energy of an earthquake through the measure of shock wave amplitude. Intensity uses the Modified Mercalli Intensity (MMI) scale to measure the effects of an earthquake at a particular place.

Magnitude and Intensity Rating	
Richter Magnitude Scale	Typical Maximum MMI
1.0 to 3.0	I
3.0 to 3.9	II to III
4.0 to 4.9	IV to V
5.0 to 5.9	VI to VII
6.0 to 6.9	VII to IX
7.0 and Higher	VIII or Higher

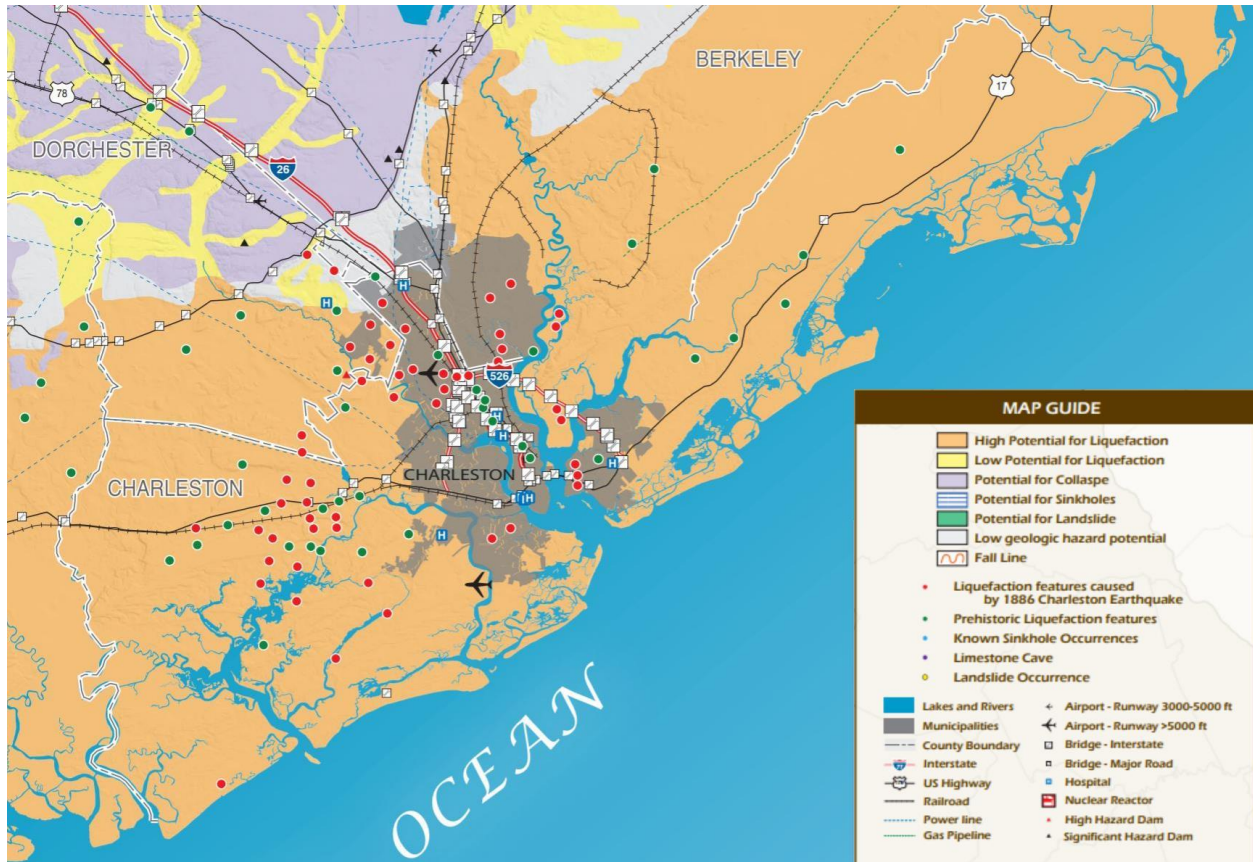
Modified Mercalli Intensity Scale		
Scale	Intensity	Description of Effects
I	Instrumental	Detected only on seismographs.
II	Feeble	Some people feel it.
III	Slight	Felt by people resting; like a truck rumbling by.
IV	Moderate	Felt by people walking.
V	Slightly Strong	Sleepers awake; church bells ring.
VI	Strong	Trees sway; suspended objects swing, objects fall off shelves
VII	Very Strong	Mild alarm; walls crack; plaster falls.
VIII	Destructive	Moving cars uncontrollable; masonry fractures, poorly constructed buildings damaged.
IX	Ruinous	Some houses collapse; ground cracks; pipes break
X	Disastrous	Ground cracks profusely; many buildings destroyed; liquefaction and landslides widespread.
XI	Very Disastrous	Most buildings and bridges collapse; roads, railways, pipes and cables destroyed; general triggering of other hazards.
XII	Catastrophic	Total destruction; trees fall; ground rises and falls in waves.

Source: Federal Emergency Management Agency

The most significant earthquake to happen in the Charleston Region was in 1886, when an estimated 7.3M occurred in Summerville, SC outside of Charleston. This earthquake was the most destructive, killing 60 people and causing \$5 to \$6 million (1886) worth of damage. This was the largest known earthquake on the east coast and is the type of event that occurs only every 500 years.

Location

Earthquakes are not an uncommon occurrence in South Carolina. The majority of earthquakes worldwide occur at plate boundaries when plates stick and then jump past each other. The cause of earthquakes in South Carolina is not so clear; the quakes are located within a plate rather than at a plate boundary. In South Carolina, approximately 70 percent of the earthquakes occur in the Coastal Plain and most are located around three areas west and north of Charleston: Ravenel-Adams Run-Hollywood, Middleton Place - Summerville, and Bowman. Geologically, Charleston lies in one of the most seismically active areas in the Eastern United States. This seismic cluster is known as the Middleton Place - Summerville Seismic Zone (MPSSZ).



Source: SC DNR Geologic Hazard of the South Carolina Coastal Plain 2012

Probability

Since different magnitude levels are felt from short to long ranges, we can include there is a highly likely chance that the whole Region can experience an earthquake or the aftershocks on one, causing minor to severe damage or loss of life. The earthquake of 1886 was estimated to be a 1 in 500-year event, meaning there is an estimated 0.2% chance of a comparable earthquake happening again any given year. Over the last 5 years, there has been an average of 3.4 small events per year, making the probability of continuing to have small events very likely on any given year for all Charleston County jurisdictions. Because most earthquakes in Charleston are around or below a 2.0 on the Richter scale, damages are minimal if not non-existent across all jurisdictions. Overall there is a higher probability of a small earthquake happening than a large earthquake occurring at any given year, therefore it is stated that there is 100% chance that an earthquake will occur within the County. The vulnerability and impact of the hazard is discussed later in the Plan. Below is a breakdown of probability of occurrence based on jurisdiction:

Probability of Damaging Earthquake Ground Motion

Based upon the 2014 National Seismic Hazard Map (Petersen et al., 2014), Charleston County lies within the zone of the greatest earthquake hazard on the east coast of the United States. More than 90% of Charleston County can expect to experience damaging earthquake ground motions (>10% of the acceleration of gravity or Modified Mercalli Intensity VI or greater) during a 1 in 475 return period earthquake (i.e., 10% in 50 year probability). For the most densely populated parts of the county (Charleston metropolitan region), this goes up >20% of the acceleration of gravity

(or Modified Mercalli Intensity VII or greater). In the northwestern part of Charleston County closest to the source of the 1886 earthquake the expected ground motion during a 1 in 475 earthquake is >30% of the acceleration of gravity (or Modified Mercalli Intensity VIII or greater).

Reference:

Petersen, M.D., Moschetti, M.P., Powers, P.M., Mueller, C.S., Haller, K.M., Frankel, A.D., Zeng, Yuehua, Rezaeian, Sanaz, Harmsen, S.C., Boyd, O.S., Field, Ned, Chen, Rui, Rukstales, K.S., Luco, Nico, Wheeler, R.L., Williams, R.A., and Olsen, A.H., 2014, Documentation for the 2014 update of the United States national seismic hazard maps: U.S. Geological Survey Open-File Report 2014-1091, 243 p., <https://dx.doi.org/10.3133/ofr20141091>.

Likelihood of Event Any Year
1. 0-25% chance
2. 26-50% chance
3. 51-75% chance
4. 76-100% chance

Earthquake Probability for each Jurisdiction	
Jurisdiction	Probability
Unincorporated Charleston County	4
Town of Awendaw	2
Town of Hollywood	2
Town of James Island	2
Town of Lincolnton	4
Town of McClellanville	2
Town of Meggett	2
Town of Ravenel	2
Town of Rockville	2
Town of Seabrook Island	2
City of Charleston	3
City of Folly Beach	2
City of Isle of Palms	2
City of North Charleston	4
Town of Kiawah Island	2
Town of Mt. Pleasant	2
Town of Sullivan’s Island	2
Charleston County Parks & Recreation Commission	2

Charleston County School District	3
Charleston Water System	3
College of Charleston	3
Cooper River Parks & Playground Commission	4
James Island Public Service District Commission	2
Mt. Pleasant Water Works Commission	2
North Charleston District	3
North Charleston Sewer District	4
Roper St. Francis Healthcare	3
St. Andrews Parish Park & Recreation Commission	3
St. Andrews Public Service District	3
St. John's Fire District Commission	2
St. Paul's Fire District Commission	2

4.6 - Tornado

Background

A tornado is a violently rotating column of air forming a funnel-shaped cloud that extends toward the ground from the base of a thundercloud. They are often referred to as a twister or cyclone although cyclone is a term in meteorology to name any closed low-pressure circulation (e.g. hurricane). This violent storm can produce winds up to 300 miles per hour and can move any direction at an average speed of 30 miles per hour. Tornadoes are most often generated by thunderstorms but sometimes are a result from hurricanes or tropical storms, which is why tornadoes are a threat to the Charleston Region. Tornadoes may form at any time of the year, but the peak of events occurs in the spring and early summer from March through June.

Classification

High winds of tornadoes are the driving force for all damages during a tornado. Picking up debris, and turning them into deadly missiles. It is rare to be able to measure pressure changes and wind speeds of a passing tornado, but it is possible to classify the damage. Mostly, tornadoes cause the greatest damage to structures like residential homes that are lightly constructed and hard to remain localized. The Fujita Scale (F-Scale) was the standard measurement for rating the strength of a tornado. The scale is based on an analysis of damage after a tornado to infer wind speeds. After 2007, the National Weather Service introduced the Enhanced Fujita Scale (EF-Scale). The new scale takes into account quality of construction and standardizes different kinds of structures. The only differences between the two are the adjusted wind speeds.

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

Source: National Oceanic and Atmospheric Administration

The strongest tornado in the Charleston Region was an EF2 tornado that had maximum winds reaching 120mph. The tornado touched down near Morris Acres on Johns Island in 2015. It is possible for a stronger tornado to impact the Charleston Region, though most of the tornado reports are unconfirmed or are a confirmed EF0 tornado.

Location

Tornadoes are not limited to specific geographic regions, although they are most common in states like Oklahoma, Texas, and Kansas. Tornadoes have been documented in every state within the United States. Hurricanes are the biggest threat to the Region and since a hurricane can produce a tornado then the whole Charleston Region is vulnerable to the threat of a tornado during a hurricane or tropical storm. Tornadoes can form over water as well as land.

Probability

According to the National Climatic Data Center and the National Oceanic and Atmospheric Administration, there is approximately one tornado every year in Charleston County. However, there is around a 94% chance it will be classified an EF1 or below. The probability of a tornado is equal across all jurisdictions in Charleston County. No specific jurisdictions have a greater chance of experiencing stronger effects from a tornado. A tornado above EF1 has only occurred twice in

the Region’s history. It is possible for a stronger tornado to impact the area. The vulnerability and impact of the hazard is discussed later in the Plan.

Likelihood of Event Any Year
1. 0-25% chance
2. 26-50% chance
3. 51-75% chance
4. 76-100% chance

Tornado Probability for Each Jurisdiction	
Jurisdiction	Probability
Unincorporated Charleston County	2
Town of Awendaw	1
Town of Hollywood	1
Town of James Island	1
Town of Lincolville	1
Town of McClellanville	1
Town of Meggett	1
Town of Ravenel	1
Town of Rockville	1
Town of Seabrook Island	1
City of Charleston	1
City of Folly Beach	1
City of Isle of Palms	1
City of North Charleston	1
Town of Kiawah Island	1
Town of Mt. Pleasant	1
Town of Sullivan’s Island	1
Charleston County Parks & Recreation Commission	1
Charleston County School District	3
Charleston Water System	1
College of Charleston	1
Cooper River Parks & Playground Commission	1
James Island Public Service District Commission	1
Mt. Pleasant Water Works Commission	1
North Charleston District	1
North Charleston Sewer District	1
Roper St. Francis Healthcare	1
St. Andrews Parish Park & Recreation Commission	1
St. Andrews Public Service District	1
St. John’s Fire District Commission	1
St. Paul’s Fire District Commission	1

4.7 – Hazardous Materials

Background

In most places, chemicals and hazardous materials surround communities. Hazardous materials come in many different forms and incidents can happen in fixed or mobile facilities. Hazardous materials are stored in homes and businesses throughout but also are shipped daily throughout communities through the highways, waterways, railways, or through pipelines. Incidents involving hazardous materials can include spilling, emitting, discharging, disposing, leaking, or escaping into the environment of any hazardous material. These materials, in their various forms, can cause injury, long-term health problems, damage to property, and even death.

Classification

The United States Department of Transportation regulates hazmat transportation within the territory of the U.S. The Federal Motor Carrier Safety Administration was established as a separate administration within the U.S. Department of Transportation in 2000 to reduce crashes, injuries, and fatalities involving large trucks and buses. Together they develop and enforce safety regulations, and educate about hazardous materials. The U.S. Department of Transportation uses a standard system of nine classes that identify different hazardous materials. These nine classifications must be labeled on all hazardous materials even if they are in mobile or fixed facilities.



Class 1: Explosives: Materials with an explosion, projection, fire, or blast hazard.

Class 2: Gases: Flammable or non-flammable compressed gases, toxic or non-toxic.

Class 3: Flammable liquids: Flammable liquids (flash point below 141°) and combustible liquids (flash point 141°-200°).

Class 4: Flammable Solids: Flammable solids, spontaneously combustible and dangerous when wet materials.

Class 5: Oxidizer and Organic Peroxide

Class 6: Toxic Materials: Poisonous materials and infectious substances.

Class 7: Radioactive Materials: Materials that emit radiation.

Class 8: Corrosive Materials: Materials that cause destruction of human skin at site of contact or corrosion rate on steel or aluminum.

Class 9: Miscellaneous: Materials that present a hazard during transport but do not meet other class definitions (ex. dry ice or lithium batteries).

The Charleston Region has experiences minor incidents relating to hazardous materials such as natural gas leaks, chemical spills, automobile accident cleanups and more. No serious incidents or injuries have been reported due to a hazardous materials incident.

Location

The Charleston Region is a rapidly growing international port with many industries and growing businesses. The Charleston Region also has a United States Air Force Base and several other smaller military establishments, which handle various types and quantities of hazardous materials. Hazardous materials are a continuous potential hazard due to the large amount of transportation of these materials occurring in and around the Region.

Probability

Hazardous Materials are located in residential and commercial locations throughout the Region. Gas leaks and automobile accidents occur frequently in both locations. Since the Charleston Region is a growing international port and military base location, the transportation of hazardous materials happens every day. Each jurisdiction in Charleston County has a 100% chance of hazardous material incidents occurring each year but no major incidents or related injuries are expected. The jurisdictions that are at an increased threat level are the City of Charleston, the Town of Mount Pleasant and the City of North Charleston due to industry, commerce, tourism, and locations of the Charleston Port and Charleston International airport. The vulnerability and impact of the hazard is discussed later in the Plan.

Likelihood of Event Any Year
1. 0-25% chance
2. 26-50% chance
3. 51-75% chance
4. 76-100% chance

Hazardous Material Incident Probability for Each Jurisdiction	
Jurisdiction	Probability
Unincorporated Charleston County	3
Town of Awendaw	3
Town of Hollywood	3
Town of James Island	3
Town of Lincolnton	3
Town of McClellanville	3
Town of Meggett	3
Town of Ravenel	3
Town of Rockville	3
Town of Seabrook Island	3
City of Charleston	4
City of Folly Beach	3
City of Isle of Palms	3
City of North Charleston	4

Town of Kiawah Island	3
Town of Mt. Pleasant	4
Town of Sullivan's Island	3
Charleston County Parks & Recreation Commission	3
Charleston County School District	2
Charleston Water System	4
College of Charleston	4
Cooper River Parks & Playground Commission	4
James Island Public Service District Commission	3
Mt. Pleasant Water Works Commission	4
North Charleston District	4
North Charleston Sewer District	1
Roper St. Francis Healthcare	3
St. Andrews Parish Park & Recreation Commission	3
St. Andrews Public Service District	3
St. John's Fire District Commission	2
St. Paul's Fire District Commission	3

4.8 - Terrorism

Background

Terrorism is commonly defined as the use of violence and threats to intimidate or coerce in the pursuit of political, religious, or any ideological goal with disregard to the safety of innocent humans. Terrorism is often described as both a tactic and strategy or a crime and a holy duty. The U.S. Department of Defense, The Federal Bureau of Investigation (FBI) and the U. S. Department of State all defined terrorism differently but all definitions have the same key elements of violence, intimidation, and fear.

Classification

Terrorism can be in the form of many different threats like kidnapping, hijacking, bombings, assassinations and the use of chemical, nuclear, or biological weapons. All of these threats range from minimal to extreme losses of life, injury, destruction of property and economic loss. Military or civilian government facilities, airports, large cities, public gatherings and landmarks are often high-risk targets for acts of terrorism. The following are main terrorism threats from the Federal Emergency Management Agency and the U.S. Department of Homeland Security that are used in a terrorism situation.

Explosions: An explosive device is one of the most common weapons among terrorist. They are highly portable and can be easily detonated from remote locations or by suicide bombers. Information for making an explosive device is readily available to anyone. Bombs have been used to damage or destroy political, financial and religious institutions. The aftermath of an explosion can lead to other threats like fire and the damage extent is unpredictable.

Biological threats: Biological agents are toxins or organisms that can kill or incapacitate people, crops, and livestock. An attack is when there is a deliberate release of biological substances or germs through the air, animals, food/water, and humans. The three basic groups of biological agents that would likely be used as weapons are bacteria, viruses and toxins. If encountered, humans should contact authorities of any unusual and suspicious substances.

Chemical threats: Chemical agents are poisonous liquids, solids, vapors and aerosols that have toxic effects on people, animals or plants. Agents can be released by bombs, or sprayed from vehicles or aircraft. A chemical attack could come without warning, and the agents are usually odorless and tasteless with effects like irritation, nausea, burning sensations or difficulty breathing. While potentially lethal, chemical agents are difficult to deliver in lethal concentrations but signs of a release can have immediate effects or a delayed effect.

Nuclear blast: Is an explosion with intense light and heat, a damaging pressure wave, and widespread radioactive material that contaminates the air, water and ground for miles. A nuclear device can be transported by an individual or by an intercontinental missile launched by a terrorist group or hostile nation. Deadly effects are associated with a nuclear blast like intense heat (thermal radiation), initial nuclear radiation, fires and blinding light. The extent, nature and arrival time of these hazards are difficult to predict.

Radiological dispersion device (RDD): Also known as a “dirty bomb” is considered more likely than use of a nuclear explosive device. A RDD combines a conventional explosive device with radioactive material. It scattered dangerous and sub-lethal amounts of radioactive material over an area. RDDs don’t require much technical knowledge to build or deploy, and the radioactive material are easier to obtain compared to nuclear weapons with uranium or plutonium.

Cyber-attack: Unlike physical threats, cyber threats are often difficult to identify and comprehend. Cyber-attacks can be intruders breaking into systems and altering files, using your computer to attack others, stealing confidential information, or erasing entire systems or files. Some attacks are more serious than others and can have wide ranging effects on individuals, organizations and at the national level. Risks include disrupted services or power to transportation, data breaches with organizations or governments and an intrusion on individuals obtaining their personal information.

Homeland Security Advisory System

The U.S. Department of Homeland Security designed the Homeland Security Advisory System to provide a national framework and comprehensive means to disseminate information regarding the risk of terrorist acts to government authorities, private sector, and the American people. It provides warnings in the form of a set of graduated “threat conditions” that increase as the risk of the threat increases. Each level will provide suggested protective measures that the government, private sector and the public can take. Alerts are heard through their website, or media channels.



The Region hasn't experienced a major threat or attack but do see many isolated incidents of domestic terrorism like shootings and bomb threats. Area police and emergency teams regularly perform drills to be prepared in case of a terrorist attack.

Location

The Charleston Region is always at risk of being targeted for a terrorist attack due to the Charleston Port. With Charleston being a major metropolitan area, it is subjected to possible terrorist attacks. With attacks ranging from size and destruction, the whole Region could experience the effects of a terrorist attack.

Probability

There is no evidence to suggest there is any substantial risk for a terrorist event. However, specific jurisdictions, Town of Mt. Pleasant and City of Charleston, have an increased probability of experiencing a terrorist attack due to the location of the Charleston Port and centralized tourism areas as well as the school district as it is a high concentration of a vulnerable population. The vulnerability and impact of the hazard is discussed later in the Plan.

Likelihood of Event Any Year
1. 0-25% chance
2. 26-50% chance
3. 51-75% chance
4. 76-100% chance

Terrorism Probability for Each Jurisdiction	
Jurisdiction	Probability
Unincorporated Charleston County	1
Town of Awendaw	1
Town of Hollywood	1
Town of James Island	1
Town of Lincolnton	1
Town of McClellanville	1
Town of Meggett	1
Town of Ravenel	1
Town of Rockville	1

Town of Seabrook Island	1
City of Charleston	2
City of Folly Beach	2
City of Isle of Palms	1
City of North Charleston	2
Town of Kiawah Island	1
Town of Mt. Pleasant	2
Town of Sullivan’s Island	1
Charleston County Parks & Recreation Commission	1
Charleston County School District	2
Charleston Water System	1
College of Charleston	1
Cooper River Parks & Playground Commission	2
James Island Public Service District Commission	1
Mt. Pleasant Water Works Commission	1
North Charleston District	1
North Charleston Sewer District	1
Roper St. Francis Healthcare	1
St. Andrews Parish Park & Recreation Commission	1
St. Andrews Public Service District	1
St. John’s Fire District Commission	1
St. Paul’s Fire District Commission	1

4.9 - Wildfire

Background

According to the South Carolina Forestry Commission, any forest fire, brush fire, grass fire, or any other outdoor fire that is not controlled and supervised is called a wildfire. These fires cause damage to the forest resource as well as wildlife habitat, water quality, and air quality. All though wildfires are considered dangerous, they are a natural process in the environment in order to clear dead vegetation. Anything that can burn is considered fire fuel, like branches, pine needles, and dead leaves. The most common cause of wildfires however is by negligent human behavior (debris burning, fireworks, arson). Another common cause of wildfires is lightning strikes but only two percent of wildfires in South Carolina are attributed to lightning, however weather is an important factor in dealing with wildfires. Wind, humidity and droughts will have an effect on the spread and flammability of wildfires. Forest fire danger is usually highest in late winter and early spring (January through mid-April). South Carolina's fire season is in the winter because most vegetation is dead or dormant during that time. Fires do not start or spread as quickly when vegetation is green. Of course the increasing concern is the threat wildfires pose to homes and lives of people

and animals. Wildfires burn 20-30 homes in the state every year, and hundreds more are threatened each fire season.

Classification

There are three classes of wildfires: surface fire, ground fire, and crown fire. A surface fire is the most common of these three classes moving slowly burns along a forest floor. A ground fire (muck fire) is usually started by lightning or human carelessness and burns on or below the forest floor. Crown fires spread rapidly by wind and move quickly by jumping along the tops of trees. The northeast part of Charleston County holds the Francis Marion National Forest, a large expanse of land that is home to many native plants and animals. The most significant fire to occur in our Region happened within the Francis Marion National Forest in March of 2011 when 2,600 acres along the Charleston/Georgetown County line burned. The fire also burned two buildings, and residents within a six-mile area were voluntarily evacuated.

Location

Wildfire is a potentially serious threat in the Charleston Region, particularly in areas with a high density of vegetation and areas within or surrounding the Francis Marion National Forest. Areas where there is an urban-wild land interface like (St. John’s Fire District) are also at risk. Even urban areas within the Region pose the threat of wildfires, since they are defined as uncontrolled fires, which most fires are. For the purpose of this plan, all areas, buildings and facilities are considered to be equally exposed.

Probability

The most significant fire in the last decade was located in March of 2011 along the Charleston/Georgetown County line with most of the burned area located within Georgetown County. However, wildfire can affect the whole Region and force evacuation of people. Since only around half of the county has protected acreage of rural land which can be affected by wildfire, there are other events like vehicle fires, house fires and marine fires that can happen anywhere within the Region. Acreages burned between the years of 1946–2017 have varied. It is unpredictable how much land will be damage per year or where a fire will occur.

In any given year, it’s expected that there will be between 32 and 114 wildfires per year, and between 691 and 992 acres burned according to the 5 year and 50 year averages. All jurisdictions within Charleston County have a probability of being affected by a wildfire, but some more rural areas have an increased risk. These jurisdictions include: Awendaw, Hollywood, Meggett and Ravenel, as well as those close to Francis Marion National Forest (Town of Mt. Pleasant, Unincorporated Charleston County and Town of McClellanville). The vulnerability and impact of the hazard is discussed later in the Plan. Refer to Appendix A.11 for more detail on wildfires.

Wildfire Averages for Charleston County				
Averages	5 Year	10 Year	15 Year	20 Year
Fires	12	19	63	50
Acres	159.1	469.0	618.3	527.3

Source: South Carolina Forestry Commission

Likelihood of Event Any Year
1. 0-25% chance
2. 26-50% chance
3. 51-75% chance

4. 76-100% chance

Wildfire Probability for Each Jurisdiction	
Jurisdiction	Probability
Unincorporated Charleston County	3
Town of Awendaw	2
Town of Hollywood	2
Town of James Island	1
Town of Lincolnville	1
Town of McClellanville	2
Town of Meggett	2
Town of Ravenel	2
Town of Rockville	1
Town of Seabrook Island	1
City of Charleston	2
City of Folly Beach	1
City of Isle of Palms	1
City of North Charleston	1
Town of Kiawah Island	1
Town of Mt. Pleasant	2
Town of Sullivan’s Island	2
Charleston County Parks & Recreation Commission	2
Charleston County School District	2
Charleston Water System	1
College of Charleston	1
Cooper River Parks & Playground Commission	1
James Island Public Service District Commission	1
Mt. Pleasant Water Works Commission	1
North Charleston District	1
North Charleston Sewer District	1
Roper St. Francis Healthcare	1
St. Andrews Parish Park & Recreation Commission	1
St. Andrews Public Service District	1
St. John’s Fire District Commission	2
St. Paul’s Fire District Commission	2

4.10 - Tsunamis

Background

Tsunami is a Japanese word for “harbor wave”. Tsunamis are a series of waves caused from vertical faulting beneath the sea, underwater landslides, meteorite impacts, or volcanic explosions above or below water. From where the waves originate, they move outward in all directions. The waves can travel up to speeds of 500 miles per hour in deep water to 30 miles per hour in shallow water. At its origin in the deep ocean, the wave may only be a few inches, but as it approaches shore it builds in height. As they slow in shallower water, it causes them to effectively pile up and wave heights dramatically increase up to several meters high. As opposed to typical waves which crash at the shoreline, tsunamis bring with them a continuously flowing ‘wall of water’ with the potential to cause devastating damage in coastal areas located immediately along the shore. Tsunamis are generally considered to be a significant hazard threat primarily for land areas near the Pacific Ocean, and are considered to be a rare phenomenon in the Atlantic Ocean.

Classification

The National Oceanic and Atmospheric Administration (NOAA) is the primary agency for providing tsunami warnings, with roles in research and observations as well. They create maps that help identify areas of likely tsunami flooding for at-risk communities. Forecast models and Inundation models are provided to the NOAA’s Weather Service forecasters to provide information to emergency managers, planners, and states. The DART system (Deep-ocean Assessment and Reporting of Tsunamis) is a real-time tsunami monitoring system positioned at strategic locations throughout the ocean for forecasting purposes. Most tsunamis are measured by height of the wave. These monitoring devices detect irregularities in the ocean and can determine the height of the wave once it hits shore and how much time it will take to reach shore. Damage ranges from the height of the wave when hitting shore, and debris carried from them onto shore create the most damage and drowning being the leader in deaths.

There are reports of 1 event in 1886, though information on damage or extent is extremely limited. The tsunami is likely tied to the record earthquake that occurred on August 31st, 1886. The entire Eastern coastline was rated as having a “Very low to low” probability of a tsunami event in a 500-year timeframe by the USGS and Department of the Interior. Preparedness measures are similar to a hurricane. Charleston has a tsunami warning buoy 425 miles off the coast and was designated as a “Tsunami Ready Community” in 2006.

Location

A tsunami poses the threat on all coastal communities even though tsunamis are generally considered to be a significant hazard threat primarily for land areas near the Pacific Ocean, and are considered to be a rare phenomenon in the Atlantic Ocean. Historical evidence does indicate that tsunamis have affected the Eastern United States but are not the result of traditional sources of tsunami waves (i.e., subduction zones such as the Cascadia Subduction Zone in the Pacific Ocean). They are typically the result of slumping or land sliding associated with local earthquakes or with wave action associated with strong storms such as hurricanes. Other possible causes of tsunami-like activity along the East Coast could include explosive decompression of underwater methane deposits, the impact of a heavenly body (i.e., an asteroid, comet or oceanic meteor splashdown), or a large underwater explosion. The Charleston County area is not an “at-risk” area for a significant type of Atlantic Ocean tsunamis. Consequently, the Charleston County area would not generally be expected to experience a tsunami but as with any coastal community along the Atlantic Ocean, there is still an extremely remote chance of events happening that can cause a tsunami.

Historical Occurrences

With the report of 1 event with limited information on damage and extent which was likely tied to the record earthquake that occurred on August 31st, 1886, the Charleston Region hasn't experienced any tsunami events since. Through the National Climatic Data Center from National Oceanic and Atmospheric Administration (NOAA), the database shows zero events from the years 2008 through April 30th, 2019.

Probability

There is no evidence to suggest there is any substantial risk for a tsunami event for any jurisdiction within Charleston County. Should one occur, coastal areas would experience the greatest effects (City of Charleston, Town of Kiawah Island, Town of Seabrook Island, City of Folly Beach, Town of Sullivan's Island and City of Isle of Palms). The vulnerability and impact of the hazard is discussed later in the Plan.

Likelihood of Event Any Year
1. 0-25% chance
2. 26-50% chance
3. 51-75% chance
4. 76-100% chance

Tsunami Probability for Each Jurisdiction	
Jurisdiction	Probability
Unincorporated Charleston County	1
Town of Awendaw	1
Town of Hollywood	1
Town of James Island	1
Town of Lincolnville	1
Town of McClellanville	1
Town of Meggett	1
Town of Ravenel	1
Town of Rockville	1
Town of Seabrook Island	1
City of Charleston	1
City of Folly Beach	1
City of Isle of Palms	1
City of North Charleston	1
Town of Kiawah Island	1
Town of Mt. Pleasant	1
Town of Sullivan's Island	1
Charleston County Parks & Recreation Commission	1
Charleston County School District	1
Charleston Water System	1
College of Charleston	1
Cooper River Parks & Playground Commission	1
James Island Public Service District Commission	1

Mt. Pleasant Water Works Commission	1
North Charleston District	1
North Charleston Sewer District	1
Roper St. Francis Healthcare	1
St. Andrews Parish Park & Recreation Commission	1
St. Andrews Public Service District	1
St. John's Fire District Commission	1
St. Paul's Fire District Commission	1

4.11 - Dam Failure

Background

Dam failure is the collapse, breach, or any incident that compromises a dam structure resulting in downstream flooding. The energy of the water stored behind a dam is capable of causing loss of life and severe property damage downstream of the dam. Dam failure can be the result of human-induced or natural events. Design error, poor maintenance and terrorism acts are examples of human-induced events, while earthquake, prolonged rainfall (flooding) and erosion are natural events that can cause structural damage to dams resulting in failure.

Classification

A series of dam failures in the 1970s resulted in a national focus on inspecting and regulating dams. States are primarily responsible for protecting their populations from dam failure. State governments regulate about 90 percent of the approximately 84,000 dams in the United States. The federal government only owns or regulates only 5% of the dams in the United States. About 27,000 dams throughout our Nation could incur damage or fail, resulting in significant property damage, lifeline disruption (utilities), business disruption, displacement of families from their homes, and environmental damage.

The federal government has used the National Dam Safety Program (NDSP) to protect Americans from dam failure for over 30 years. The NDSP is a partnership of the states, federal agencies and other stakeholders that encourages individual and community responsibility for dam safety, which includes information, training, grant assistance and research. There are also many partners of the NDSP like the Interagency Committee on Dam Safety, National Dam Safety Review Board, and the Association of State Dam Safety Officials (ASDSO) which is a non-profit organization that supports dam safety programs and communities.

Since states are primarily responsible for their dams, South Carolina passed the S.C. Dams and Reservoirs Safety Act in 1977. The act protects citizen's health, safety, and welfare by creating a regulatory program to reduce the risk of failure of dams. The law confers upon the Department of Health and Environmental Control as the regulatory authority to accomplish the purposes of the act. The act also provides a classification for potential hazards that pertain to potential loss of human life or property damage in the event of failure or improper operation of the dam or appurtenant works.

Dam Failure Hazard Potential Classification	
Classification	Hazard Potential
High Hazard (Class I)	Dams located where failure will likely cause loss of life or serious damage to homes, industrial and commercial facilities, important public utilities, main highway(s) or railroads.
Significant Hazard (Class II)	Dams located where failure will not likely cause loss of life but may damage homes, industrial and commercial facilities, secondary highway(s) or railroads or cause interruption of use or service of relatively important public utilities.
Low Hazard (Class III)	Dams located where failure may cause minimal property damage to others. Loss of life is not expected.

Source: South Carolina Department of Health & Environmental Control

There are two dams that could impact areas of the Charleston County. The Pinopolis Dam could temporarily flood parts of North Charleston with up to 15.4 feet of water. The Santee Dam could temporarily flood McClellanville with up to 22.7 feet of water. To this date, there hasn't been any major historical event.

Location

Dam failures are extremely rare events. Santee Cooper, a state-owned utility, operates both the Santee Dam and the Pinopolis Dam System, a failure of which could affect areas within Charleston County. A catastrophic failure at either of these dams would create flooding within the Charleston County area, and would be a significant event. The most likely root cause of such a failure would be an earthquake of a larger magnitude than 7.6 on the Richter scale or perhaps an act of terrorism. While dam failure is unlikely, it is possible that the Charleston County area could experience dam-related flooding.

Historical Occurrences

There have been no recorded historical incidents regarding the Santee Cooper Dam and Pinopolis Dam, which are the only two dams that would impact the Charleston Region during a failure.

Probability

There is no evidence to suggest there is any substantial risk for a dam failure. Only two jurisdictions that could be directly at risk should dam failure occur, City of North Charleston and the Town of McClellanville. Either of these jurisdictions would have a 100% probability of flood inundation if either of the two area dams were to fail in each given location. The vulnerability and impact of the hazard is discussed later in the Plan.

Likelihood of Event Any Year
1. 0-25% chance
2. 26-50% chance
3. 51-75% chance
4. 76-100% chance

Dam Failure Probability for Each Jurisdiction	
Jurisdiction	Probability
Unincorporated Charleston County	1
Town of Awendaw	1
Town of Hollywood	1
Town of James Island	1
Town of Lincolntonville	1
Town of McClellanville	3
Town of Meggett	1
Town of Ravenel	1
Town of Rockville	1
Town of Seabrook Island	1
City of Charleston	1
City of Folly Beach	1
City of Isle of Palms	1
City of North Charleston	3
Town of Kiawah Island	1
Town of Mt. Pleasant	1
Town of Sullivan's Island	1
Charleston County Parks & Recreation Commission	1
Charleston County School District	1
Charleston Water System	1
College of Charleston	1
Cooper River Parks & Playground Commission	3
James Island Public Service District Commission	1
Mt. Pleasant Water Works Commission	1
North Charleston District	3
North Charleston Sewer District	3
Roper St. Francis Healthcare	1
St. Andrews Parish Park & Recreation Commission	1
St. Andrews Public Service District	1
St. John's Fire District Commission	1
St. Paul's Fire District Commission	1

4.12 - Rip Currents

Background

Rip currents are powerful channels of water flowing quickly away from shore. As waves travel from deep to shallow water, they break close to the shoreline. As they break, they generate currents that flow in both alongshore and offshore directions. Currents flowing away from the coast are

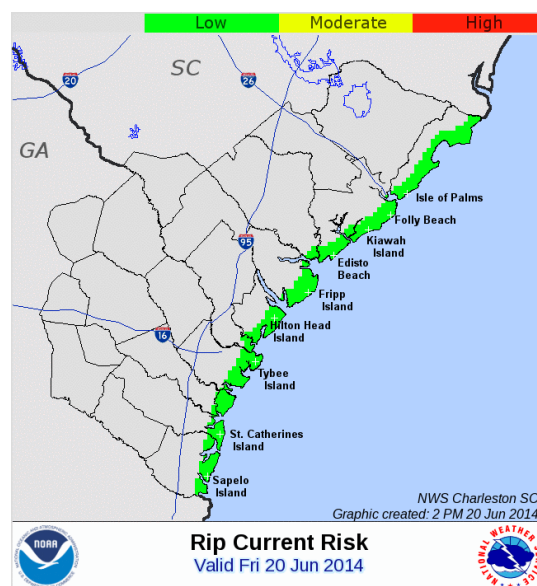
called rip currents. A rip current forms this narrow, fast moving section of water. They can also form when a current traveling along the shoreline encounters a structure and is forced offshore. Rip currents typically form at breaks in sandbars, or at low spots. According to the United States Lifesaving Association, 80% of surf beach rescues are attributed to rip currents, and more than 100 people die annually from drowning in rip currents.

Classification

The National Weather Service Family of Services (FOS), the National Oceanic and Atmospheric Administration (NOAA), Weather Wire Service and the Emergency Manager’s Weather Information Network (EMWIN) created The Surf Zone Forecast in the Summer of 2003. The Surf Zone forecast is issued from the National Weather Service’s Forecast Offices every day. It provides valuable information on the hazards of the surf zone to communities. It describes the precipitation, visibility, wind speed, wind direction, wave height, surf temperature, tide information, rip currents, and more. The Rip Current Outlook portion of the Surf Zone Forecast provides the public with standard terminology for describing the rip current hazard. That terminology is categorized into three sections: Low Risk, Moderate Risk and High Risk.

Rip Current Outlook for the Surf Zone Forecast	
Risk	Description
Low	Wind and/or wave conditions are not expected to support the development of rip currents. However, rip currents can still occur, especially at low spots or breaks in the sandbar and in the vicinity of structures such as groins, jetties and piers. Know how to swim and heed the advice of lifeguards and the beach patrol. Pay attention to flags and posted signs.
Moderate	Wind and/or wave conditions support stronger or more frequent rip currents. Only experienced surf swimmers that know how to escape a rip current should enter the water. Pay attention to flags and posted signs.
High	Wind and/or wave conditions support dangerous rip currents. No one should enter the surf due to this life threatening hazard. Pay attention to flags and posted signs.

Source: National Oceanic and Atmospheric Administration



An example of the Surf Zone Forecast that is issued every day.

In the United States, it is estimated that 100 people will lose their life due to rip currents each year. Extensive signage and education efforts continue to educate beachgoers, though future deaths are possible and unfortunately likely as rip currents occur regularly. In 2014, one person drowned in a rip current in the Charleston Region.

Location

The Charleston Region stretches nearly 100 miles along the Atlantic Ocean. The Region’s beaches are prone to rip currents daily leaving citizens who enjoy the beaches vulnerable to this threat. This type of hazard does not cost damage to buildings or infrastructure but it continues to take lives of residents and visitors on an annual basis. Since majority of people in the Region will experience being around the water at some point, the whole Region can be affected.

Historical Occurrences

According to the National Oceanic and Atmospheric Administration (NOAA) and the National Climatic Data Center (NCDC), rip currents will be listed in Storm Data only when they cause a drowning(s), near-drowning(s), result in numerous rescues (i.e., 5 or more at one beach community), or damage watercraft. Events associated with other surf-related currents, such as long-shore or tidal currents, will not be included in Storm Data as Rip Current events. Rip currents can occur any time and any place along beaches or in other bodies of water.

Probability

Since the Charleston Region is located along the coast, the ocean presents a strong threat to the communities close and away from it. With the beach being a popular location for many in the Region, we can claim that the whole Region is exposed to the threat of a rip current during a beach visit. Rip currents occur every day posing a low to high risk threat. There is a 100% chance that a rip current could occur every day leaving a 100% chance coastal jurisdictions such as the City of Isle of Palms, Town of Sullivan’s Island, Town of Kiawah, and Town of Seabrook, City of Folly Beach, along with Charleston County Parks and Recreation which has beachside parks, could experience this hazard. The vulnerability and impact of the hazard is discussed later in the Plan.

Likelihood of Event Any Year
1. 0-25% chance
2. 26-50% chance
3. 51-75% chance
4. 76-100% chance

Rip Current Probability for Each Jurisdiction	
Jurisdiction	Probability
Unincorporated Charleston County	1
Town of Awendaw	1
Town of Hollywood	1
Town of James Island	1
Town of Lincolnville	1
Town of McClellanville	1
Town of Meggett	1
Town of Ravenel	1

Town of Rockville	1
Town of Seabrook Island	3
City of Charleston	1
City of Folly Beach	4
City of Isle of Palms	4
City of North Charleston	1
Town of Kiawah Island	3
Town of Mt. Pleasant	1
Town of Sullivan’s Island	4
Charleston County Parks & Recreation Commission	3
Charleston County School District	1
Charleston Water System	1
College of Charleston	1
Cooper River Parks & Playground Commission	1
James Island Public Service District Commission	1
Mt. Pleasant Water Works Commission	1
North Charleston District	1
North Charleston Sewer District	1
Roper St. Francis Healthcare	1
St. Andrews Parish Park & Recreation Commission	1
St. Andrews Public Service District	1
St. John’s Fire District Commission	1
St. Paul’s Fire District Commission	1

4.13 - Severe Storm

Background

Severe thunderstorms, wind storms, and hail can occur any day throughout the year. According to the National Weather Service, there are approximately 100,000 thunderstorms that occur in the United States per year and about 25 million lightning flashes a year. Severe thunderstorms are caused by the rapid upward movement of warm, moist air. As the warm moist air moves upward, it cools, condenses, and forms cumulonimbus clouds. Cumulonimbus clouds can move in lines, in clusters, or singularly, and they can move through an area very quickly or linger for hours. These types of clouds which produce thunderstorms also produce lightning, which is a serious threat during a thunderstorm. Along with lightning, thunderstorms can produce other accompanying hazards like windstorms and hailstorms.

Classification

Thunderstorms: Thunderstorms are usually classified as severe when at least wind speeds exceed 58 miles per hour or when hail exceeds 0.75 inch in diameter. Nearly 10% of yearly thunderstorm events are classified as severe. Thunderstorms form and clump together in a variety of different

ways; Single cell, Multi-cell clusters, Multi-cell lines, and Super cells. The term “cell” refers to each separate principal updraft. The more updrafts, the more severe the thunderstorm can be.

Windstorms: Severe thunderstorms have the ability to produce strong winds, typically resulting to be categorized as a windstorm. These high winds can cause downed trees, power lines, flying debris, and damage infrastructures. Wind speeds during a windstorm typically exceed 34 miles per hour which can be attributed to gusts, either short bursts or long periods of sustained winds. Flying debris is the primary cause of damage during high winds.

Lightning: Lightning is a discharge of electrical energy resulting from the buildup of positive and negative charges in cumulonimbus clouds that produce thunderstorms. When the charges are strong enough, it creates a “bolt” of electricity that travels between the cloud and the ground or within the clouds. Lightning can reach temperatures approaching 50,000 degrees Fahrenheit. Thunder is heard from the rapid heating and cooling of the surrounding air following the bolt of lightning. On average, less than 100 people die every year by lightning.

Hailstorms: Hail is produced when ice crystals form due to the rapid rising of warm air into the upper atmosphere and the subsequent cooling of the air mass. Updrafts carry raindrops into parts of the atmosphere where the temperatures are below freezing. These raindrops gradually accumulate onto the ice crystal, and when they develop sufficient weight, they fall as precipitation, usually in the shape of irregularly shaped masses or in the shape of a ball, and greater than 0.75 inches in diameter. The Tornado and Storm Research Organization (TORRO) in England is a privately supported research body, serving the national and international public interest. The Tornado and Storm Research Organization (TORRO) produced a Hailstorm Intensity Scale, which puts different hail sizes into categories with damage descriptions.

TORRO Hailstorm Intensity Scale			
Size Code	Intensity Category	Typical Hail Diameter (mm)	Damage Impacts
H0	Hard Hail	5	No damage.
H1	Potentially Damaging	5 - 15	Slight general damage to plants, crops.
H2	Significant	10 - 20	Significant damage to fruit, crops, vegetation.
H3	Severe	20 - 30	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored.
H4	Severe	25 - 40	Widespread glass damage, vehicle bodywork damage.
H5	Destructive	30 - 50	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries.
H6	Destructive	40 - 60	Bodywork of grounded aircraft dented, brick walls pitted.
H7	Destructive	50 - 75	Severe roof damage, risk of serious injuries.
H8	Destructive	60 - 90	Severe damage to aircraft bodywork.
H9	Super Hailstorms	75 - 100	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open.
H10	Super Hailstorms	>100	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open.

Source: The Tornado and Storm Research Organization

Hail Size Comparison			
Size Code	Size (mm)	Size (inches)	Object
H0	5 - 9	0.25	Pea
H1	10 - 15	0.5	Mothball
H2	16 - 20	0.75 (Classifies storm as severe)	Marble, Grape
H3	21 - 30	1	Walnut
H4	31 - 40	1.5	Squash ball
H5	41 - 50	1.75	Golf ball
H6	51 - 60	2	Hen's egg
H7	61 - 75	2.5	Tennis ball
H8	76 - 90	3	Orange
H9	91 - 100	3.75	Grapefruit
H10	>100	4	Melon

Source: The Tornado and Storm Research Organization

The Charleston Region typically experiences hail events between size codes H0 to H2.

Location

A thunderstorm event is an atmospheric hazard, and has no geographic boundaries. They can occur in all regions of the United States however, thunderstorms are most common in the central and southern states because atmospheric conditions are more favorable for generating thunderstorms. Since thunderstorms are unpredictable, all jurisdictions are equally exposed to these hazards.

Probability

Since thunderstorms are unpredictable and can occur any day of the year, all jurisdictions are equally exposed to these hazards, and there is a 100% chance that the area will be hit by severe weather in any given year. The likelihood of hail events depends on the severity of the storm. There have been 16 hail events over the past four years, averaging 4 hail events per year. The vulnerability and impact of the hazard is discussed later in the Plan.

Likelihood of Event Any Year
1. 0-25% chance
2. 26-50% chance
3. 51-75% chance
4. 76-100% chance

Severe Storm Probability for Each Jurisdiction	
Jurisdiction	Probability
Unincorporated Charleston County	4
Town of Awendaw	4
Town of Hollywood	4
Town of James Island	4
Town of Lincolnton	4
Town of McClellanville	4
Town of Meggett	4
Town of Ravenel	4

Town of Rockville	4
Town of Seabrook Island	4
City of Charleston	4
City of Folly Beach	4
City of Isle of Palms	4
City of North Charleston	4
Town of Kiawah Island	4
Town of Mt. Pleasant	4
Town of Sullivan’s Island	4
Charleston County Parks & Recreation Commission	4
Charleston County School District	4
Charleston Water System	4
College of Charleston	4
Cooper River Parks & Playground Commission	4
James Island Public Service District Commission	4
Mt. Pleasant Water Works Commission	4
North Charleston District	4
North Charleston Sewer District	4
Roper St. Francis Healthcare	4
St. Andrews Parish Park & Recreation Commission	4
St. Andrews Public Service District	4
St. John’s Fire District Commission	4
St. Paul’s Fire District Commission	4

4.14 -Drought

Background

Drought and heat advisories do not damage buildings and roads, drainage channels and other similar types of infrastructure; however, drought does cause potential loss of agricultural production and increases the possibility of wildfires. Droughts are the consequence of a natural reduction in the amount of precipitation expected over an extended period of time. High temperatures, high winds, and low humidity can exacerbate drought conditions. Also, human actions and demands for water can hasten drought-related impacts. Since droughts can be a natural and human component, it is defined in both conceptual and operational terms. Droughts are generally defined in these four terms; meteorological, agricultural, hydrological, or socioeconomic. **Meteorological:** Based on the degree of dryness or actual precipitation from an expected average of time. They have a slow-onset that usually takes at least three months to develop and may last for several seasons or years.

Agricultural: Based on the impact to agricultural activity from a deficit in precipitation, soil moisture, ground water supply, or reservoir levels.

Hydrological: Based from a precipitation deficit that affects the surface and subsurface water supply (stream flow, lake levels, and ground water). Other facts such as changes in land use, land degradation, and construction of dams can contribute to hydrological droughts.

Socioeconomic: Based on the adverse supply and demand relationship between economic goods that are dependent on precipitation and water supply. Occurs when water shortage beings to affect the population, individually and collectively.

Classification

In the United States, the U.S. Drought Monitor is a weekly map product produced through the partnership of the National Drought Mitigation Center, US Department of Agriculture (USDA), and the National Oceanic and Atmospheric Administration (NOAA). Drought Monitor maps measure present drought levels and future outlooks through a synthesis of multiple drought indices. Meteorologists predict and monitor droughts using drought indices, as well as monitoring variables that reflect precipitation patters, stream flow, and soil moisture. The U.S. Drought Monitor is a composite index that includes many indicators but its primary purpose measures drought intensity using a scale of D0 through D4. D0 being abnormally dry, D1-moderate, D2-severe, D3-extreme, D4-exceptional.

U.S. Drought Monitor - Drought Severity Classification		
Category	Description	Possible Impacts
D0	Abnormally Dry	<u>Going into drought:</u> short-term dryness slowing planting and growth of crops or pastures. <u>Coming out of drought:</u> some lingering water deficits; pastures or crops not fully recovered.
D1	Moderate Drought	Some damage to crops and pastures; streams, reservoirs, or wells low; some water shortages developing or imminent; voluntary water-use restrictions requested.
D2	Severe Drought	Crop or pasture losses likely; water shortages common; water restrictions imposed.
D3	Extreme Drought	Major crop/pasture losses; widespread water shortages or restrictions.
D4	Exceptional Drought	Exceptional and widespread crop and pasture losses; shortages of water in reservoirs, streams, and wells creating water emergencies.

S=Short-Term, typically less than 6 months. L=Long-Term, typically more than 6 months.

Source: National Drought Mitigation Center

The Palmer Drought Severity Index Scale was developed in the 1960’s and uses temperatures and rainfall information in a formula to determine dryness, incorporates soil moisture, and is considered most effective for non-irrigated cropland. It primarily reflects long-term drought and has been used extensively to initiate drought relief.

Palmer Drought Severity Index Classifications	
Category	Description
4.0 or more	Extremely Moist
3.0 to 3.9	Very Moist
2.0 to 2.9	Moderately Moist
1.9 to -1.9	Near Normal
-2.0 to -2.9	Moderate Drought
-3.0 to -3.9	Severe Drought
-4.0 or less	Extreme Drought

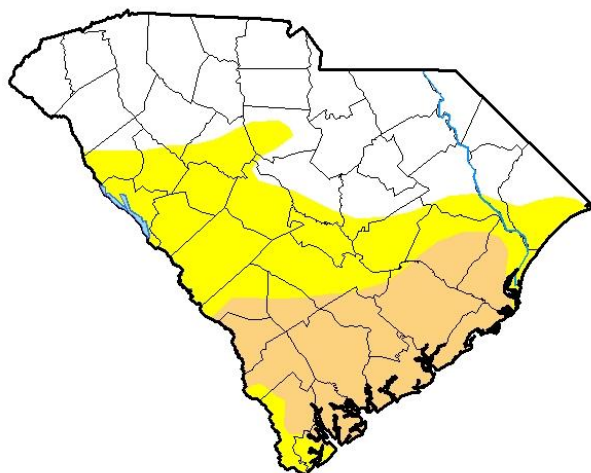
Source: National Oceanic & Atmospheric Administration

Location

Droughts typically cover a large area and cannot be confined to any geographic boundary. For this purpose, the whole Charleston Region is vulnerable to the threat of a drought.

U.S. Drought Monitor South Carolina

April 30, 2019
(Released Thursday, May 2, 2019)
Valid 8 a.m. EDT



	Drought Conditions (Percent Area)					
	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	45.71	54.29	23.20	0.00	0.00	0.00
Last Week 04-23-2019	46.10	53.90	23.13	0.00	0.00	0.00
3 Months Ago 01-29-2019	100.00	0.00	0.00	0.00	0.00	0.00
Start of Calendar Year 01-01-2019	100.00	0.00	0.00	0.00	0.00	0.00
Start of Water Year 09-25-2018	89.90	10.10	1.52	0.00	0.00	0.00
One Year Ago 05-01-2018	60.27	39.73	23.91	0.00	0.00	0.00

Intensity:
■ D0 Abnormally Dry ■ D3 Extreme Drought
■ D1 Moderate Drought ■ D4 Exceptional Drought
■ D2 Severe Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:
Brad Rippey
U.S. Department of Agriculture



<http://droughtmonitor.unl.edu/>

(An example of the extent of drought that the State experienced in late April 2019)

Probability

Since droughts typically cover a large area and aren't confined to any geographic boundary, the chance that the Region will experience some stage of drought is 100% any given year. Over the past six years, the Region has experienced D2 (Severe Drought), D3 (Extreme Drought), and D4 (Exceptional Drought) only 4 weeks. The probability of the Region being in a severe or worst drought is 14% any given year, and the probability of drought is equal across all jurisdictions. The vulnerability and impact of the hazard is discussed later in the Plan.

Likelihood of Event Any Year

1. 0-25% chance

2. 26-50% chance

3. 51-75% chance

4. 76-100% chance

Drought Probability for Each Jurisdiction

Jurisdiction	Probability
Unincorporated Charleston County	2
Town of Awendaw	2
Town of Hollywood	2
Town of James Island	2
Town of Lincolville	2
Town of McClellanville	2
Town of Meggett	2
Town of Ravenel	2
Town of Rockville	2
Town of Seabrook Island	2
City of Charleston	2
City of Folly Beach	2
City of Isle of Palms	2
City of North Charleston	2
Town of Kiawah Island	2
Town of Mt. Pleasant	2
Town of Sullivan's Island	2
Charleston County Parks & Recreation Commission	2
Charleston County School District	2
Charleston Water System	2
College of Charleston	2
Cooper River Parks & Playground Commission	2
James Island Public Service District Commission	2
Mt. Pleasant Water Works Commission	2
North Charleston District	2
North Charleston Sewer District	2
Roper St. Francis Healthcare	2
St. Andrews Parish Park & Recreation Commission	2
St. Andrews Public Service District	2
St. John's Fire District Commission	2
St. Paul's Fire District Commission	2

4.15 - Winter Weather

Background

Winter weather is generally rare in the Charleston Region; however, there have been a few instances of winter weather in the area. A winter storm can range from just a moderate snow over a certain amount of time to blizzard conditions with blinding wind-driven snow. They are often thought of as a snowstorm but winter storms usually have other types of weather associated with it that can be extremely dangerous. Winter storms can be accompanied by dangerous conditions with freezing rain, heavy winds, snow and sleet. A winter storm develops from three basic elements; cold air, moisture and lift. Freezing temperatures near the ground and in the clouds are necessary for snow and ice. Moisture is needed to form clouds and precipitation. Lift is needed to raise the moist air to form clouds and precipitation, which is when warm air collides with cold air and is forced to rise over the cold air. Winter conditions can be significant enough to affect several states or just affect localized areas only. All winter weather conditions have the potential to be very dangerous to the affected area. Snowfall can reduce visibility in driving conditions, and freezing conditions can damage infrastructure throughout the area. These storms are not necessarily restricted to the winter season; they may occur in early spring or late autumn.

Classification

There is no general accepted classification of winter weather or winter storms but they generally include snow, ice, freezing rain, and freezing temperatures. The following are a few that the Charleston Region can be affected as a result of winter weather or winter storms.

Ice Storms/Freezing Rain: An ice storm is when freezing rain accumulates to at least ¼ inch of ice on exposed surfaces. Heavy accumulations of ice can bring down trees, electrical wires, telephone poles and lines, and communication towers. Freezing rain occurs when rain falls onto surfaces with temperatures below freezing, thus turning the rain to ice on contact. They can be perceived as rain storms occurring just below freezing temperatures. Freezing rain can create black ice on roads, which is difficult for drivers to see and may cause an accident. Ice and freezing rain can lead to frozen water lines and other infrastructures.

Snow: Snowfall can immobilize a region and paralyze a city, stopping the flow of supplies, and disrupting emergency and medical services. The cost of snow removal, repairing damages, and loss of business can have large economic impacts on cities and towns. Regions not prone to annual winter weather may lack the resources to safely remove snow or ice.

Freezing temperatures: Any impact from winter weather requires temperatures below 32°. Prolonged exposure to cold temperatures can cause hypothermia or frostbite and become life-threatening. Freezing temperatures can cause severe damage to crops or other vegetation in the Region. It could also freeze pipes in homes that are poorly insulated or have exposed pipes.

The Charleston Region experienced an extremely rare snowfall in 2010 with isolated areas reporting up to 8 inches of snow and ice. Trees were down due to the ice and snow. Most winter hazards that the Region experiences are freezing pipes/temperatures, vegetation damage, and ice, but the Region is still vulnerable to larger winter weather events.

Location

While the Region does not regularly encounter extreme winter storms, some aspects of winter weather occur in the Region annually. With the random nature of this hazard, all jurisdictions are subject to winter weather conditions.

Probability

The Region has experienced 10 winter events between the years of 2000 and 2018. The Region is located in a subtropical climate zone but will still experience low temperatures in the winter season every year. The probability of extreme winter weather events affecting the Region is approximately 55% per year with the probability being equal for all jurisdictions. The vulnerability and impact of the hazard is discussed later in the Plan.

Likelihood of Event Any Year
1. 0-25% chance
2. 26-50% chance
3. 51-75% chance
4. 76-100% chance

Winter Weather Probability for Each Jurisdiction	
Jurisdiction	Probability
Unincorporated Charleston County	3
Town of Awendaw	3
Town of Hollywood	3
Town of James Island	3
Town of Lincolnville	3
Town of McClellanville	3
Town of Meggett	3
Town of Ravenel	3
Town of Rockville	3
Town of Seabrook Island	3
City of Charleston	3
City of Folly Beach	3
City of Isle of Palms	3
City of North Charleston	3
Town of Kiawah Island	3
Town of Mt. Pleasant	3
Town of Sullivan’s Island	3
Charleston County Parks & Recreation Commission	3
Charleston County School District	3
Charleston Water System	3
College of Charleston	3
Cooper River Parks & Playground Commission	3
James Island Public Service District Commission	3
Mt. Pleasant Water Works Commission	3
North Charleston District	3
North Charleston Sewer District	3
Roper St. Francis Healthcare	3

St. Andrews Parish Park & Recreation Commission	3
St. Andrews Public Service District	3
St. John's Fire District Commission	3
St. Paul's Fire District Commission	3

Hazard Summary

Table 4.2 – Summary of Hazard Extent

Summary of Hazard Extent			
Hazard Type	Extent (based on historical events)		Comments
	Minimum	Maximum	
Hurricane/ Tropical Storm/ Coastal Storm/ Coastal Erosion	Tropical Depression	Category 4	On September 21st, 1989, Charleston was hit by Hurricane Hugo. Hugo made landfall as a Category 4 hurricane. On October 7, 2016, Charleston was hit by Hurricane Matthew. Previously a Category 5, Matthew had downgraded to a Category 1 before making landfall in Charleston. The hurricane still left considerable damage; 830,000 South Carolinians lost power and 355,000 evacuated their homes. Tropical Storms have passed by Charleston County and caused considerable erosion problems and minor related damage.
Flooding	0 ft.	19.3 ft.	Following Hurricane Hugo, storm surge flooding reached 19.3 feet. Non-hurricane related flooding events occur each year with great variation in intensity. This report includes isolated storm water flooding events and riverine flooding that reached various levels, but such flooding is completely dependent upon the area.
Sea Level Rise	N/A	N/A	King tides, which is the above average high tide occurring when once a lunar cycle, are a good predictor of sea level rise. On average there were 10.4 observed king tides for every king tide event, compared to the predicted 4.9 king tides. The depth averaged more than half a foot deeper than expected. There were 44 more king tides than predicted in 2016 and a cumulative 4.7 feet higher.
Earthquake	0 M	7.3M	In 1886, an earthquake with an estimated magnitude of 7.3M occurred in Summerville, SC outside of Charleston. This was the largest known earthquake on the east coast. This type of event is extremely rare and expected to occur only every 500 years.
Tornado	EF0	EF2	The strongest tornado in the Charleston region since the first Hazard Mitigation Report in 1999 was an EF2 Tornado with maximum winds reaching 120mph that touched down near Wadmalaw Island in 2008. It is possible for a stronger tornado to impact the area, though the majority of tornado reports are unconfirmed or are confirmed EFO.
Hazardous Materials	N/A	N/A	Category includes natural gas leaks, small automobile accident cleanups, chemical spills, and more. No common measure exists. No serious injuries have been reported due to a hazardous materials incident since this Hazard Mitigation Report has been produced.
Terrorism	N/A	N/A	Due to the Charleston Port, the terrorism threat to the area may be increased. Isolated incidents of domestic terrorism are always possible, though area police and emergency teams regularly perform drills for shootings, bomb threats, and full scale terrorism events.
Wildfire	0 acres	2,600 + acres	Numerous small fires (fractions of an acre) are reported annually and countless are unreported. The most significant fire in the last decade was located in March of 2011 along the Charleston/Georgetown County line which burned nearly 2,600 acres within the Francis Marion National Forrest.

Tsunamis	1 event in 1886	1 event in 1886	There are reports of 1 event in 1886, though information on damage or extent is extremely limited. The tsunami is likely tied to a record earthquake. Due to the vast amount of coastland, a tsunami is a possibility, though extremely remote. The entire Eastern coastline was rated as having a "Very low to low" probability of a tsunami event in a 500 year timeframe by the USGS and Department of the Interior. Preparedness measures are similar to a hurricane. Charleston has a tsunami warning buoy 425 miles off the coast and was designated as a "Tsunami Ready Community" in 2006.
Dam Failure	0 ft.	22.7 ft.	The Santee Dam and Pinopolis Dam could both impact areas of Charleston County. The larger Santee Dam is far enough away from homes to give nearly four hours of notice should a breach occur and regular testing of warning sirens and messages occur. The smaller Pinopolis Dam could temporarily flood parts of North Charleston with up to 15.4 feet of water. The Santee Dam could temporarily flood McClellanville with up to 22.7 feet of water.
Severe Storms/Wind Storms/Hail/Other	H0	H8	The Charleston County region has experienced baseball size hail (2.75in / 70mm) in 2011. This H8 rating estimates severe damage to windows, some tree limbs, small animals, and automobiles. More common to the area are H0-H2 hail (0mm-20mm), which causes damage mainly to crops and vegetation.
Drought/Heat Advisory/Climate Change	Palmers 0 / D0	Palmers -5 / D4	The Charleston County region saw a drought period in 2012 that reached to the D4 stage (Exceptional Drought) with a Palmers Drought index of at least -5.0. for 3 weeks. According to the Drought Monitor, the Charleston Region is regularly in a moderate drought (D1) or listed as abnormally dry (D0). This responds to a Palmers Drought index between 0-2.9.
Winter Weather	0 inches	8 inches	An extremely rare snowfall occurred in 2010 with isolated areas reporting up to 8inches of snow and ice. Many trees were downed by the snow and ice. Most winter hazards are associated with vegetation damage, freezing pipes, and occasional icing of roads.

Table 4.3 – Summary of Hazard Probability

Future Probability Summary for Each Hazard			
Hazard Type	Previous Incidents		Future Probability / Frequency
	Historical Range	Recorded in 2013-2018	
Hurricane/ Tropical Storm/ Coastal Storm/ Coastal Erosion	31 total events since August 11th, 1940.	According to the National Climatic Data Center, there have been 3 Tropical Storms that affected the area.	In any given year, there is a 42% chance Charleston County will be impacted by a Hurricane/Tropical Storm/Coastal Erosion Event. Hurricane Hugo is known to be the Region's 100 year storm. A 100 year storm has a 1% probability of occurring at that location in any given year.
Flooding	Minor and isolated flooding events regularly occur. It is estimated a major hurricane landfall near Charleston County is needed for a regional, widespread flooding event. Hurricane Hugo has been the only major flooding event in history.	According to the National Climatic Data Center, there have been 64 regular minor and isolated flooding events. There have been zero major, widespread flooding events.	Hurricane Hugo was a massive regional flooding event (up to 19.3ft). This type of flooding is considered a 100 year flood, which is a 1% probability of occurring. It is expected small, isolated flooding events will 100% occur each year but given the 64 events between 2008 - 2013, there is a 68% chance per year of a flooding event.
Sea Level Rise	Sea level rise has been accelerating in the last decade.	On average there were 12.625 observed king tides for every king tide event, compared to the predicted 3.88 king tides. The depth averaged more than half a foot deeper (0.71 ft) than expected	These values are expected to increase in 2019 and onward.
Earthquake	1 major earthquake in 1886 with minor tremors several times per year, on average, in the north area of the county or in Summerville. (Berkeley County)	According to the South Carolina Department of Natural Resources, there have been 39 earthquakes in the past 5 years. The average magnitude for these tremors has been 1.835.	In any given year, it's estimated that there will be about 7.8 small earthquakes per year (39 earthquakes in the previous 5 years), all likely to be located in the Summerville area. The earthquake of 1886 was estimated to be a 1 in 500 year event, meaning there is an estimated 0.2% chance of a comparable earthquake happening.
Tornado	19 tornadoes from 1996 through 2018. This equates to about one tornado every year on average.	The National Climatic Data Center has 3 confirmed tornadoes in the region over the past 5 years.	In any given year, it's estimated there is a 100% chance of a tornado occurring. Based off historic standards, there is roughly a 94% chance a tornado would be a EF1 or below. (15 of 16 tornadoes have been EF1 or below).
Hazardous Materials	No major hazardous materials incidents or related injuries.	No major hazardous materials incidents or related injuries.	No major incidents or related injuries are expected. 100% chance of small isolated hazardous material incidents to occur each year.
Terrorism	N/A	N/A	There is no evidence to suggest there is any substantial risk for a terrorist event.
Wildfire	Over the last 50 years, there were an average of 114 wildfires per year burning an average total of 991.9 acres per year in Charleston County.	The South Carolina Forestry Commission has produced an average of 32 fires per year burning an average of 691 acres per year according to a 5 year average.	In any given year, it's expected that there will be between 32 and 114 wildfires per year during between 691 and 992 acres. (Both 50 year average data and most recent 5 year data)
Tsunamis	1 tsunami report in 1886 due to the record earthquake of the same year. Charleston was designated as a 'Tsunami Ready Community' in 2006.	Zero events	There is no evidence to suggest there is any substantial risk for a tsunami event.

Dam Failure	N/A	N/A	There is no evidence to suggest there is any substantial risk for a dam failure.
Rip Currents	In the United States, it is estimated that 100 people will lose their life due to rip currents each year.	Two deaths and 4 injuries have occurred due to rip currents in the past 5 years, as reported by the National Climatic Data Center	Rip currents can take place each day so there is a 100% chance per year that a rip current incident could happen.
Severe Storms/Wind Storms/Hail/Other	Storms are often unpredictable and can occur any day out of the year.	According to the National Climatic Data Center, there have been 5136 Thunderstorm Wind, 40 Hail & 10 Lightning events between 2013-2018.	40 Hail events over the past 5 years = 8 hail events per year. 1.75in/44 mm hail (H5 on the TORRO Hailstorm Intensity Scale) is expected about once per year. More common to the area are H0-H2 hail (0mm-20mm).
Drought/Heat Advisory/Climate Change	Droughts typically cover a large area and aren't confined to any geographic boundary. The U.S. Drought Monitor has been forecasting droughts on a weekly basis since 1999.	Over the past five years, the region has only experienced D2(Severe Drought), D3(Extreme Drought), and D4(Exceptional Drought) only 26 weeks. The rest have been D0, D1 or not classified of being in a drought.	The probability of the region being in a severe or worst drought under the classification by the U.S. Drought Monitor is 17%.
Winter Weather	The Charleston Region is in a subtropical climate, which has and will continue to experience low temperatures.	According to the National Climatic Data Center, there were two winter events recorded. One heavy snow event and one ice storm event.	The probability of a winter weather event occurring is 40%.

Table 4.1a – Summary of Jurisdiction Affected

Jurisdictions Affected by Hazard Type		
Hazard	Comments	Future Probability
Hurricane	Hurricanes and Tropical Storms threaten the entire Atlantic Coast. Landing patterns are unpredictable until the storm has formed and is within a short time from landing. Those jurisdiction closer to the coast will experience greater effects from a hurricane.	42%
Flood	Around 68% of the Charleston Region is in a floodplain. Some jurisdictions aren't located in that floodplain but are still considered at risk for the aftermaths of a flooding event.	90%
Sea Level Rise	Land in the most susceptible flood zones (AE and VE) will be most affected as sea level continues to rise.	100%
Earthquake	Charleston lies in one of the most seismically active areas in the Eastern United States, so the whole county is at risk of the aftermaths of an Earthquake.	100%
Tornado	Tornados aren't limited to any specific geographic region. The landing of tornados is unpredictable so all areas in the region are at risk.	94% of ≤ EF1
Hazardous Materials	The Charleston Region is a rapidly growing international port, areas around the port and Air Force base are at a higher risk but hazardous materials are located in most homes and incidents can occur anywhere.	100%
Terrorism	The urban areas of the region are more at risk for terrorism threats but the whole region is still at risk depending on size and destruction of an attack.	< 5%
Wildfire	Uncontrollable fires can occur in forested areas as well as urban cities, so all areas are considered at risk.	100%
Tsunamis	Tsunamis could only affect jurisdictions located along the coast, however depending on size and destruction, the whole region could experience the aftermaths of a tsunami event.	< 5%
Dam Failure	Dam failure are extremely rare events and would the flooding could only affect certain jurisdictions, however after a catastrophic failure, the whole region would be affected either physically or economically.	< 5%
Rip Currents	Rip currents only occur near jurisdictions located on the coast (Folly Beach, Sullivan's Island, Isle of Palms), but the whole region has access to the ocean and anyone could be caught in a rip current.	100% for coastal jurisdictions
Severe Storms	Thunderstorms or severe storms have no geographic boundaries so all areas are at risk.	100%
Drought	Droughts can cover large areas and aren't confined to any geographic boundary so the whole region is at risk.	100% for some stage of drought; 14% of severe drought
Winter Weather	Extreme winter weather conditions are rare for the region, but low temperatures are common in the Winter. With the random nature of winter weather events, all areas are at risk.	30%

Probabilities refer to all jurisdictions in the Region except where indicated. Table 4.1b includes specific jurisdictional information.

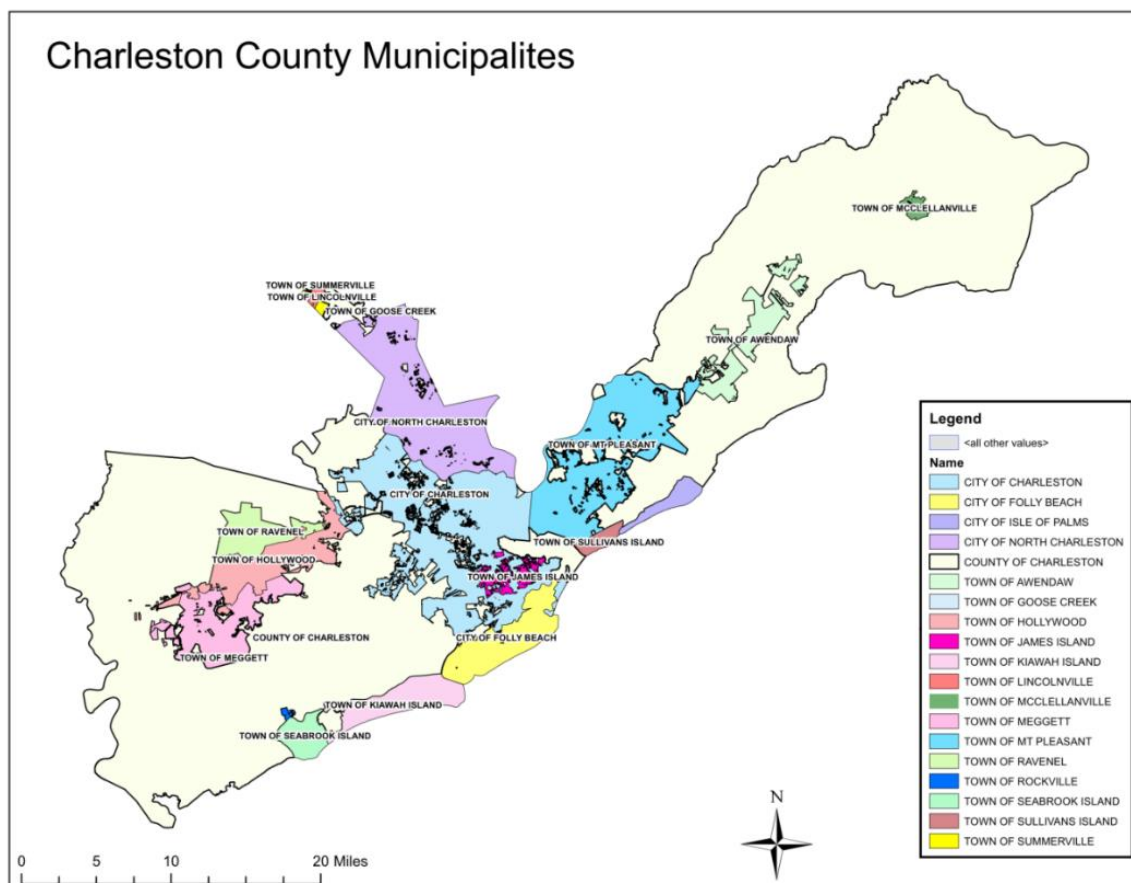
Table 4.1b – Individual Jurisdiction Hazard Assessment

Jurisdiction Name	Jurisdiction Type	Hurricane	Flood	Sea Level Rise	Earthquake	Tornado	HazMat	Terrorism	Wildfire	Tsunami	Dam Failure	Rip Current	Severe Storm	Drought	Winter Weather
Charleston County	County		x						x				x	x	x
Awendaw	Town			x					x				x	x	x
Hollywood	Town		x		x				x				x	x	x
James Island	Town		x	x									x	x	x
Lincolville	Town				x				x				x	x	x
McClellanville	Town		x				x		x		x		x	x	x
Meggett	Town		x						x				x	x	x
Ravenel	Town				x				x				x	x	x
Rockville	Town		x										x	x	x
Seabook Island	Town	x	x	x								x	x	x	x
Kiawah Island	Town	x	x	x								x	x	x	x
Mt. Pleasant	Town		x				x	x	x				x	x	x
Sullivan's Island	Town	x	x	x						x		x	x	x	x
Charleston	City		x				x	x					x	x	x
Folly Beach	City	x	x	x						x		x	x	x	x
Isle of Palms	City	x	x	x						x		x	x	x	x
North Charleston	City		x		x		x				x		x	x	x
Charleston County Parks & Rec Commission	Parks & Rec	x	x	x					x	x		x	x	x	x
Charleston County School District	School District		x						x	x			x	x	x
Charleston Water System	Water System		x										x	x	x
College of Charleston	College		x										x	x	x
Cooper River Parks & Playground Commission	Parks & Rec		x		x		x						x	x	x
James Island Public Service District Commission	Public Service District		x	x									x	x	x
Mt. Pleasant Water Works Commission	Water System		x										x	x	x
North Charleston District	District		x		x		x				x		x	x	x
North Charleston Sewer District	Sewer District		x		x		x				x		x	x	x
Roper St. Francis Healthcare	Healthcare		x		x		x						x	x	x
St. Andrews Parish Park & Recreation Commission	Parks & Rec		x										x	x	x
St. Andrews Public Service District	Public Service District		x						x				x	x	x
St. John's Fire District Commission	Fire District								x				x	x	x
St. Paul's Fire District Commission	Fire District												x	x	x

This table lists all jurisdictions within the Region and all of the previously discussed hazard types. Although all jurisdictions have the same probability of being affected by these hazards, those marked with an X will likely experience the worst of the hazard effects based on different factors (location within Region, infrastructure, geography, etc.). These factors are explained within each hazard section (4.2 - 4.15).

Section 5 Hazard and Problem Assessment by Jurisdiction

While all jurisdictions in Charleston County are equally likely of being affected by hazards introduced in Section 4, certain jurisdictions will likely experience the worst impact of the hazards based on different factors (location within the Region, infrastructure, geography, etc.). These factors are explained within each jurisdiction’s Problem Assessment. To maintain brevity, not all hazards a jurisdiction experiences are detailed in its respective section of this plan. Complete histories of all hazard occurrences in the region are instead listed in Appendix A.9.



5.1(a) - Unincorporated Charleston County Hazard Descriptions

Flood

Location

Flooding can occur throughout most of the Charleston Region since around 68% resides within a floodplain. The Federal Emergency Management Agency (FEMA) identifies floodplain areas by producing Flood Insurance Rate Maps (FIRM). These maps show all locations near major bodies of water, and show base flood elevations and floodplain boundaries like the 100-year floodplain boundaries. 100-year flood event is a 1% probability of occurring in any given year. The roughly 68% of the areas located in the floodplain are exposed to the threat of floods but that does not mean the other areas aren't vulnerable to a flash flood or flooding events. Damaged infrastructure and roadways can limit mobility for citizens. All areas can experience flooding hazards.

Below are the locations Charleston County identified as areas of concern for flooding.

Flood Prone Areas of Charleston County	
<i>Jurisdictions Serviced by Charleston County</i>	<i>Area</i>
Unincorporated Charleston County	Woodland Shores, James Island
	Capri Isle Area, West Ashley
	Boone Hall Dr., West Ashley
	Main Rd at Hwy 17, Johns Island

Historical Occurrences

Flooding Events Between Jan 1, 1950 – April 30, 2019	
Total: 225 Events	Total Property Damage: \$13,166,350

These flooding events were mainly the result from heavy rain or severe weather (thunderstorms, tropical storms, heavy rain) incidents that caused flooding in the Charleston Region. Charleston broke its record for number of annual-flood days last year. The previous record of 38 days, observed in 2015, was exceeded by 12 days for a total of 50 annual-flood days in 2016. Compared to 1995, trends in flooding during 2016 have increased by 130 percent on average.

Flooding Probability for each Jurisdiction	
Jurisdiction	Probability
Unincorporated Charleston County	76-100%

Wildfire

Location

Wildfire is a potentially serious threat in the Charleston Region, particularly in areas with a high density of vegetation and areas within or surrounding the Francis Marion National Forest. Areas where there is an urban-wild land interface like (St. John's Fire District) are also at risk. Even urban areas within the Region pose the threat of wildfires, since they are defined as

uncontrolled fires, which most fires are. For the purpose of this plan, all areas, buildings and facilities are considered to be equally exposed.

Historical Occurrences

The table below shows the amount of fires and acres buried each fiscal year from 2012 to 2019.

Wildfire Events from 2013-2019							
Year	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019
Fires	19	15	9	6	23	6	Unknown
Acres	656.6	37.5	349.9	134.8	249.2	30.2	Unknown

Source: South Carolina Forestry Commission

Below is a table summarizing fire incidents from 2013 to 2019 recorded by the Consolidated 9-1-1 system.

Fire Incidents from May 1, 2013 – April 30, 2019							
As Reported by Charleston County Consolidated 9-1-1							
Category	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	
Outside Fires	893	542	632	999	657	573	
Trail/Rail Fires	3	1	2	1	3	0	
Marine Fires	13	5	11	11	21	7	
Vehicle Fire	102	90	111	111	112	124	
Total	1011	638	756	1122	793	704	11,366

Wildfire Probability for Each Jurisdiction	
Jurisdiction	Probability
Unincorporated Charleston County	51-75%

Severe Storm

Location

A thunderstorm event is an atmospheric hazard, and has no geographic boundaries. They can occur in all regions of the United States however, thunderstorms are most common in the central and southern states because atmospheric conditions are more favorable for generating thunderstorms. Since thunderstorms are unpredictable, all jurisdictions are equally exposed to these hazards.

Historical Occurrences

Severe Storm Events (Thunderstorm Winds) 1956 – April 2019		
TOTAL: 392 Events	Average Wind Speed: 51.80102	Total Property Damage: \$631,500

Severe Storm Probability for Each Jurisdiction	
Jurisdiction	Probability
Unincorporated Charleston County	76-100%

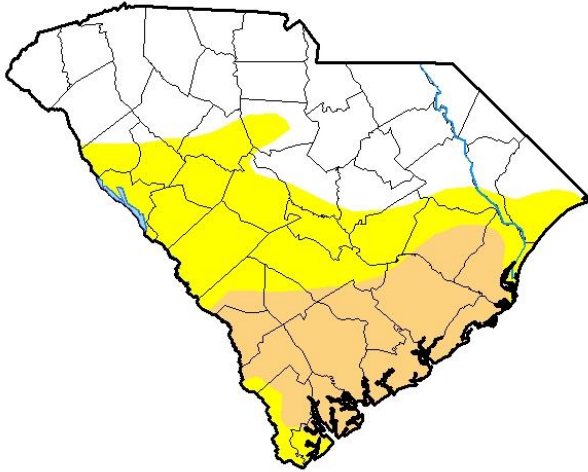
Drought

Location

Droughts typically cover a large area and cannot be confined to any geographic boundary. For this purpose, the whole Charleston Region is vulnerable to the threat of a drought.

U.S. Drought Monitor South Carolina

April 30, 2019
(Released Thursday, May 2, 2019)
Valid 8 a.m. EDT



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	45.71	54.29	23.20	0.00	0.00	0.00
Last Week 04-23-2019	46.10	53.90	23.13	0.00	0.00	0.00
3 Months Ago 01-29-2019	100.00	0.00	0.00	0.00	0.00	0.00
Start of Calendar Year 01-01-2019	100.00	0.00	0.00	0.00	0.00	0.00
Start of Water Year 09-25-2018	89.90	10.10	1.52	0.00	0.00	0.00
One Year Ago 05-01-2018	60.27	39.73	23.91	0.00	0.00	0.00

Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:

Brad Rippey
U.S. Department of Agriculture



<http://droughtmonitor.unl.edu/>

(An example of the extent of drought that the State experienced in late April 2019)

Historical Occurrences

Year	Number of weeks of Drought Events between May 1, 2013 – April 30, 2019						Description
	None	D0 Abnormally Dry	D1 Moderate Drought	D2 Severe Drought	D3 Extreme Drought	D4 Exceptional Drought	
1999-2000	35	17	2	0	0	0	
2000-2001	17	35	19	5	0	0	
2001-2002	4	48	38	32	19	0	
2002-2003	18	34	20	18	13	0	
2003-2004	46	6	0	0	0	0	
2004-2005	32	20	5	0	0	0	
2005-2006	47	5	0	0	0	0	
2006-2007	27	25	3	0	0	0	
2007-2008	0	53	35	12	0	0	
2008-2009	15	37	22	0	0	0	
2009-2010	38	14	2	0	0	0	
2010-2011	29	23	0	0	0	0	
2011-2012	0	53	50	46	39	3	
2012-2013	7	45	20	9	5	0	
2013-2014	32	20	0	0	0	0	The Region experienced 20 weeks in drought stage. 32 weeks of no drought stage were reported and 20 weeks of D0 drought from October to December.
2014-2015	37	15	0	0	0	0	The Region experienced only 15 weeks of D0 drought. During weeks when drought was experienced, only approximately 10-20 percent of the county was

							affected. 37 weeks of the year, the Region experienced no drought.
2015-2016	36	16	0	0	0	0	The Region experienced 16 weeks of D0 drought. During weeks when drought was experienced, only approximately 10-20 percent of the county was affected. 36 weeks of the year, the Region experienced no drought.
2016-2017	38	14	6	0	0	0	The Region experienced 20 weeks of drought stage. During these 20 weeks, the drought stage remained at D0 for 14 weeks and D1 for 6 weeks. 38 weeks of the year, the Region experienced no drought.
2017-2018	23	29	14	4	0	0	The Region experienced 29 weeks of drought stage D0 and 14 weeks of D1. In addition, 4 weeks were spent at D2; there were 23 weeks where the Region experienced no drought.
2018-2019	26	26	10	0	0	0	The Region experienced 36 total drought weeks. 26 weeks were spent at D0 and an additional 10 weeks were spent at D1. The Region was no experiencing a drought for 26 weeks.

Source: U.S. Drought Monitor

According to the U.S. Drought Monitor, the Charleston Region was in the D4 (Exceptional Drought) category for a number of weeks in early 2012 with a Palmer Drought Index of at least -5.0 (Extreme Drought). It is possible for severe and exceptional drought periods to return to the Charleston Region.

Drought Probability for Each Jurisdiction	
Jurisdiction	Probability
Unincorporated Charleston County	26-50%

Winter Weather

Location

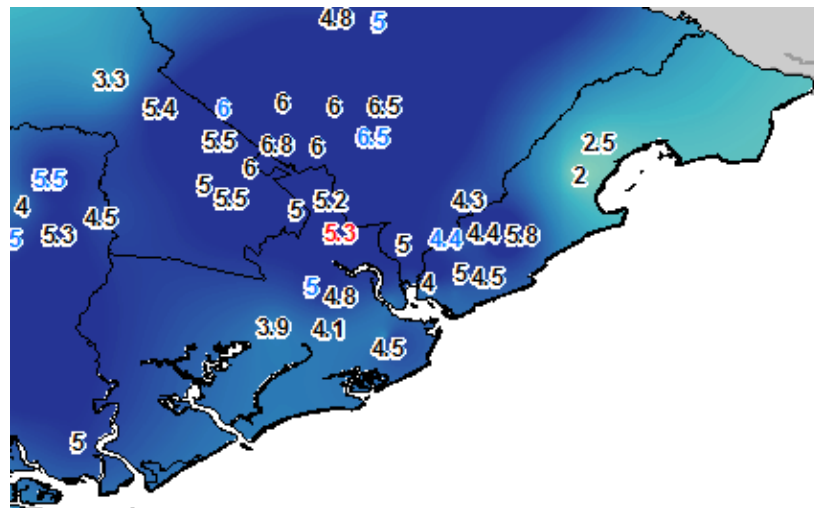
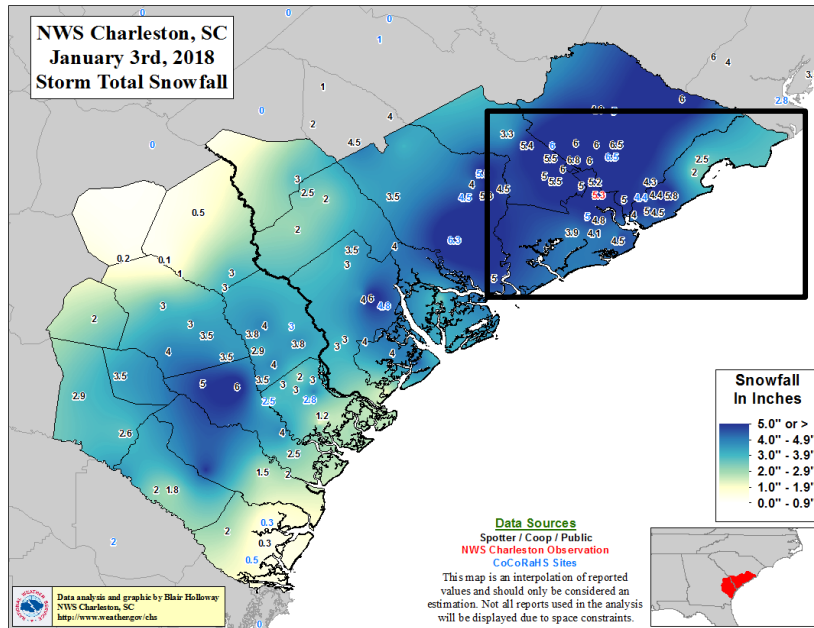
While the Region does not regularly encounter extreme winter storms, some aspects of winter weather occur in the Region annually. With the random nature of this hazard, all jurisdictions are subject to winter weather conditions.

Historical Occurrences

Winter Weather Events Through April 2019	
Total of 10 Events	\$233,000

Source: NOAA Climate Data

A rare winter storm affected southeast South Carolina on January 3, 2018. The storm produced a variety of wintry precipitation, including snow, sleet and freezing rain. Charleston Airport (KCHS) measured 5.3 inches of snow, the 3rd greatest daily snowfall on record, just 0.1 inches shy of the 5.4 inches that fell during the 1973 storm (NWS, 2019).



Winter Weather Probability for Each Jurisdiction	
Jurisdiction	Probability
Unincorporated Charleston County	51-75%

5.1(b) – Unincorporated Charleston County Problem Assessment

The Plan discusses three vulnerabilities in the following sections: Hazard, Building, and Infrastructure. Each outlines and spotlights different aspects of the participating communities and organizations and what their vulnerabilities are as well as their capabilities to handle such. Before these are discussed, a point should be made about educational vulnerability. Educational vulnerability is a multi-jurisdictional problem that addresses a lack of access to or awareness of the knowledge and resources that might reduce one’s risk of harm from a potential hazard. Poor, ethnic minority communities are those that environmental issues like sea level rise are most likely to adversely impact. They are also the most likely populations to lack access to traditional means of information disbursement. Opportunities to develop, implement, and share culturally responsive, community-specific hazard risk literacy and messaging (for example, school and faith-based programs about hurricane science and preparedness) need to be explored

and funded. (Submitted by Merrie Koester, Ph.D. / Director, Kids Teaching Flood Resilience / University of SC Center for Science Education). This is an important point to keep in mind while reading through the rest of the HMP and assessing the vulnerabilities of the organizations.

5.1.1 – Hazard Vulnerability

The Charleston Region is potentially vulnerable to the hazards listed in the following Table 5-1. This table contains a quantitative risk assessment of all hazards required to be included in the Plan for Disaster Mitigation Act of 2000 compliance and additional hazards added to this plan as a result of incidents of this type of hazard occurring (i.e. rip currents) or the Hazard Mitigation & Public Information Plan Committee determining that the hazard type poses a potential risk to residents of this area (i.e. global climate change, avian flu/pandemic). Although the probability of these hazards is equal across all jurisdictions, not all jurisdictions within the region would be affected equally, depending on the hazard. Jurisdictions most vulnerable to different hazard types can be seen in Table 4.1b and each jurisdiction addresses the hazards that would most likely affect them in their individual action reports.

This risk assessment evaluates each type of hazard based upon its frequency and severity to determine which hazards represent the greatest potential risk to the Charleston County Region. The frequency and severity categorizations are based upon the number of each type of hazard event that has occurred in the Region and the dollar amount of damages that have actually occurred (or are estimated to be possible for those types of events, such as dam failure, that have not occurred in Charleston County). For those types of hazard events where there are no structural damages (i.e. rip currents) the actual or potential loss of life has been utilized to determine the severity of the hazard event. The prioritization of hazards using this method essentially mirrors that determined through the pre-planning questionnaires distributed as a part of this planning process. Where the risk assessment utilizing this methodology determines that multiple types of hazards pose comparable risks, the questionnaire rankings from the 2019 questionnaires yield the rank order of the hazards, as applicable.

Of the additional hazards evaluated per the Disaster Mitigation Act of 2000 guidelines, the drought/heat advisory/climate change hazards score similarly to hazardous materials incidents, wildfire, earthquake, tornado and severe storms/windstorms/hail and other events utilizing the risk assessment methodology. Freezing winter weather also scores comparably to these hazards, however, ice and snow winter weather score lower since these are rarer events in the area, so the winter weather hazard overall is ranked slightly lower. Avian flu/pandemics scores slightly lower than freezing weather, due mostly to the rare nature of these events. The dam failure hazard scores lower than the other hazards identified through the pre-planning questionnaire except for terrorist activity and tsunami, mostly due to the extremely low probability of such an event occurring. Terrorism scores relatively low due to the small number of actual terrorist events that have occurred in the area over time when acts of school violence are excluded. (The acts of school violence discussed in this plan have been excluded in the frequency calculations in Table 5-1 since the data on this type of event is not always considered as an “act of terrorism” by other government agencies, so as not to skew the risk relative of this hazard to other areas of the State or country.)

The tsunami hazard scores the lowest of those for which the area is considered potentially at risk again due to the low frequency of this type of event and the minor damage that occurred during the two recognized tsunami events experienced in this area since the 1700’s. It is recognized in this plan that should a mega-tsunami occur in the Atlantic Ocean, the Charleston County area would be potentially vulnerable to more than minor damages as a result, however, based on historical evidence of events experienced, this hazard is considered to be the lowest ranked hazard. See Section 4 of this Plan for a more detailed discussion of these hazards.

Table 5-1-1

Summary Table of Risk Assessment by Hazard Type				
No.	Hazard Type	Frequency (1)	Severity (2)	Frequency x Severity
1	Hurricane	High	Catastrophic	16 points
2	Flood	High	Extensive	12 points
3	Sea Level Rise	Medium	Extensive	9 points
4	Wildfire	High	Serious**	8 points
5	Tornado	High	Serious	8 points
6	Earthquake	High	Serious*	8 points
7	Hazardous Materials	High	Serious	8 points
8	Rip currents	High	Serious*****	8 points
9	Severe Storms	High	Serious	8 points
10	Drought	High	Serious	8 points
11	Winter Weather			
	Freezing	High	Serious	8 points
	Snow	High	Minor	4 points
	Ice	Very Low	Extensive	3 points
12	Dam Failure	Very low	Catastrophic****	4 points
13	Terrorism	Low	Minor***	2 points
14	Tsunami	Very low	Minor*****	1 point

Based on Frequency and Severity of damages from events

(Risk assessments based on the number of incidents per hazard type as recorded in Part 4 of this plan, and damages experienced from hazards during past events as discussed in Part 4 of this plan. The higher the points in the Frequency x Severity column, the greater the risk posed by the hazard.)

Criteria for frequency categorization:

“**Very Low**”: events that occur less frequently than once in 1,000 years (1 point)

“**Low**”: events that occur from once in 100 years to once in 1,000 years (2 points)

“**Medium**”: events that occur from once in 10 years to once in 100 years (3 points)

“**High**”: events that occur more frequently than once in 10 years (4 points)

Criteria for severity categorization:

“**Minor**”: little or no damage to structures or infrastructure (area-wide) (1 point)

“**Serious**”: less than \$10 million in damage to structures or infrastructure (area-wide) (2 points)

“**Extensive**”: \$10 million to \$1 billion in damage to structures or infrastructure (area-wide) (3 points)

“**Catastrophic**”: greater than \$1 billion in damage to structures or infrastructure (area-wide) (4 points)

* The Charleston area experiences numerous small earthquakes each year that do “minor” or “serious” damage at the most. However, Charleston experienced the worst earthquake to strike in the Eastern United States in 1886. If an earthquake of comparable magnitude to the 1886 earthquake were to occur today, the severity of the event would be “catastrophic”.

** The Charleston area has the potential for wildfire-related losses to the over 2,000 buildings located in the Francis Marion National Forest area. Actual building damages due to wildfire

have, however, been less than \$10 million in the area (e.g. “serious”). The City of Charleston has a historic district where there are many closely-spaced structures of historic significance, which could result in an extensive or possibly catastrophic loss to the community if a wildfire were to occur and not be quickly contained to the building of origin.

*** The Charleston area has had several “false alarm” anthrax-related incidents since September 11, 2001, however, these events were not actual cases and did not cause damage to structures or infrastructure. This plan also addresses incidents of school violence in the terrorism section, however these have not been included in the frequency calculations for this vulnerability assessment. The potential exists for catastrophic consequences from terrorist-related activity depending upon the structure(s) targeted by terrorists.

**** The Charleston area has never experienced a failure of the dams, which as discussed in this plan, could cause damage to structures and/or infrastructure. The dams are heavily secured, retrofitted to withstand earthquakes, and frequently inspected to ensure that the integrity of the dams is not compromised. In the unlikely event of a dam failure, the potential damage to structures and infrastructure could be catastrophic.

***** The Charleston area has only experienced one tsunami-like wave of negligible magnitude in its history. The Hazard Mitigation & Public Information Plan Committee consider this type of hazard unlikely to occur in Charleston. However, in the unlikely event of a tsunami-like wave of significant magnitude striking the Charleston area, the damages incurred would likely be greater than “minor”.

***** The severity is based upon loss of life associated with this type of hazard event rather than property or infrastructure damages, since this type of hazard does not cause property damage directly.

In addition to the quantitative risk assessment as indicated in Table 5-1, the Committees considered data provided in the State of South Carolina Hazards Assessment (SCEMD, 2013), which evaluated the hazard vulnerability of each of the counties in South Carolina utilizing an index calculated from hazard event frequency and a “social vulnerability score”. This assessment did not, however, include all of the hazards identified by the Committees as those to which the Charleston Region is potentially vulnerable, so the data that was available was considered, as applicable. This social vulnerability score utilizes data from the U. S. Census Bureau to determine the social vulnerability of each county in South Carolina. Charleston County had the second highest “social vulnerability score” (SCEMD, 2013) of all counties in South Carolina.

The summary table provided in Table 5-2 provides the vulnerability scores for Charleston County for each of the types of hazards evaluated in the State of South Carolina Hazards Assessment (SCEMD, 2013). Charleston County ranked highest in the State in terms of overall hazard vulnerability, based upon the methodology utilized in this hazards assessment, and also has the highest vulnerability score for hurricanes/tropical storms, earthquake, and hazardous materials of all counties in South Carolina. Charleston County ranked third in the State for the flood, tornado, and drought hazards, ranked fourth in the State for wildfire hazard, and seventh in the State for winter storms. Considering the State ranking, the State of South Carolina Hazards Assessment (SCEMD, 2013) analysis methodology indicated that the hurricane hazard is amongst the greatest potential risks to the Region, which is in agreement with the risk assessments determined through the other methodologies utilized in this plan to determine building vulnerability.

Based on State ranking, the State of South Carolina Hazards Assessment (SCEMD, 2013) analysis method places a higher risk on earthquakes and hazardous materials incidents than the other analysis methods utilized in this plan. Conversely, the State of South Carolina Hazards Assessment (SCEMD, 2013) analysis method placed a lower risk on floods, tornadoes, and wildfires than the other methods utilized in this plan to assess risks, based on State ranking. Given the size of the floodplain, the number of flood claims, and the number of buildings potentially vulnerable to flooding due to their date of construction and location in the floodplain (refer to Attachments 5-D and 5-E) in Charleston County, maintaining the flood hazard as the second riskiest hazard to the area is justifiable and prudent. Given that hazardous materials incidents do not typically create damage to buildings, maintaining this hazard at its ranking as determined through the other analysis methods utilized in this plan is also reasonable.

The other analysis methods utilized in this plan determined the tornado and earthquake hazards to be nearly comparable in terms of risk, whereas the State of South Carolina Hazards Assessment (SCEMD, 2013) determined the earthquake hazard to be of higher priority than tornado. Both of these hazards are considered as higher priority hazards in this plan, which is consistent with all of the analysis methods utilized to assess risks. Based purely on the vulnerability score, wildfire was the highest scoring hazard facing the Charleston Region per the State of South Carolina Hazards Assessment (SCEMD, 2013). However, the Charleston County State ranking for this hazard would indicate that this hazard should perhaps not be considered as great a risk as several of the other hazards (e.g. hurricane). This plan considers the wildfire hazard to be higher than the earthquake and tornado hazards, but less than hurricanes and floods. While Charleston County has experienced frequent drought conditions, these droughts have not caused damage to buildings, as previously indicated. Consequently, the risk posed by the drought hazard is justifiably considered lower than the other hazards.

The State of South Carolina Hazards Assessment (SCEMD, 2013) indicated that the winter storm hazard was the lowest ranking hazard for Charleston County compared to other counties in the State. Therefore, considering this hazard to be a lower priority hazard than several of the other hazards is consistent in all of the analysis methods used. The other analysis methods utilized in this plan also considered hazards not included in the vulnerability scores in the State of South Carolina Hazards Assessment (SCEMD, 2013) (e.g. terrorist activity, rip currents, pandemics, dam failure, tsunami), providing additional information for determining hazard priorities.

The data for the following Tables 5-2 to 5-4 are from the State of South Carolina Mitigation Plan (2013), but as previously indicated, not all of the hazards determined to be potentially damaging to the Charleston Region were included in these assessments:

The State of South Carolina Hazards Assessment (SCEMD, 2013) utilizes a “Vulnerability Score”, which is an index of the frequency of hazard events multiplied by the “Social Vulnerability Score” to assess the hazard vulnerability of each County in South Carolina. Following are these “Vulnerability Scores” for Charleston County, SC for the hazards included in this report. Vulnerability Score (SCEMD 2013) is the product of the frequency of the hazard event and the social vulnerability score for the County (based on U. S. Census data for total population, age of population, gender of population, racial composition of population, and housing types in the County).

Table 5-1-2

2013 Risk Assessment by Hazard Type Based on Place "Vulnerability Score" Charleston County, SC		
Hazard Type	Vulnerability Score	State Ranking
Hurricane	0.92	5
Flood	1	1
Wildfire	0.24	17
Tornado	0.77	4
Earthquake	0.95	2
Hazardous Materials	1	1
Rip currents	Not studied	Not studied
Severe storms	0.41	12
Drought	0.56	17
Winter Storms	0.10	24
Avian Flu/Pandemics	Not studied	Not studied
Dam Failure	Not studied	Not studied
Terrorism	Not studied	Not studied
Tsunami	Not Studied	Not Studied
Overall	8.64	1

Source: South Carolina Hazard Mitigation Plan, 2013, pg 158

Charleston County maintained its number one ranking for vulnerability relative to the other 45 counties in South Carolina under this updated hazards assessment. In this plan, transportation-related incidents are included under hazardous materials, but otherwise, the hazards included in this assessment are comparable to those analyzed using alternative methodologies.

As was previously discussed, there are some differences in the vulnerabilities determined utilizing this social vulnerability score than those determined using other methods, however, the overall ranking of the hazard vulnerabilities as included in Table 5-1 is justified and in general supported through the combination of methods utilized to generate the assessment. This 2013 analysis does also, however, reflect differences in the vulnerability of the Region relative to the other counties in the State when comparing the results between 2005 and 2008. Specifically, the earthquake hazard ranking dropped for Charleston County from a ranking of 1 to 4 between 2005-2008, which may be partly attributed to the sensor equipment for Charleston County being out of commission during some of this time. The ranking for Charleston County also dropped for tornadoes, wildfires, and winter storms, which may be reflective of increased incidences of these types of events in other counties of the State relative to Charleston County. Charleston County's ranking for drought, however, went up to number 2 in South Carolina in terms of vulnerability, indicating that this county has experienced more droughts relative to the other counties in South Carolina since 2013, which is consistent with the discussion in Section 4 of this plan.

The overall determination from all of the risk assessment methodologies utilized in the Charleston Regional Hazard Mitigation Plan is that the Charleston County Region is potentially vulnerable to multiple types of hazards. While slight variations in terms of which hazards may pose the greatest risk exist depending upon the analysis method utilized to assess the risk, all of the methodologies suggest that potential vulnerability to multiple types of hazards exists in the Region, including hurricanes, floods, tornadoes, earthquakes, wildfires, hazardous materials, drought, winter storms, terrorist activity, dam failure, and other forms of severe weather. In subsections 5.2, 5.3 and 5.7 there are tables outlining specific vulnerability assessments based on each participating jurisdiction for various hazards. Each jurisdiction was

given the option to identify any other hazard that could be a threat. Mt. Pleasant has identified bridge failure as a vulnerability due to the connectivity across rivers and channels being vital to response operations and safety of the Town. This would also apply to other jurisdictions including City of Charleston, City of North Charleston, Unincorporated Charleston County, Town of James Island, Town of Seabrook Island, Town of Kiawah Island, Town of Sullivan’s Island, City of Isle of Palms, and City of Folly Beach.

In summary, the following hazards are those for which vulnerability has been estimated in this plan using probability and severity rankings. Table 4.1 provides a listing of which government entities represented in this plan are vulnerable to each specific hazard. If a government entity is listed in Table 4.1b as having a vulnerability to a specific hazard that vulnerability’s severity is indicated in Table 5-1. Where a hazard inflicts building or infrastructure damages that can be reasonably estimated, this information is provided in the Vulnerable Buildings and Infrastructure Vulnerability subsections in this Problem Assessment portion of the Plan. If a hazard does not inflict damages to buildings or infrastructure that can be reasonably estimated (either due to the hazard not damaging these at all and causing loss of life rather than physical building or infrastructure damages, or due to the random nature of the hazard making meaningful estimations of building or infrastructure losses not possible to reasonably determine), it is not discussed further in these latter sections of this Problem Assessment.

In the 2008 update to the State of South Carolina Hazards Assessment from the Office of the Adjutant General, the report focuses on more than just the likelihood of a hazardous event based on the frequency of prior events. The assessment evaluates each South Carolina County on their social vulnerability as well as hazard vulnerability, giving each county a more complete measure of risk known as their place vulnerability.

Charleston County stretches along the Atlantic Ocean and contains nearly 100 miles of coastline. Because of the geography and the location of the county, Charleston County has continued to hold the distinction as the most hazard prone county in South Carolina. This calculation is driven by higher than average frequencies of hurricanes and other coastal events, earthquakes, waterspouts, flooding, HAZMAT, tornadoes, extreme temperatures, hail, and other threats. Table 5-3 shows Charleston County leading the next highest four counties in that regard. But it’s important to acknowledge that hazard score only tells a portion of the total hazard risk to the county.

Table 5-1-3

2018 Top Five Most Hazardous Counties in South Carolina	
County	Ranking
Charleston	1
Horry	2
Georgetown	3
Berkeley	4
Sumter	5

Source: South Carolina Hazard Mitigation Plan, 2018

To create the overall place hazard score, the hazard vulnerability numbers seen above are combined with a Social Vulnerability Score. The Social Vulnerability Assessment is a peer reviewed methodology for standardizing the statistical impact of several social issues including urbanization, employment, wealth, racial makeup, special needs, language, Native American population, and others within each county. This assessment paints a very broad picture of each county and it should be noted that a great deal of variation exists within each area. But that

being said, it is a powerful tool that can help in identifying where extra resources should be deployed in the event of an eminent disaster.

Six distinct components explain 84% of the variance in the data for the Social Vulnerability Index, or SoVI-SC. (Table 5-4). These components include wealth (per capita income, % rich, median rent); race and gendered employment (female headed households, female labor force participation), age (over 65, % under 18); working professionals (% females, labor force participation); ethnicity and migration (% Hispanics, % newly immigrated); rural special needs (nursing home residents, farm populations); and Native Americans.

Table 5-1-4

2013 Top Factors in Social Vulnerability Index (SoVI)	
Component	Name
1	Social Economic Status (wealth, education, occupation)
2	Age (elderly population and young children are more vulnerable)
3	Gender
4	Race and Ethnicity
5	Employment/Employment sector
6	Special Needs Population

Source: South Carolina Emergency Management Division Risk Assessment Report, 2013

Total social vulnerability scores across all South Carolina Counties ranged from 7.31 in Saluda County, indicating it to be most vulnerable, to the least vulnerable Union County at -2.31. In Charleston County, the social vulnerability score is considerably lower than average at -1.265. Overall, that puts Charleston County in the lowest category of social risk. Again, while such figures do not represent every citizen and their individual vulnerability, the calculations predict the county and its residents are better able to respond to hazardous threats and events. Broken across the seven components, Charleston County scored as the second highest in the state on the category of urbanism and wealth, but was also listed as one of the counties with higher than average racial minority populations and unemployment numbers. The complete breakdown for the County is as follows on Table 5-5 again, a score of zero is completely neutral, and anything more than +/- 1 is significant and highlighted.

As stated previously, Charleston has a high hazard occurrence and a low social vulnerability resulting in a mixed place vulnerability score. The 2008 South Carolina Hazard Map indicates the County has an elevated historical All Hazard Occurrence due to the extensive historical inventory.

In 2013, the State of South Carolina released the South Carolina Hazard Mitigation Plan, in which each county was given two hazard scores, one based on future annual probability, and another based on annualized losses per county. Total hazard scores were calculated using the sum of each hazard class probability and the sum of annual losses. Place vulnerability was determined by adding the total hazard score with the social vulnerability score. According to these calculations, Charleston County once again had the highest place vulnerability due to location and high number of hazard exposures. The following table 5.5 depicts the updated 2018 all-hazard score and 5.6 depicts the Charleston County all-hazard annualized losses as of 2013.

Table 5-1-5

2018 All-Hazard Score Based on Future Annual Probability of Hazard Charleston County, SC	
Hazard Type	Hazard Score
Hurricane	0.8
Coastal	1
Severe Storm	0.77
Lightning	0.62
Tornado	0.7
Flood	1
Wildfire	0.23
Drought	0.19
Hail	0.64
Winter Weather	0.35
Earthquake	0.07
Hazmat	0.34
Social Vulnerability Score (SoVI)	0.36
Place Vulnerability	8.64
Total All-Hazard Score	6.29

Source: South Carolina Hazard Mitigation Plan, 2018, pg. 183

Table 5-1-6

2013 All-Hazard Score Based on Annualized Losses by Hazard Charleston County, SC	
Hazard Type	Hazard Score
Hurricane	1
Coastal	1
Severe Storm	0.04
Lightning	0.75
Tornado	0.26
Flood	0.46
Wildfire	0.08
Drought	1
Hail	0.08
Winter Storms	0.01
Earthquake	1
Hazmat	0.06
Social Vulnerability Score (SoVI)	0.36
Place Vulnerability	6.11
Total All-Hazard Score	5.74

Source: South Carolina Hazard Mitigation Plan, 2013, pg. 159

2018 hazard scores for the County based on future annual probability is rated as an elevated hazard with limited social vulnerability and the Hazard score based on annualized losses is an elevated hazard risk with limited social vulnerability (Source: South Carolina Hazard Mitigation Plan, 2018).

5.1.2 – Vulnerable Buildings

The original pre-planning questionnaire asked respondents to rank the vulnerability of the building stock to the various hazards facing the Region. The average results for this vulnerability assessment indicate that the structures in the Charleston County Region are most vulnerable to hazards in the following order:

Hurricane
Flood
Tornado
Sea Level Rise
Earthquake
Wildfire
Hazardous Material
Terrorism
Tsunami
Dam Failure

As previously discussed, the following hazards do not cause determinable damage to buildings, so they will not be addressed in this section of this plan:

Severe Storms
Drought
Winter weather
Rip currents

The new hazards added to this plan as a result of the requirements for meeting the Disaster Mitigation Act of 2000, also in some cases create a potential vulnerability for buildings within the Region. While drought and heat wave hazards do not typically affect buildings, dam failure could potentially damage buildings within the Charleston County Area.

A questionnaire was distributed to the signatory entities to this Plan and others on the Project Impact e-mail lists during 2017 to determine if the hazard vulnerability rankings had changed since the last survey was taken. For structure vulnerability, the hazards were ranked as follows in this more recent survey: 1. hurricane; 2. earthquake; 3. flood; 4. tornado; 5. sea level rise; 6. hazardous materials incident; 7. terrorist incidents; 8. tsunami; 9. wildfire; 10. dam failures. In this plan, the shootings/carrying of weapons in schools are listed in the acts of terrorism subcategory. Earthquakes surpassed flooding in this most recent survey and the new hazards added to meet the Disaster Mitigation Act of 2000 requirements were the lowest ranked by the survey respondents. The federal focus on terrorism since the attacks of September 11, 2001 and sea level rise with the increased importance and relevance of climate change may be at least in part responsible for the higher ranking of the terrorist activity hazard and the need for the addition of sea level rise in this more recent survey. The earthquake hazard increasing in ranking is perhaps reflective of the educational activities that have been ongoing since this Plan was originally developed to promote awareness of the earthquake hazard in this area.

In this section, municipalities and the County are the government entities that are discussed because the special purpose districts have overlapping jurisdictional boundaries with the Unincorporated County and/or one or more municipalities, and these are the entities for which records are available in the Assessor's data base regarding building numbers and valuations.

1, 2 & 3. Hurricane, Flood, and Sea Level Rise

Although building codes have been enforced in the Charleston County Region in some cases from as early as the late 1800's (City of Charleston), the codes in general did not begin addressing high wind until the late 1970's and seismic design parameters until the late 1990's.

Similarly, floodplain management regulations in general did not come into force throughout the Charleston County Region until in most cases the late 1970's or early 1980's. Therefore, structures built pre-1985, in general, are considered to be more likely to be vulnerable to hurricane damage and flood damage than those constructed since 1985. Manufactured housing (mobile homes) constructed pre-1976 are also highly vulnerable to high wind damage since there were no federal guidelines for construction of this type of housing prior to that date. Even after 1976 when Federal guidelines for the construction of mobile homes were implemented, the construction of mobile homes was not up to the wind speed designs of site-built construction. There are an estimated 2,424 manufactured homes in the special flood hazard zone Charleston County Region at this time.

There are an estimated 64,574 residential site-built buildings in "A" flood zones and 6,947 in "V" flood zones in the Region, for an estimated total of 71,521 residences potentially vulnerable to flooding due to their location in the special flood hazard area (SFHA) only. The "A" zone includes parcels designated with any "A" flood zone. The "V" zone includes parcels designated with any "V" designation. Since most manufactured homes are treated for tax assessment purposes as "titled property" as opposed to real property, differentiating flood zones for the manufactured homes using the parcel layer was not feasible at this time. Manufactured homes in the SFHA were considered as "A" zone properties for total building count per flood zone area purposes, since most jurisdictions within Charleston County restrict manufactured homes from their "V" zone areas. There are also 6,445 commercial structures throughout the Region, which are potentially vulnerable to flooding due to their location within the SFHA only. Attachment 5-D to this section provides an estimation of the number of vulnerable buildings by jurisdiction/area within Charleston County. The estimates for the number of mobile homes in the SFHA are listed separately, since mobile homes are more highly vulnerable to high wind conditions sometimes associated with flooding, in general, than are site-constructed dwellings. The data utilized for this table were derived using a GIS overlay of FEMA Q-3 flood zone data for Charleston County to designate flood zones for the parcels within Charleston County. Building counts were obtained from the Charleston County Assessor's data base, utilizing this flood zone information to differentiate the "A" and "V" flood zones from the non-SFHA areas. Building count and valuation data for several of the special purpose districts (e.g. Cooper River Parks and Playground Commission, North Charleston District, St. Andrew's PSD, St. John's Fire District, and St. Paul's Fire District) are included in the data for unincorporated Charleston County. The service areas for the several of the special purpose districts included in this plan also cross multiple jurisdictional boundaries, and are included in the building count and valuation data for these jurisdictions.

The actual vulnerability of the building stock within the special flood hazard area (SFHA) does potentially vary depending upon the date of construction for the building, since buildings constructed since the enforcement of floodplain development regulations are elevated to anticipated flood levels and built in accordance with more stringent code requirements. The year of 1985 has been selected as a point at which newest construction in the Charleston Region should be able to withstand the effects of most flood and hurricane events. The estimated numbers of residential and commercial site-built structures that were constructed prior to 1985 and located in the SFHA are shown in this table (5-F). Since no date of construction data is available for manufactured homes in the Charleston County database, the manufactured home data estimates the potential vulnerability of these structures because of their location within the SFHA only. Using this refined data, there are an estimated total of 36,059 buildings (including manufactured homes), of which 6,460 are in Unincorporated Charleston County, that are vulnerable to flooding due to their age of construction and location in the Special Flood Hazard Area in the Charleston Region. Of all structures, 32,235 are residential structures, 3,173 are commercial structures, and 651 are manufactured homes. Attachment 5-F summarizes the

vulnerable building counts using this refined analysis method for each of the jurisdictions within Charleston County.

The table provided in Attachment 5-G further refines the potential vulnerability of the building stock within the Region by estimating the average value of the buildings by jurisdiction within the Region that are potentially vulnerable to flooding. The data provided for pre-1985 building valuations were estimated from data derived from the computerized appraisal records in the Charleston County, SC Assessor's office. The average building valuation data indicated is current through April 2017, so the valuations indicated reflect a 20% upward adjustment to reflect current values. This data does not include "exempt" properties, manufacturing properties, or utility or railroad properties. Exempt properties are generally those owned by a government entity (Federal, State or Local) or some charitable organizations. The ages of the buildings were derived from the "year built" records in the tax assessor's database. The building values shown are estimated market value, not replacement value. The valuations provided do not include land values. As this table reflects, the Charleston Region has an estimated \$6.7 billion in real property value and mobile homes potentially vulnerable to flood losses due to its location in the Special Flood Hazard Area and construction prior to 1985. The data provided for each jurisdiction gives a rough estimate of potential flood losses if a severe flood event, including hurricane storm surge, occurs.

The table in Attachment 5-H provides information regarding the total value of buildings located within the "A" and "V" flood zones per jurisdiction, as determined from the tax assessor's data base. There is a total of approximately \$19.0 billion of real property located in the "A" flood zone and \$2.9 billion of real property located in the "V" flood zone. The "V" flood zone property is considered to be the most highly vulnerable to hurricanes, since it is subject to wave action and rising water during hurricanes and coastal flooding events.

As a further step to attempt to quantify the vulnerability of the Charleston Region to hurricane-force winds and storm surge flooding, a HAZUS-MH simulation of a category 4 hurricane making landfall at the northern-most tip of the Isle of Palms was performed. The following is the relative degree of anticipated building-related damages (moderate or more) for all of Charleston County as a result of a hurricane of this magnitude striking in this location. When this simulation was run using data from the 2010 census as the basis for the building count and valuation information, at least 21,885 buildings were expected to have moderate or more damage in Charleston County. Of these, 10 fire stations, 2 hospitals, 4 police stations, and 119 schools would be expected to have at least moderate damage as a result of a hurricane of this magnitude striking in this location, per this simulation. This simulation estimates that 1,604 buildings will be completely destroyed in Charleston County as a result of a hurricane of this magnitude, with 1,600 of these being residential structures. No critical facilities are expected to be totally destroyed by a hurricane of this magnitude striking in this location, per this simulation. Estimated building, contents, inventory, and business interruption losses from this simulated hurricane are as follows:

Building:	\$1.14 billion
Contents:	\$416.5 million
Inventory	\$ 4.4 million
Business Interruption Losses:	\$ 334.6 million
Total (approx.):	\$1.89 billion

Of these total estimated building-related damages determined through this simulation, approximately 83.9% are anticipated to occur to residential properties, 13.1% to commercial properties, 1.9% to industrial properties, and 1.1% to other properties in Charleston County. As a comparison of these results to the damages incurred as a result of Hurricane Hugo (a category 4 hurricane), the comparably lower magnitude of the estimated damages from this simulation than actually occurred during Hurricane Hugo is believed to be attributable to several factors. Specifically, Hurricane Hugo destroyed many of the pre-FIRM buildings,

mostly on affected barrier islands and coastal communities in the central and northern parts of Charleston County, and structures built to replace these have been constructed in accordance with more current codes and designed to withstand high wind speeds associated with hurricanes, and have also been elevated to or above anticipated flood elevations associated with the hurricane storm surge. The HAZUS-MH models take applicable codes into account in determining estimated building losses and damages with simulated hurricanes. In addition, the track of this simulated hurricane is slightly north of the track actually taken by Hurricane Hugo in 1989, placing the most damaging quadrant of the hurricane slightly further north and in less developed areas of Charleston County than where Hurricane Hugo struck, thereby potentially estimating fewer damages in the more highly developed areas (i.e. the City of Charleston and the Town of Mt. Pleasant) than would be expected from a hurricane following Hugo's path more directly. HAZUS-MH also uses census data, which is not considered to be as accurate in its building count and valuation information as the data contained in the Charleston County Assessor's data base. In an attempt to rectify this for future updates to this Plan, Charleston County has submitted a grant application to seek funding to develop an enhanced tool for populating the HAZUS-MH program with data from the Charleston County Assessor's data base, for the purpose of being able to further define the estimates of potential hazard-related damages generated from this software. Therefore, while this simulation is valuable in helping to quantify potential current damages associated with large scale hurricanes, the results from this simulation are also not exactly representative of Hurricane Hugo, which is the most damaging hurricane to strike the Region in recent history, so these estimates should be analyzed keeping this in mind.

This HAZUS-MH simulation also produced estimates of the quantity of debris that would likely be generated by a hurricane of this magnitude striking in this location. The model estimates that approximately 3.1 million tons of debris would be expected to be generated by this type of hurricane, with 91% of this being trees and limbs. The model estimates that it will take 10,791 (25 ton) truckloads to haul the debris generated from this hurricane. A preponderance of tree-related debris was evident as a result of Hurricane Hugo in 1989, so in this aspect, the simulation appears to be providing relatively accurate and useful information for post-event clean-up planning.

4. Wildfire

Fire prevention and control have been intimate requirements in the building-related codes and zoning ordinances enforced throughout the Charleston County Region since the adoption of the first of these types of codes. The most vulnerable structures to fire other than wildfire would likely be those in the central business district of the City of Charleston. This is due primarily to the close physical proximity of the structures in this area. The City of Charleston, however, has a fire department that is rated Class 1 through the Insurance Services Organization fire rating schedule, and is therefore well equipped to deal with fires should they occur in this area. There are also well-established jurisdiction-conducted fire prevention inspection programs throughout the Region, providing periodic inspections for fire prevention of the commercial buildings in the Region. Even developed islands in Charleston County without road access, such as Dewees Island, have access to fire fighters and equipment for prompt response to fires should these develop.

Wildfires in rural areas are possible due to, for example, arson, drought or lightning initiation, and are often difficult to contain due to the lack of access to the fire and a lack of readily available water to fight these wildfires, and the rapid spread of these fires due to the dense forestation of these areas. In the event of wildfires, structures in less populated areas in the proximity of the forested areas could be at risk of fire damage. Factors that makes homes at higher risk for wildfire damage include, but are not limited to, long narrow driveways with no turnarounds for fire apparatus, and fuel loads (brush, trees, shrubs, pine straw, etc.) adjacent to the structure. Within Charleston County there are 2,252 buildings located within the boundaries

of the Francis Marion National Forest. Of these 1,032 are in the Awendaw area, and 1,220 are in Unincorporated Charleston County. Utilizing the average residential building valuation for buildings constructed pre-1985 as detailed in Attachment 5-F of this plan to be consistent with the refined methodology utilized for estimating flood-related building value loss potential, these buildings within the wildfire prone area are estimated to have an average value of \$65,000 in the Town of Awendaw, and \$89,000 in Unincorporated Charleston County. These buildings, by nature of their location within the forest, are the most vulnerable buildings to wildfire damage within the Charleston County Region.

5. Tornado

Tornado vulnerability exists in almost any structure in the Region since the building-related codes in general do not address designing for winds of the speed often associated with tornadoes. The major vulnerability regarding tornadoes is that in most cases, structures in this Region are not provided with basements or below-grade shelter areas due to the high water table and the flood zone restrictions on basements in the special flood hazard area. Manufactured housing is probably the most vulnerable general category of structures in the Region to tornadoes, since these structures are often located in areas where tornado activity is greatest and are less likely to provide adequate shelter from these storms than site-constructed structures. The majority of the mobile homes within Charleston County are located in the unincorporated areas of the County and the City of North Charleston.

Tornadoes of a severe magnitude are capable of totally damaging any type of structure in their path. According to the National Weather Service, the Charleston County area has never been hit by a tornado greater than an F2 in magnitude on the Fujita Tornado Damage Scale. Chances of the Charleston County area being hit by a stronger tornado remain very slim because of the marine influence layer along the coastal areas. Tornadoes of an F2 magnitude may have winds between 113 and 157 miles per hour, and are capable of totally destroying mobile homes and taking the roofs off of site-built homes. Tornadoes of this magnitude can also overturn box cars, uplift automobiles, snap and uproot trees, and cause small objects to become wind-borne debris. Tornadoes can form any time of the year and may also be spawned by hurricanes.

According to data provided by the American Red Cross (2016), there have been 11 tornadoes in South Carolina for which the American Red Cross provided disaster services. Following is a listing of the tornadoes that occurred in Charleston County per the American Red Cross data, and the number of families affected by these tornadoes:

<u>Date of Tornado</u>	<u>Location of Tornado</u>	<u>No. of Families Affected</u>
October 15, 2015	Johns Island, SC	10

The American Red Cross data do not include any commercial structures that may have been damaged by these storms. The Charleston County area could potentially incur heavy localized property damage, particularly if an intense tornado made landfall in a densely populated area. The potential loss of one or more major employers to this type of event should also be considered, since the economic loss to the community can spread beyond the area immediately affected by a tornado, if an employer is forced to permanently or temporarily cease operations as a result of building or other property damage. Not only is there potential for commercial building and property losses, but also the potential for job loss throughout the community if an employer cannot quickly recover from this type of event.

Building and other property loss is also only one type of loss associated with tornadoes, particularly for those that live in manufactured homes. Researcher Harold Brooks, of the NOAA National Severe Storms Laboratory, has indicated that mobile home residents are killed at a rate 20 times greater than permanent home residents in tornadoes. Therefore, potential loss of life to manufactured home residents as a result of tornadoes, for which no dollar value can be assigned, must also be considered when evaluating potential losses to this type of event.

6. Earthquake

Seismic (earthquake) design parameters are also relatively recent additions to the building-related codes enforced by the various jurisdictions in the Charleston County Region. For the most part, buildings constructed since the between the middle 1980's and early 2000's have been designed to meet the seismic resistance criteria specified in the Standard Building Code or the CABO One and Two Family Dwelling Code. Buildings constructed since the early 2000's have been constructed to even higher standards for earthquake as contained in the International Building and Residential Codes. However, buildings constructed prior to this time have the potential to be vulnerable to earthquakes, particularly those which are unreinforced masonry construction. In addition, structures on reclaimed land (filled marsh, old landfill, etc.) will respond with differing characteristics in the event of an earthquake than those on non-reclaimed land.

According to the Comprehensive Seismic Risk and Vulnerability Study for the State of South Carolina, and a report produced from a HAZUS study for the South Carolina Emergency Management Division, an earthquake of a similar magnitude to the earthquake that occurred in Charleston in 1886 (magnitude 7.3 on the Richter Scale) would be expected to produce the following building-related losses:

- Berkeley, Charleston and Dorchester Counties would be expected to have an estimated \$7.6 billion in building losses.
- 14,267 million tons of debris (wood/masonry and steel/concrete) would be expected to be generated in Charleston County alone.
- Over 250 fires would be expected to result in the Tri-County area as a result of an earthquake of this magnitude, resulting in further building-related losses.
- Schools and fire stations are vulnerable to damage due to the age of the buildings and type of construction (state-wide estimate of over 220 schools and 100 fire stations damaged).
- More than 30 hospitals in the State (30%) are expected to be non-functional. Most of this damage is expected in the Berkeley-Charleston-Dorchester County areas.

Charleston County participated in the state-wide earthquake drill on March 14, 2016, where the scenario was a 7.7 magnitude earthquake occurring in the same location as the 1886 Charleston earthquake. HAZUS-MH was utilized to estimate the damages due to this earthquake for Charleston County only. The following building-related damage estimates were derived from this simulation:

Structural Losses (total):	\$4.56 billion
Non-Structural Losses (total):	\$17.23 billion
Contents losses (total):	\$4.60 billion
Inventory losses (total)	\$86.64 million
Income losses (total):	\$2.47 billion
Total losses:	\$28.94 billion

Of these estimated losses, approximately 55.4% are anticipated for single family residences, 23.2% for other residential properties, 17.5% for commercial properties, 2.4% for industrial properties, and 1.5% for other properties. A total of 73,777 buildings in Charleston County and its inclusive municipalities are expected to have damage as a result of an earthquake of this magnitude, with 53% of these expected to receive extensive damage. Critical facilities such as hospitals (12), schools (119), police stations (12), fire stations (58) and emergency operations centers (1) are also expected to receive some damages as a result of an earthquake of this magnitude, based upon this HAZUS-MH simulation.

It should be noted that earthquake intensity is on a logarithmic scale, so an earthquake with a magnitude of 7.7 has much greater damage potential than, for example, the 7.3 magnitude earthquake that the Charleston area previously experienced in 1886. The Charleston County

area has fortunately not previously experienced an earthquake with a magnitude as high as a 7.7 on the Richter scale. This of course, is not impossible, but it is also a more damaging earthquake than the largest earthquake that the area has ever experienced in its history. As HAZUS-MH simulation points out, Charleston County could receive catastrophic damages if the area would experience an earthquake of this magnitude. Consequently, educating the citizenry regarding preparations they should take to minimize building-related damages due to earthquakes is a high priority item for the area. It is also important for this education to be aimed at those in the construction community, so as to reduce their interest in attempting to exclude some of the provisions of the adopted codes that apply to seismic strengthening of buildings. (The Homebuilders Association of South Carolina had recommended several changes to the adopted codes, some of which would have resulted in a relaxation of seismic requirements, but these amendments were ultimately either withdrawn or were rejected by the code adoption commission.)

On June 20th, 2012, another HAZUS earthquake simulation was performed to include new construction in the county, new population figures, and additional refinements in the HAZUS simulation program. The simulated earthquake was a 6.8 magnitude on the Richter scale and the simulated epicenter was modeled after the historic 1886 earthquake.

HAZUS estimates that 84,208 buildings will be at least moderately damaged; this is over 62.0% of the buildings in the area. There are an estimated 25,715 buildings that will be damaged beyond repair.

With regards to essential facility damage, all 12 area hospitals, 118 of the 124 schools, the single Emergency Operations Center, 10 of the 12 Police Stations and 20 of the 21 Fire Stations are expected to receive at least moderate damage. Response and functionality of these facilities will be compromised.

With regards to transportation systems, 275 of the 332 bridges are expected to receive moderate damage, 160 of them are estimated to suffer complete damage. After day 1, only 57 bridges will have functionality and after day 7, 89 will be operable. The main bus facility is expected to receive moderate damage, 3 of the 5 ferry facilities are expected to receive moderate damage, 2 of the 3 airport facilities are expected to receive moderate damage, and all 57 port facilities are expected to receive moderate damage, though only 13 suffer complete damage.

Nearly each utility system (water, wastewater, oil systems, electricity, and communication) is expected to receive at least moderate damage at nearly 100% of area locations, though nearly 90% of water, 60% of wastewater, 71% of electrical power, and 67% of communication systems will be functional after one week. It is estimated that after one week, there will not be any functioning oil/fuel systems in the area. It is estimated that by day 30 after the earthquake, all area households will have potable water service, but 16,904 households of the 123,326 will still not have electricity.

As a result of the earthquake, 6.66 million tons of debris will be generated.

The total estimated economic loss is expected to total 14.8 billion dollars. 24% of the estimated losses were related to business interruptions of the Region. By far, the largest loss was sustained by the residential occupancies which made up over 43% of the total loss.

Transportation system losses are expected to reach \$5.1 billion with a resulting economic loss at \$0.5 billion. These figures are based on a relatively long term 15-year timeframe. Utility system losses were estimated at \$2.2 billion with respective economic loss at \$300 million.

7. Hazardous Material Incidents

The Charleston County Region has an exemplary hazardous material program. The local industries and other businesses which store hazardous materials support this program through annual fees based upon the type and quantity of hazardous materials stored. The revenues generated through this program are utilized to provide hazardous material response equipment, training, and services for the emergency responders of the community. The greatest hazardous

material vulnerability of the structures in the Region is likely due to releases that may occur as a result of a natural hazard damaging permanent storage facilities. Building-related hazardous materials incidents represent a very small percentage of the hazardous materials incidents that occur within the Region.

8. Dam Failure

Pinopolis Dam

From the standpoint of damage to structures, the dam failure event with the greatest potential for overall damage in Charleston County would be a failure of the Pinopolis Dam system. A dam failure that would affect the Charleston County area is, however, an extremely unlikely event, since the Pinopolis dams have been retrofitted to withstand an earthquake of the magnitude of the 1886 Charleston earthquake and are inspected and maintained to strict standards. If a catastrophic failure of the Pinopolis dam system were to occur, floodwaters would be expected to reach the closest areas within Charleston County to the dam location within one day of the failure. The Emergency Action Plan for Dam Failure (Santee Cooper December 2015) provides maps of potential inundation areas in the event of a breach of this dam system. The floodwaters would not be expected to recede until approximately 12 days after the dam breach. In addition, if the floodwaters caused the above ground liquid storage tanks located along the Cooper River to dislodge or rupture, the tanks themselves could become floating objects and/or the contents of the tanks could pollute the floodwaters with potentially hazardous and/or flammable substances. Other debris resulting from up-stream damages would also likely be carried in the flood stream. This debris could create additional damages within Charleston County as it strikes and damages buildings and infrastructures along its path to the Atlantic Ocean. Utilizing a Geographic Information System (GIS) overlay map, a determination of buildings potentially in the inundation area for a Pinopolis Dam system break has been made for the three municipalities with the greatest potential number of buildings in the inundation area, namely the City of North Charleston, the City of Charleston, and the Town of Mt. Pleasant. It is estimated that 10,498 buildings in the City of North Charleston, 19,896 buildings in the City of Charleston (including Daniel Island), and 16,242 buildings in the Town of Mt. Pleasant are potentially in the inundation zone for a breach of the West Pinopolis Dam. Whether or not these buildings would be flood damaged is contingent upon the elevation of the finished floor of the buildings relative to the actual elevation of the floodwaters. Any buildings located along the Cooper or Ashley riverfronts that are not elevated above the anticipated dam failure inundation level indicated in Table 5-7 would be potentially vulnerable to floodwater-related losses. Consistent with the refined analysis methodology for estimating the value of buildings potentially vulnerable to loss due to flooding events (see the hurricane/flood discussion in this section), buildings constructed pre-1985 are considered to be the most likely buildings to have finished floor areas at lower elevations, and are therefore considered more likely to incur flood-related losses in the event of a dam breach. The barrier islands would not be expected to experience flooding as a result of a breach and catastrophic failure of the Pinopolis Dam system.

Table 5-1-7

Projected Maximum Flood Water Elevations in the Charleston Region for a Breach of the Pinopolis Dam System					
Locations	52 hrs. after breach	64 hrs. after breach	96 hrs. after breach	104 hrs. after breach	Flooding not projected as a result of a breach
City of North Charleston near Hwy. 52 (near the Berkeley County border) and near to the Cooper River.	15.4 feet				
Central North Charleston near the Cooper River, Daniel Island, Mt. Pleasant near the Cooper River.		12.7 feet			
Neck area of peninsula Charleston, Highway 17 area near the Ashley and Cooper Rivers (City of Charleston, Town of Mt. Pleasant), City of Charleston and Unincorporated Charleston County areas West of and bordering the Ashley River.			9.8 feet		
Eastern Mt. Pleasant, Ashley River border areas near Atlantic Ocean (City of Charleston, Unincorporated Charleston County, James Island), lower peninsula Charleston.				8.3 feet	
Isle of Palms, Sullivan’s Island, Folly Beach, Kiawah Island, Seabrook Island.					X
Ravenel, Meggett, Hollywood, St. Paul’s Fire District, St. John’s Fire District, Southern portions of Unincorporated Charleston County, City of Charleston areas in southern portions of Charleston County, Town of James Island areas not adjacent to Ashley River or Atlantic Ocean.					X
Awendaw, McClellanville, Northern portion of Town of Mount Pleasant (areas beyond 19 miles north following Hwy. 17 from Cooper River bridges), Northern portions of Unincorporated Charleston County.					X
City of North Charleston areas remote from Cooper River, Lincolnville, other areas in Charleston County not otherwise indicated.					X

Source: Emergency Action Plan for Dam Failure (Santee Cooper, December 2015)

Santee Dam

A catastrophic failure of the Santee Dam system would result in building losses, primarily in the areas located in the northern-most portion of Charleston County along the Santee River floodplain. Properties in Unincorporated Charleston County and in the McClellanville-area would be the main areas expected to experience affects from a breach of this dam. The Emergency Action Plan for Dam Failure (Santee Cooper, December 2015) provides maps of areas projected to experience flooding as a result of a breach of the Santee Dam, and lists 54 structures that are in the potential inundation area within Charleston County. The buildings potentially affected by a breach of this dam would be estimated to be approximately valued at \$3.6 million. Nearly all of these structures are in Unincorporated Charleston County (e.g. St. James-Santee areas) in the McClellanville-area along the Santee River and in the Wambaw Creek area. The maximum water elevations projected from a breach of the Santee Dam within Charleston County (22.7 feet) are expected to occur near Germantown along the Santee River, approximately 64 hours after a breach of the dam. Flooding is not projected to extend further south into Charleston County than approximately 6 miles from the northern-most border with Georgetown County. Therefore, no jurisdictions within Charleston County, except for Unincorporated Charleston County near the Town of McClellanville, would be projected to receive flooding as a result of a Santee Dam breach. The maximum projected flood elevation and location are shown on Table 5.8. Any buildings not elevated to or above the anticipated dam failure inundation level would potentially experience flood damages. Floodwaters are

expected to mostly recede from Charleston County within 10 days of a Santee Dam breach event (Emergency Action Plan for Dam Failure, Santee Cooper).

Table 5-1-8

Projected Maximum Flood Water Elevations in the Charleston Region for a Breach of the Santee Dam System					
Locations	52 hrs. after breach	64 hrs. after breach	72 hrs. after breach	104 hrs. after breach	Flooding not projected as a result of a breach
In the vicinity of Railroad Bridge, near the intersection of Hwy 377 and Hwy 45	42.3 ft				
The general region where Highway 301 and State Highway 45 intersects		38.1 ft			
Southwest portion of Charleston County, West of the Ashley River, near intersection of US Hwy 17/701			19.1 ft		
Region of Berkeley County which includes the intersection of US route Hwy 17A and State Hwy 45				28.5 ft	
Isle of Palms, Sullivan's Island, Folly Beach, Kiawah Island, Seabrook Island.					X
Ravenel, Meggett, Hollywood, St. Paul's Fire District, St. John's Fire District, Southern portions of Unincorporated Charleston County, City of Charleston areas in southern portions of Charleston County, Town of James Island areas not adjacent to Ashley River or Atlantic Ocean.					X
Awendaw, McClellanville, Northern portion of Town of Mount Pleasant (areas beyond 19 miles north following Hwy. 17 from Cooper River bridges), Northern portions of Unincorporated Charleston County.					X
City of North Charleston areas remote from Cooper River, Lincolnville, other areas in Charleston County not otherwise indicated.					X

Source: Emergency Action Plan for Dam Failure (Santee Cooper, December 2015)

9. Terrorism

The federal government-owned facilities (e.g. air force base, post offices, etc.) are probably the most vulnerable general category of structures to terrorist threats, followed closely by the structures at the shipping port and the local government offices in the Region. These facilities located in highly congested areas with easy access to the structures, in general, are likely to be more vulnerable than those with more controlled access to the structures. A terrorism annex to the emergency operations plan has been developed to address response to this threat.

The following table summarizes building vulnerability for Unincorporated Charleston County and the Plan's participating jurisdictions. Since Unincorporated Charleston County surrounds the Plan's other jurisdictions, all participants are displayed in the table.

Table 5-1-9

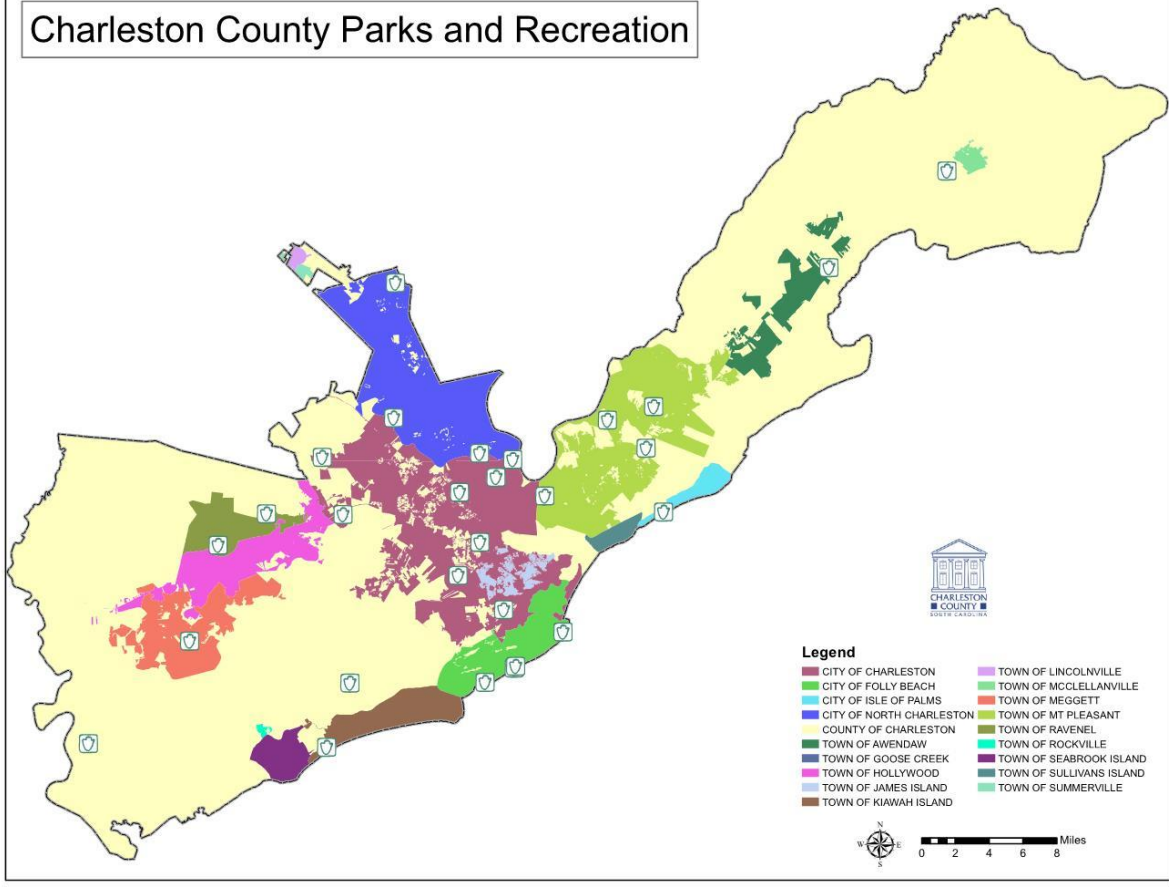
Building Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
Jurisdiction	Dam Failure	Drought	Earthquakes	Flooding	Hazardous Material Incidents	Hurricanes	Sea Level Rise	Tornadoes	Terrorist Incidents	Tsunamis	Wildfires	Winter Weather
Unincorporated Charleston County	5	3	4	4	4	3	3	3	4	5	3	3

Charleston County School District (CCSD), Roper St. Francis Healthcare, and Charleston County Parks and Recreation Commission span multiple jurisdictions. The following is a table of all of the schools in Charleston County and their jurisdictions to identify their risk level with Table 5-9 as well as a map of Charleston County Parks and Recreation Commission and what jurisdictions it crosses. The maps for CCSD and Roper St. Francis Healthcare can be found in section 5-7 Critical Facilities.

Table 5-1-10

Charleston County Public School Jurisdiction		Laing Swing Space	TOWN OF MT PLEASANT
School	Jurisdiction		
Academic Magnet High School	CITY OF NORTH CHARLESTON	Lambs ES	CITY OF NORTH CHARLESTON
Angel Oak ES	CITY OF CHARLESTON	Laurel Hill ES	TOWN OF MT PLEASANT
Apple Charter School	TOWN OF JAMES ISLAND	Liberty Hill Academy	CITY OF NORTH CHARLESTON
Ashley River ES	CITY OF CHARLESTON	Lincoln MS & HS	COUNTY OF CHARLESTON
Baptist Hill MS & HS	TOWN OF HOLLYWOOD	Mary Ford ES	CITY OF NORTH CHARLESTON
Belle Hall ES	TOWN OF MT PLEASANT	Meeting Street ES at Brentwood	CITY OF NORTH CHARLESTON
Blaney ES	TOWN OF HOLLYWOOD	Memminger ES	CITY OF CHARLESTON
Buist Academy	CITY OF CHARLESTON	Midland Park Primary	CITY OF NORTH CHARLESTON
Burke HS	CITY OF CHARLESTON	Military Magnet Acad.	CITY OF NORTH CHARLESTON
Burns ES	CITY OF NORTH CHARLESTON	Minnie Hughes ES	COUNTY OF CHARLESTON
Camp Road MS	CITY OF CHARLESTON	Mitchell ES	CITY OF CHARLESTON
Cario MS	TOWN OF MT PLEASANT	Montessori Comm.	CITY OF CHARLESTON
Carolina Park ES	TOWN OF MT PLEASANT	Morningside MS	CITY OF NORTH CHARLESTON
Carolina Voyager Charter School	CITY OF CHARLESTON	Moultrie MS	TOWN OF MT PLEASANT
Charleston Co. School of Arts	CITY OF NORTH CHARLESTON	Mt. Pleasant Acad. ES	TOWN OF MT PLEASANT
Charleston Development Academy	CITY OF CHARLESTON	Mt. Zion ES	COUNTY OF CHARLESTON
Charleston Progressive Academy	CITY OF NORTH CHARLESTON	Murray-LaSaine ES	CITY OF CHARLESTON
Charleston Progressive Academy	CITY OF CHARLESTON	N. Charleston Creative Arts Elementary	CITY OF NORTH CHARLESTON
Chicora ES	CITY OF NORTH CHARLESTON	North Charleston ES	CITY OF NORTH CHARLESTON
Child and Family Dev Center	CITY OF NORTH CHARLESTON	North Charleston HS	CITY OF NORTH CHARLESTON
Corcoran ES	CITY OF NORTH CHARLESTON	Northwoods MS	CITY OF NORTH CHARLESTON
Daniel Jenkins Academy	CITY OF NORTH CHARLESTON	Oakland ES	CITY OF CHARLESTON
Drayton Hall ES	CITY OF CHARLESTON	Orange Grove ES	CITY OF CHARLESTON
Dunston ES	CITY OF NORTH CHARLESTON	Pattison's Academy	CITY OF CHARLESTON
East Cooper Montessori	TOWN OF MT PLEASANT	Pepperhill ES	CITY OF NORTH CHARLESTON
Ellington ES	TOWN OF RAVENEL	Pinckney ES	TOWN OF MT PLEASANT
Fort Johnson MS	TOWN OF JAMES ISLAND	Pinehurst ES	CITY OF NORTH CHARLESTON
Frierson ES	COUNTY OF CHARLESTON	Saint Andrews MS	CITY OF CHARLESTON
Garrett Academy	CITY OF NORTH CHARLESTON	Saint John's HS	CITY OF CHARLESTON
Goodwin ES	CITY OF NORTH CHARLESTON	Sanders-Clyde ES	CITY OF CHARLESTON
Greg Mathis HS	CITY OF NORTH CHARLESTON	School for Math and Science	CITY OF CHARLESTON
Harbor View ES	CITY OF CHARLESTON	Septima P. Clark Academy	COUNTY OF CHARLESTON
Haut Gap MS	CITY OF CHARLESTON	Simmons Pinckney MS	CITY OF CHARLESTON
Hunley Park ES	CITY OF NORTH CHARLESTON	Springfield ES	CITY OF CHARLESTON
Hursey ES	CITY OF NORTH CHARLESTON	St. Andrews ES	CITY OF CHARLESTON
James B. Edwards ES	TOWN OF MT PLEASANT	St. James-Santee ES	COUNTY OF CHARLESTON
James Island Charter HS	CITY OF CHARLESTON	Stall HS	CITY OF NORTH CHARLESTON
James Island ES	COUNTY OF CHARLESTON	Stiles Point ES	CITY OF CHARLESTON
James Simons ES	CITY OF CHARLESTON	Stono Park ES	CITY OF CHARLESTON
Jane Edwards ES	COUNTY OF CHARLESTON	Sullivan's Island ES	TOWN OF SULLIVANS ISLAND
Jennie Moore ES	TOWN OF MT PLEASANT	Wando HS	TOWN OF MT PLEASANT
Jennie Moore ES	TOWN OF MT PLEASANT	West Ashley HS	CITY OF CHARLESTON
Ladson ES	COUNTY OF CHARLESTON	West Ashley MS	CITY OF CHARLESTON
Laing Swing Space	TOWN OF MT PLEASANT	Whitesides ES	TOWN OF MT PLEASANT
Lambs ES	CITY OF NORTH CHARLESTON	Williams MS	CITY OF CHARLESTON
		Zucker MS	CITY OF NORTH CHARLESTON

Charleston County Parks and Recreation



5.1.3 – Infrastructure Vulnerability

The questionnaire also asked respondents to indicate their opinions regarding the vulnerability of the infrastructure in the Charleston County area to natural and man-made hazards. The average results for this vulnerability assessment indicated that the infrastructure in the Charleston County Region was most vulnerable to hazards in the following order:

Hurricane
Flood
Earthquake
Sea Level Rise
Tornado
Terrorism
Hazardous Material
Wildfire
Winter Weather
Dam Failure

As previously discussed, of the hazards to which the government entities represented in this plan are considered to be vulnerable, the following do not cause infrastructure damages:

Severe Storms
Drought
Tsunami
Rip currents

These latter 4 hazards will not be discussed further in this infrastructure vulnerability section of this plan as previously discussed since these do not cause damages to infrastructure that can be reasonably determined. Applicable infrastructure damages as discussed herein apply to all government entities, including the special purpose districts that overlap jurisdictional boundaries with municipalities or Unincorporated Charleston County as indicated in Table 4.1 as having a potential vulnerability to the indicated hazard.

The analysis for the questionnaire that was distributed during 2017 indicated that the vulnerability of the infrastructure in the Region per hazard was ranked as follows: 1. hurricane; 2. flooding; 3. earthquake; 4. sea level rise; 5. tornado; 6. terrorist incident; 7. tsunami; 8. Wildfire; and 9. dam failure. The rankings for floods and earthquakes demonstrate a slight reduction in the perceived vulnerability of infrastructure to earthquakes compared to the earlier survey and a slight increase in this vulnerability for flooding. The perception of the survey respondents as to the vulnerability of infrastructure in the Region to fire and tornadoes also went down.

Of the additional hazards required to be included in hazard mitigation plans to meet the requirements of the Disaster Mitigation Act of 2000 that the Charleston County area could possibly experience (drought/heat wave, dam failure, tsunami), only dam failure and tsunami would be expected to potentially cause damages directly to the infrastructure within the Region, although the probability of either of these types of events is very low. Any damages to infrastructure as a result of drought would most likely be indirect due to wildfires, which are addressed within this plan under “Wildfire”. Rip currents and avian flu/pandemics do not cause structural damage to infrastructure and subsequently are not considered as hazards to infrastructure within this plan.

1. Hurricane

The infrastructure most vulnerable to hurricane activity is likely to be the above ground electrical, telephone, liquefied petroleum gas, and cable television service. The City of

Charleston, in conjunction with South Carolina Electric and Gas Co., has, however, initiated a program where neighborhoods may convert their overhead electrical service to underground service for enhanced hurricane protection. SCE&G maintains a fund to which consumers and the utility contribute to provide funding for special projects, such as infrastructure upgrades or subterranean line installations, although this utility stresses that underground problems in the electrical service are more difficult to find and repair than overhead transmission line problems. Wastewater treatment facilities may also be vulnerable to hurricane activity, particularly if inundated by storm surge often associated with hurricane activity. Older bridges may also be vulnerable to hurricane damage if these bridges were not originally designed to withstand the high winds (minimum 130 mph 3 second gust wind speeds) generally associated with hurricanes, or are in deteriorated structural condition. Shipping port facilities are also potentially vulnerable to hurricanes due to the close proximity of these facilities to the water. Roads, while generally not vulnerable to high wind conditions directly, could experience damage (washout) from flooding as well as obstruction/damage from fallen debris generally associated with hurricanes. Roads in coastal areas are also vulnerable to sand obtrusion as a result of hurricane activity. Drainage ways may also be vulnerable to damage from hurricanes if they become obstructed by debris or are unable to carry the volume of water generated by the flooding often associated with this type of event.

2 & 3. Flood and Sea Level Rise

The most highly vulnerable infrastructure to flood is likely to be roads in low-lying areas and bridges which are close to the water level of the body of water over which they cross. Liquefied petroleum gas tanks that are above ground are also vulnerable to uplift and floatation if not adequately anchored to withstand hydrostatic and hydrodynamic forces associated with high flood water levels. Grade level utility boxes (e.g. telephone, cable television, electrical transformers, etc.) in low-lying areas are also likely to be made inoperable/insecure during high water levels unless the boxes are flood proofed or the equipment is designed to be operated in a submerged state. Wastewater treatment plants are also vulnerable in the event of a flood as a result of the operational necessity for this type of facility to be located close to sea level. The shipping port is also potentially vulnerable to flood damage due to the close proximity to the water.

4. Wildfire

The most vulnerable infrastructure to localized fire would likely be gas utility services (particularly above ground liquefied petroleum gas). In the event of wildfire, any utility lines crossing through forested areas would be potentially vulnerable to damage. Roads or bridges located in forested areas may also be vulnerable to damage from fire, either directly as a result of proximity to intense heat or as a result of damage/obstruction due to fallen debris.

5. Tornado

Tornado infrastructure vulnerability is likely to be greatest for those utilities located above ground (electrical, telephone and cable service). Bridges which may be in the path of a tornado are also vulnerable to damage as a result of a direct strike by one of these storms. Roads are also vulnerable to damage as a result of fallen debris associated with tornado activity. Any buildings in the direct path of a tornado which may be operation centers for utility or emergency services (e.g. power transmitting stations, wastewater treatment facilities, water utility control buildings, police stations, fire stations, emergency operation centers, etc.) would also be vulnerable to a direct strike by a tornado.

6. Earthquake

Earthquake infrastructure vulnerability is dependent upon the magnitude of the earthquake, the location of the earthquake epicenter, soil type and conditions, and duration of ground shaking. If an earthquake should cause a failure of the Santee Cooper dam, infrastructure damages associated with flooding as will be discussed in the following section would also apply to earthquake vulnerability. If a dam failure is not associated with an earthquake, the most

vulnerable infrastructure to an earthquake would likely be underground water, sewer, and natural or liquefied petroleum gas utility lines. The Charleston Waterworks has, however, begun work on a \$26.5 million project to replace an aging sewer tunnel that services the Charleston peninsula which helps reduce some of this vulnerability to earthquakes and flooding. They have also asked the Charleston County Sheriff's Department to utilize their reverse 911 notification systems to let residents know of any issues that may result with drinking water, should there be damages to any water lines. A major earthquake would be expected to create stresses on water transmission lines, which could disable water services to a large number of residents for a long period since earthquake-related water line breaks could affect a larger number of water lines making diversion of water more difficult. Older bridges may be vulnerable to collapse in an earthquake of magnitude 5 or greater on the Richter scale, particularly if they are in deteriorated structural condition. Roads and bridges in areas subject to liquefaction are also highly vulnerable in the event of an earthquake of significant magnitude to result in soil liquefaction (magnitude 6 or greater on the Richter scale). The Charleston International Airport is located on land that experienced liquefaction during the 1886 earthquake. The effect this prior liquefaction may have in future earthquakes has not been definitively determined, however, it is likely the airport may experience liquefaction again in the event of a significant earthquake. Roads in areas not subject to liquefaction may also still be vulnerable to damage/obstruction by fallen debris in earthquakes large enough to cause buildings to shed masonry veneer/appendages or experience actual structural failure (magnitude 6 or greater on the Richter scale). Roads on reclaimed land (filled marsh, old landfill, etc.) will respond with differing characteristics in the event of an earthquake than roads on non-reclaimed land.

According to the Comprehensive Seismic Risk and Vulnerability Study for the State of South Carolina, a HAZUS-based study produced for the South Carolina Emergency Management Division, an earthquake of the magnitude of the 1886 Charleston earthquake (magnitude 7.3 on the Richter Scale) would be expected to potentially cause the following infrastructure-related losses:

- Direct economic losses to lifeline (transportation and utility) systems state-wide is expected to be over \$1 billion.
- An estimated 800 bridges state-wide are expected to suffer damage to the extent that they will be inaccessible. Charleston County communities accessible only by bridge routes could be left without access until bridges are repaired or replaced.
- Damage to electric power facilities is expected to be mostly limited to major substation equipment, with 63 electric power facilities state-wide expected to be damaged, leaving approximately 300,000 households without electric service. Distribution lines are also expected to need repairs so that restoration of electrical service may take days to weeks to complete.
- Damage to water systems is expected primarily to pipelines, storage tanks or reservoirs, treatment facilities and pumping plants. Pipeline damage is expected to be most critical in determining when water service can be restored to the general public. Since liquefaction is expected in the Charleston County area if an earthquake of this magnitude occurs, damage to the water distribution system is expected requiring weeks to months to complete repairs. It is estimated that 80% of households will be without water.
- Water failures are expected to drain water reserves and create issues for water availability for fighting fires that are expected.

- Environmental damage is expected due to the wastewater treatment facilities or pipelines being damaged.
- Natural gas and oil systems are expected to receive moderate to minor damage, particularly natural gas transmission lines where gas-welded joints are present.
- All elevated above-ground storage tanks are potentially vulnerable, particularly if ground shaking is intense.
- Communications system damages are expected primarily with equipment inside communication buildings. Replacing this equipment may take days to weeks.

Charleston County participated in the state-wide earthquake drill on March 14, 2016, where the scenario was a 7.7 magnitude earthquake occurring in the same location as the 1886 Charleston earthquake. HAZUS-MH was utilized to estimate the damages due to this earthquake for Charleston County only. The following infrastructure damage estimates (Charleston County only) were derived from this simulation:

Bridges Damaged:	332
Water Facilities Damaged:	44
Waste Water Facilities Damaged:	344
Electrical Power Facilities Damaged:	35
Communication Facilities Damaged:	24
Oil System Facilities Damaged:	8
Anticipated water pipeline leaks:	574
Anticipated waste water pipeline leaks:	1,366

Per this HAZUS-MH simulation, over \$2 billion in transportation-related inventory losses would be expected in Charleston County if an earthquake of this magnitude would occur at this location, given the current transportation infrastructure in the Charleston County area. Appendix F contains a map indicating the location of the anticipated bridge damages in the central portion of Charleston County. As is indicated, several major arteries connecting James Island and West Ashley to Peninsula Charleston would be expected to be damaged should the area experience an earthquake of this magnitude. This study upgraded the collective health of the bridges in Charleston County, with the number of substandard bridges in Charleston County on the top 20 list dropping from 10 to 6, due in large part to the replacement of the old Cooper River bridges with the new Ravenel bridge, and other bridge repairs undertaken on I-26 and U.S. Highway 17. The loss of the use of this transportation inventory would make it difficult, if not impossible, for emergency response agencies to respond to many calls for assistance in the immediate aftermath of an earthquake of this magnitude. An additional potential result of a major earthquake that is not specifically addressed in the HAZUS-MH simulation could be the loss of internet capabilities due to damage to underground/undersea internet fiber optic cables, as occurred throughout Asia after an undersea earthquake near Taiwan. While this type of loss is unlikely to occur in the Atlantic Ocean basin due to more redundancy in the fiber optic cabling network for the internet in this region, it is not out of the question that a major earthquake could also temporarily take out internet service to Atlantic coastal regions, if damages occur to multiple fiber optic transmission lines. (The infrastructure loss potential from an earthquake highlights the need for training area residents through the Community Emergency Response Team (CERT) program to be able to assist their neighbors and be self-sufficient after a large-scale event until the emergency responders are able to resume their normal response activities post-event. Charleston County has been active in training area residents through the CERT program since 2003, and had trained approximately 531 people in this program in Charleston, Berkeley, and Dorchester Counties.

In addition to the anticipated transportation system inventory losses, an estimated \$1.27 billion in inventory losses to utility systems in the Charleston County area would be expected under this earthquake scenario, per HAZUS-MH. Of these estimated inventory losses, 35.1% would be anticipated to occur to potable water systems, 30.6% to waste water systems, 3.3% to natural gas systems, 1.1% to oil systems, 28.0% to electric power systems, and 1.9% to communications facilities.

As was previously discussed in the earthquake “Vulnerable Buildings” section of this plan, earthquake intensity is on a logarithmic scale, so an earthquake with a magnitude of 7.7 has much greater damage potential than, for example, the 7.3 magnitude earthquake that the Charleston area previously experienced in 1886. While an earthquake of this magnitude is not impossible in Charleston, a 7.7 magnitude earthquake is a more damaging earthquake than the largest earthquake that the area has ever experienced in its history. As this HAZUS-MH simulation points out, the Charleston County area could receive catastrophic infrastructure-related damages if the area would experience an earthquake of this magnitude. Consequently, educating the citizenry and owners/operators of infrastructure facilities regarding earthquake safety and mitigation measures is understandably a high priority activity for the area.

7. Hazardous Material Incidents

The infrastructure vulnerability of the Region is greatest for heavily traveled roads or for roads/bridges which serve as the only artery for access to highly populated areas. The shipping port is also vulnerable to hazardous material incidents associated with transportation-related releases. Drainage ways are also potentially vulnerable to liquid transportation-related hazardous material releases since spills may migrate to the roadside drainage channels and be transported to other locations or to the terminus of the drainage channel through these channels. Airborne releases of hazardous materials, whether through transportation-related causes or from stationary storage sources, may also create vulnerability for utility operation facilities in the proximity of the release, depending on the nature and type of materials released. More than half of the railroad tracks in South Carolina do not have electronic systems in place to warn of oncoming trains, so the potential exists for future train accidents and subsequent release of hazardous materials associated with railroad transportation in our State.

8. Winter Weather

Above ground utility lines are potentially vulnerable to failure and/or damage as a result of ice storms. Structural damage occurred to cross-arms and poles where above-ground utility services were present in the area affected by this ice storm. While ice storms are rarer in Charleston County than in the upstate of South Carolina, this event shows evidence of a potential vulnerability of above ground utility service lines in Charleston County, should the area experience a winter storm or a high wind event such as a hurricane or tropical storm.

9. Dam Failure

In the highly unlikely event of a Santee Cooper dam failure, infrastructure damages are possible. However, since a dam failure is not likely to occur without a major earthquake preceding the dam failure, infrastructure damages as discussed in the earthquake section of this plan are likely to accompany damages projected to occur as a result of any dam failure in the Charleston County area.

Santee Dams – Roads/Bridges

In the highly unlikely event of a dam failure, damages to roads or bridges in the projected flood inundation areas are possible. According to the Emergency Action Plan for Dam Failure, a breach of the Santee Dam is projected to result in flood inundation near portions of Highway 45, Highway 857, and Highway 17 and 701 (causeway) within Charleston County. Several of these roads are often used by residents of areas not expected to be flooded by a breach of this dam (e.g. barrier island communities) for evacuation for hurricanes. Consequently, advising residents of alternate evacuation routes from those used for other hazards may be necessary in

the event of a breach of the dam. Since these floodwaters could potentially cover portions of these highways for up to 5 days and may contain floating debris, damages to the road surfaces or overpasses could occur as a result of the event. Road clearing operations and inspections will likely be necessary to make the roads passable to vehicular traffic and ensure road and bridge safety once the flooding has ceased.

Pinopolis Dams – Roads/Bridges

Similarly, a breach of the Pinopolis Dam system would also be expected to result in floodwater inundation of roads, specifically near portions of Cainhoy Road, Clements Ferry Road (near I-526), Highway 17 (near Cooper and Ashley Rivers), Ashley River Road, Dorchester Road, Rhett Avenue, N. Rhett Extension, Remount Road (terminus), Highway 78 (near I-26 and Berkeley County Border) and Highway 52 (between I-26 and Redbank Road interchanges) (Emergency Action Plan for Dam Failure, Santee Cooper, 2000, December 29). Several of these roads are often used by residents of areas not expected to be flooded by a breach of this dam (e.g. barrier island communities) for evacuation for hurricanes. Consequently, advising residents of alternate evacuation routes from those used for other hazards may be necessary in the event of a breach of the dam. Any road areas covered with floodwaters could remain so for possibly seven (7) or more days. Debris carried in the flood stream could potentially damage roads or bridges, so flooded roads or bridges will need inspecting and clearing post-event to make these roads passable to vehicular traffic and ensure road and bridge safety.

Shipping Port

The shipping port, being located on the Cooper River, is vulnerable to damage as a result of rising water elevations and floating debris as a result of a breach of the Pinopolis Dam system. Any containers in storage at the port near the Cooper River that are not anchored against flotation could potentially become floating debris in the Cooper River. Docking facilities and container unloading equipment at the port could also potentially be damaged by debris carried in the floodwaters that could result from a breach of this dam. Since debris-laden floodwaters would not be expected to reach the port facilities for 4-5 days, any ships docked at the port should be able to be moved out of the Cooper River to the Atlantic Ocean prior to the floodwaters reaching the port, consequently damages to ships should be minimized. Loss of business at the port for the minimum of seven (7) or more days this facility would be expected to be closed, due to water elevations and debris in the Cooper River as a result of a dam failure, could have a negative effect on the profitability of the shipping port, even if the port does not receive physical plant damages as a result of the projected flooding. The economic effect of any hazard-induced closure of the port is addressed in the “Economic Impact” section of this plan.

10. Terrorism

Vulnerability of infrastructure to terrorism is most likely where a single damage event is able to cause extensive damage. This vulnerability is probably greatest for facilities without tightly controlled access (e.g. reservoirs, bridges, major arterial roadways, utility transmission lines, etc.).

The following table summarizes infrastructure vulnerability for Unincorporated Charleston County and the Plan’s participating jurisdictions. Since Unincorporated Charleston County surrounds the Plan’s other jurisdictions, all participants are displayed in the table.

Table 5-1-11

Infrastructure Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
Unincorporated Charleston County	5	4	1	1	2	1	2	2	2	2	3	3

The following problem statement summarizes Unincorporated Charleston County’s main concerns regarding hazard vulnerability. Each participating jurisdiction issues a problem statement in this Plan.

Problem Statements and Vulnerability Based on Jurisdiction	
Jurisdiction	Vulnerability Assessment
Unincorporated Charleston County	The unincorporated areas of the County are spread throughout all portions of the county. Mostly, it is rural in the west on Edisto and Johns Islands and in the east near Awendaw and McClellanville. These areas tend to have more mobile homes, limited access to evacuation routes and more low income/at-risk populations. This puts the County at high risk for hurricanes. The County is more vulnerable to tornadoes as well as riverine flooding with the amount of mobile homes in the area. Unincorporated Charleston County does not have much coastal land. The County has some low lying areas which make it vulnerable to flooding. The County is also vulnerable to earthquakes with it being close to a fault line and most buildings are not built to withstand a severe earthquake. The entire County is vulnerable to winter weather as we do not experience it often and are not equipped with the plows, salt, etc. for ice and snow.

5.1.4 – Known Flood Damages

FEMA’s National Flood Insurance Program identifies those repetitive loss properties for which a claim has been filed for flood insurance twice in any ten-year period as Repetitive Loss Properties. When a community participates in the NFIP/ ISO Community Rating System, it becomes a Class “C” repetitive loss community when there are ten or more repetitive loss properties within that community. Mt. Pleasant, for example, joined several other Charleston County communities (Charleston County, City of Charleston, City of Folly Beach, City of Isle of Palms, City of North Charleston, and Town of Sullivan’s Island) and became a class “C” community in 1998 with twenty-one repetitive loss properties at that time. As of May 2013, this number for the Town of Mt. Pleasant increased to twenty-eight, an increase of one repetitive loss home from the previous year. Several drainage projects have been performed or are under evaluation in the Town and in the other communities with repetitive loss properties. The entire Charleston Region currently has 1,179 properties that have been repetitively damaged by floods throughout the area, 937 of which are insured. These past floods have varied in size and the amount of damage caused. The properties in these repetitive loss areas are considered to be vulnerable to future flooding, particularly associated with hurricanes or tropical or coastal storm systems, due to the proximity of many of these properties to the Atlantic Ocean or tidally influenced water bodies. Many of these repetitive flood loss properties also had one National Flood Insurance Program claim from Hurricane Hugo in 1989, highlighting this vulnerability to hurricanes or other coastal storms. The complete list of the repetitive loss areas is included as Attachment as 5-C to this section.

The repetitive loss areas in the Charleston Region are located in the City of Charleston (742), Unincorporated Charleston County (111), the Town of Mt. Pleasant (49), the City of North Charleston (86), the City of Isle of Palms (24), the Town of Sullivan’s Island (20), the City of Folly Beach (97), the Town of McClellanville (3), the Town of Meggett (2), the Town of James Island (24), the Town of Hollywood (4), the Town of Kiawah Island (7), the Town of Seabrook Island (9), and the Town of Awendaw (1). The remaining government entities in Charleston County that are participants in the National Flood Insurance Program have no repetitive loss properties reported at this time. The government entities that have jurisdictional limits concurrent with a municipality or the county (special purpose district governments (see definition in Preface) and the College of Charleston) have none of their government-owned facilities on the National Flood Insurance Program list of repetitive flood loss properties. The repetitive flood loss properties in the Region are, however, potentially within the service areas

of these special purpose governments (for example, the repetitive flood loss properties in the City of North Charleston are also potentially in the service districts for the Cooper River Parks and Playground Commission and the North Charleston Sewer District and the Charleston Water System). Because of these concurrent jurisdictional boundaries, the special purpose district governments are considered as potentially servicing repetitive loss properties but not in a position to assist property owners with flood loss mitigation measures. [The National Flood Insurance Program participating communities are the government entities that would work directly with the owners of these properties if they were interested in taking measures to alleviate future flooding of their properties.]

FEMA keeps records titled “Policy & Claims Statistics for Flood Insurance” which shows current and historical information on the National Flood Insurance Program (NFIP). Per this database, a total of 18,480 total losses have occurred in the Charleston Regional Area since 1978 when the NFIP was founded. These losses accumulated to a total of \$298,761,177.20 over the 39 year period. Below is a breakdown by jurisdiction:

Table 5-1-12

Loss Statistics for Charleston County as of 9/30/2018					
Jurisdiction	Total Losses	Closed Losses	Open Losses	CWOP Losses	Total Payments
AWENDAW, TOWN OF	5	3	0	2	59,575.25
CHARLESTON, CITY OF	6,598	4,901	17	1,680	116,935,267.83
CHARLESTON COUNTY*	4,914	2,770	8	2,136	50,597,589.93
FOLLY BEACH, CITY OF	1,244	894	2	348	17,387,774.07
HOLLYWOOD, TOWN OF	17	9	0	8	194,427.11
ISLE OF PALMS, CITY OF	2,562	2,009	0	553	63,324,936.22
KIAWAH ISLAND, TOWN OF	114	73	0	41	375,382.27
MCCLELLANVILLE, TOWN OF	67	58	0	9	2,144,786.64
MEGGETT, TOWN OF	31	16	0	15	314,126.70
MOUNT PLEASANT, TOWN OF	1,546	992	1	553	15,788,749.43
NORTH CHARLESTON, CITY OF	476	324	2	150	9,987,064.05
RAVENEL, TOWN OF	1	1	0	0	5,066.66
SEABROOK ISLAND, TOWN OF	61	41	0	20	690,177.55
SULLIVANS ISLAND, TOWN OF	849	659	0	190	21,015,828.74
<i>FEMA Policy and Claims Statistics Database, 2019</i> https://bsa.nfipstat.fema.gov/reports/1040.htm#45					

*Includes Unincorporated parts of the County.

Most total losses occur in the City of Charleston (peninsula area), as well as the Unincorporated, City of Isle of Palms, Town of Mt. Pleasant, and City of Folly Beach areas, all with at least 1,000 total losses since 1978. These areas have the most known flood damages, either from nuisance flooding due to sea level rise, or more commonly, hurricanes.

In an effort to reduce flood damages some jurisdictions include higher standards as part of their participation in the NFIP.

A table outlining higher standards enforced in Charleston County is below. Each jurisdiction's problem assessment will outline that respective entity's higher regulatory standards:

Unincorporated Charleston County Higher Regulatory Standards
2' freeboard
min. 5 CFMs on staff
1/2 foot rise in floodway
All Inspectors are State certified
Five year cumulative of all permits is included when conducting a substantial review

5.1.5 – Past Flood Impacts

Past flood impacts on buildings have become extremely expensive for property owners as indicated in the previous section. Flood levels, unless during the event of a hurricane, were typically fairly shallow (1-5 feet) and limited to rainfall combined with poor drainage in relation to tides. Nevertheless, the impact on buildings has been quite extensive in the past. Flood waters in the Charleston Region have caused siding to bend and warp on structures inundated with water. Older brick homes without hydrostatic vents may experience foundation collapse associated with flooding. Flooding has also resulted in interior damages to structures (e.g. insulation, sheetrock, doors, carpeting, furniture, etc.). In the coastal environment areas of the Region, saltwater presents an additional problem. Saltwater can corrode piping, corrode electrical wiring, and contaminate drinking water wells. Public safety becomes a concern during flooding situations, particularly if the water fails to quickly drain completely after the event. Stagnant water in drainage ditches often fosters mosquitos. Standing water under houses also attracts cockroaches and vermin, posing a health risk and may cause moisture-related problems for the integrity of the structure. These problems have been experienced in the Charleston Region following a local flood.

Impact of All Hazards

Please see the Appendix A.8 for a description of the hazards' impact on the jurisdictions for more detailed information. Appendix A.9 provides details regarding previous flooding occurrences. The data provided in this appendix are events contained within the Storm Event Database, provided by the National Center for Environmental Information (formerly the National Climatic Data Center, or NCDC). While there are numerous, oftentimes daily, flooding occurrences throughout Charleston County, the events provided are based upon the best available data. Additionally, Appendix A.11 provides maps which elaborate on the extent of flooding impacts across the peninsula.

5.1.6 – Emergency Warning Needs

There are several situations that could arise, causing the need for evacuation of part or all of the Charleston Region. Small-scale, localized evacuations may be needed as a result of a flood, hazardous material release, fire, or transportation accident. Mass evacuation of the entire

Region could be required in the event of the threat of a major hurricane or a damaging earthquake. Charleston County participates in the Emergency Alert System and cable-TV override to provide emergency warning information to all residents in the Charleston County area as needed in emergency situations. If required to evacuate residents from areas potentially subject to flooding or other hazard events, local fire department and police personnel will perform street patrols with their public address systems and/or door-to-door patrols to advise residents of the need to evacuate. Charleston County also has a reverse 9-1-1 system that will be activated to alert residents of the need to evacuate or shelter in place if circumstances warrant. Charleston County Consolidated Dispatch center is also tied into the County's Warning Point through the warning notification (ALERT) system, and is an 800 MHz based voice radio alert system. The system will allow police to disseminate information about hazardous materials, threatening weather, and major police actions to citizens quickly. In addition, Charleston County and Motorola are looking at ways to redesign the system and add more radio towers. Evacuation warnings are based upon data received from the National Weather Service, the U. S. Army Corps of Engineers, FEMA, the U.S. Geological Survey, and/or other computer assisted modeling of areas potentially subject to damages from a specific hazard event. The current emergency warning system per the Charleston County Emergency Operations Plan is as follows:

1. Pre-disaster evacuation phase:

A. Director, Emergency Management Department

1. Coordinates with all appropriate agencies to ensure emergency operational readiness.
2. Maintains Emergency Operations Center Standard Operating Procedures.
3. Coordinates identification of feasible evacuation routes likely to be available in the anticipated disaster.
4. Coordinates identification of emergency shelters.
5. Coordinates with appropriate agencies in plans for emergency medical care for evacuees.
6. Coordinates with appropriate agencies in plans for mass feeding of evacuees and decontamination of evacuees (if needed).
7. Assists affected agencies with development of evacuation plans. Plans will specifically identify critical facilities such as schools, hospitals, nursing facilities, industries, and places of public assembly when possible.

B. Sheriff

1. Identifies evacuation routes in coordination with EPD.
2. Identifies traffic control points (TCPs) with assistance of local law enforcement officials.
3. Identify potential impediments to evacuation, plan, and alternate/contingency routes to avoid impediments, and report actual impediments to the EOC for removal.
4. Provide training to law enforcement officers concerning the evacuation process and their role at the TCPs.
5. Has representation on the Evacuation Key Alerter Team comprised of Sheriff's Office, City of Charleston Police Department, North Charleston Police Department, and Town of Mt. Pleasant Police Department.

C. Dept. Of Social Services

1. Plan for Emergency Welfare Services

2. Coordinate in identifying emergency shelters with American Red Cross and County Schools and places for emergency pick-up of special needs populations and mass feeding

D. Charleston County School District

1. Plans for Emergency Welfare Services
2. Plans for providing mass transportation

E. Emergency Response Agencies (fire, police, EMS, etc.) (Ristow, 2005, April 15)

1. Coordinates with Director, Emergency Management
2. Plans for securing employees and physical facilities and equipment against injuries or damages
3. Plans for emergency warning of residents
4. Provides training on emergency procedures, including the National Incident Management System (NIMS), to personnel
5. Obtains equipment needed to perform emergency functions

2. Disaster Phase:

A. Director, Emergency Management Department

1. Activates EOC and augments staff and equipment as required
2. Alerts all possible agencies
3. Coordinates with Chief of Transportation the allocation and dispatch of transportation resources.
4. Coordinates information with the Public Information Service.
5. Coordinates evacuation with lead law enforcement agencies.

B. Sheriff

1. As a Key Alerter, notifies assigned law enforcement agencies of evacuation requirements.
2. Staffs traffic control points (TCPS) as assigned and insures that other TCPs are staffed by proper law enforcement agencies.
3. Keeps law enforcement officers at EOC informed of evacuation progress/problems
4. Coordinates law enforcement activities including curfews, coordinates with all out of town law enforcement personnel.
5. Coordinates the provision of security in evacuated area with municipal EOCs, National Guard and others

C. Department of Social Services

1. Coordinates Emergency Welfare Services

D. Charleston County Schools District

1. Supports Emergency Welfare Services
2. Provides mass transportation

E. Emergency Response Agencies (fire, police, EMS, etc.) (Ristow, 2005, April 15)

1. Responds to emergencies, if possible, depending on the nature of the event, following the National Incident Management System (NIMS)
2. Secures employees and physical assets against hazard-related injuries or damages, as needed

3. Assists with emergency evacuation of residents as needed

3. Reentry/Recovery Phase:

A. Director, Emergency Management Department

1. Director, Charleston County EMD coordinates return of evacuees as required through appropriate services and Emergency Council members, municipal EOCs (MEOCs) and utility companies. EOC recovery team coordinates recovery and donation system with MEOCs.

B. Sheriff

1. Coordinates Law Enforcement activities during return to normal activities including assistance to search and rescue, security, and monitoring of curfew activities.

C. Charleston County Schools District

1. Provides support to Emergency Welfare Services as required.
2. Provides mass transportation for return evacuees as required.
3. Develops standard operating procedures for handling cases where "back to school" shelters are used at night for sleeping quarters.

D. Emergency Response Agencies (fire, police, EMS, etc.) (Ristow, 2005, April 15)

1. Responds to emergencies to the extent possible
2. Reports on damages observed to damage assessment team
3. Assists in clearing roads of obstructions, to the extent possible
4. Maintains equipment needed for emergency response

5.1.7 – Critical Facilities

The Charleston Region has many critical facilities due to its size. According to the S.C. Emergency Management Division list of critical facilities and with additions from the Members of the Charleston Regional Hazard Mitigation & Public Information Plan Committee, there are 518 critical facilities (excluding bridges and overpasses) in the Charleston County area. The majority of the increase was facilities such as wastewater lift stations, other water distribution systems along with increase of local governmental offices, government-owned facilities (e.g. libraries, parking garages, and museums), shelters, telephone service facilities, residential and nursing care facilities, law enforcement facilities, and fire stations.

Since hurricanes and floods are the hazards considered the highest priority hazards per the respondents to the planning survey used to develop this plan and based on these hazards being the highest frequency events with the greatest property losses experienced in the Region, the category of hurricane at which storm surge flooding is anticipated to occur (S.C. Emergency Management Division electronic storm surge flood maps) has been determined, where available electronically, for the critical facilities listed in the S.C. Emergency Management Division list and those added by the members of the Charleston Regional Hazard Mitigation & Public Information Plan Committee. Critical facilities in the Charleston Region are also potentially vulnerable to wind-related losses associated with hurricanes. This is particularly the case for facilities not protected from wind-borne debris. The following discussion of critical facility vulnerability is based upon the storm surge elevation data as provided in the S.C. Emergency Management Division electronic storm surge maps.

A list of Charleston County Critical Facilities is available dependent upon security clearance of the requestor or agency. Please contact Building Inspection Services at 843-202-6940 to submit a request.

Critical Facilities in Category 1 hurricane storm surge flooding areas: Of the critical facilities indicated as being in the Charleston Region per the S.C. Emergency Management Division critical facility list, three hospitals, three law enforcement entities, one EMS station, and one fire station are located in the category 1 storm surge zone. Four court locations and five government offices/emergency operations for four separate local governments are also indicated as being in this storm surge zone. One water pump station, one water treatment facility, one wastewater treatment plant, and ten wastewater lift stations are also listed as being in this zone. There is also one electrical facility listed as being located in this zone. Three media outlets also have broadcast facilities indicated as being in this storm surge zone. Other critical facilities, such as residential care facilities, are also listed as being in this zone. Since storm surge associated with a category 1 hurricane is not expected to exceed 5 feet at the Ocean, and many of the structures listed as being in this storm surge zone are elevated above the anticipated flood elevation, it is not anticipated that flooding within the critical facility structures will occur during a category 1 hurricane. Minor road flooding near or around the critical facilities closest to the ocean is possible during a category 1 hurricane. The critical facility list provides the storm surge flood zone for critical facilities in the Charleston Region. This storm surge elevation data is available on the S.C. Emergency Management Division internet site.

Critical Facilities in Category 2 hurricane storm surge flooding areas: One additional hospital, one additional television station, 15 additional fire stations, and five additional law enforcement facilities are indicated in the S.C. Emergency Management Division storm surge elevation internet site (2003) as being in locations potentially subject to storm surge flooding in a category 2 hurricane. In addition, eleven local government offices in three separate jurisdictions and two additional Courts are located in this storm surge zone. Four water-distribution system components, twelve wastewater lift stations, two telephone service facilities, and multiple residential care and nursing care facilities are also located in the

category 2 storm surge area. Fourteen other government-owned facilities (e.g. libraries, museums, parking garages, etc.) are also indicated as being in the category 2 storm surge area. There are also two nursing homes and multiple residential care facilities listed as being in this storm surge zone. The majority of the critical facilities listed for this zone are located on peninsula Charleston, on barrier islands in Charleston County, or directly adjacent to one of the tidal rivers. Since maximum storm surge elevations anticipated during a category 2 hurricane are 8 feet at the Ocean, and many of these buildings have withstood hurricanes of greater than this magnitude without flood-related damages, it is unlikely that many of these buildings would be flood damaged during a category 2 hurricane. However, for those older pre-FIRM buildings where the floor elevation is not elevated above the current base flood elevation, it is possible minor flooding could occur in lowest levels of these buildings. Since most of these older buildings are masonry construction, any flood damages that may occur are likely to be minor and easily repaired. Heavy equipment and fire apparatus from barrier island locations is also relocated to higher ground in the event of a pending serious hurricane to minimize the possibility of damage to the equipment due to flooding. Valuable artifacts on display or stored at the museum or libraries are also relocated to alternative storage locations in the event of a predicted major hurricane strike to preserve these items for future generations.

Critical Facilities in Category 3 hurricane storm surge flooding areas: One additional hospital, eleven additional fire stations, one additional law enforcement agency, one additional EMS station, and two additional media outlets are indicated as being located in the category 3 storm surge area per the S.C. Emergency Management Division storm surge map internet site. In addition, 20 more local government facilities for 5 separate jurisdictions, six detention facilities, one court facility, and two animal shelters are indicated as being in this zone. Two water system facilities, one wastewater treatment facility, and two electrical system facilities are also indicated as being in the category 3 storm surge area. Three nursing homes and multiple residential care and intermediate care facilities are also listed as being in this zone. Since category 3 hurricanes may have storm surge elevations up to 12 feet, it is possible that flood damage could occur to pre-FIRM critical facilities as a result of a hurricane of this magnitude. These damages are most likely to critical facilities on barrier islands and in peninsula Charleston. Those facilities most likely to be flood damaged are those of frame construction with finished floor elevations below currently required finished floor elevations. Temporary relocations of equipment and offices may be necessary, particularly from critical facilities on barrier islands and adjacent to tidal rivers, in the event of a hurricane of this magnitude. Nursing homes and residential care facilities located in this hurricane storm surge zone will likely evacuate patients/residents in the event of an anticipated direct strike of a hurricane of this magnitude or greater. It is also possible components of the water and sewer distribution systems, particularly on the barrier islands, could be damaged as a result of a hurricane of this magnitude. Electrical system components could also be damaged by a hurricane of this magnitude.

Critical Facilities in Category 4 hurricane storm surge flooding areas: Since the flood insurance rate map required elevations are based on a category 3 hurricane, critical facilities in Charleston County that are elevated just to the required base flood elevation could receive minor to moderate flooding in lowest floor areas during a category 4 or greater hurricane. Several other pre-FIRM critical facilities and other critical facilities that were constructed in accordance with flood maps where the required elevation for the structures was changed in the late 1980's or early 1990's have finished areas below the currently required base flood elevation. These critical facilities could receive moderate to major flood damage as a result of a category 4 or greater hurricane. Several other additional critical facilities are also listed as being in this storm surge flood zone in the S.C. Emergency Management Division storm surge elevation map database. One shelter, one additional hospital, three additional media outlets,

and one additional fire station, and one special purpose district administration building are listed as being in this storm surge zone. One additional nursing home and several other residential care/health services entities are also listed as being in this storm surge zone. In the event of a pending hurricane of this magnitude, these facilities would likely plan to evacuate their residents/patients to more in-land areas on higher ground. Multiple wastewater lift stations are also indicated as being in this storm surge zone.

Critical Facilities in Category 5 hurricane storm surge flooding areas: A catastrophic hurricane of category 5 would likely cause major flood damages to critical facilities located on the barrier islands and in communities bordering the Atlantic Ocean. Other critical facilities in more in-land areas would also likely receive flooding in lowest floor areas since several of these facilities are not elevated above a level where flood waters could reach in the event of a hurricane of this magnitude. Several additional critical facilities are also listed in the S.C. Emergency Management Division storm surge map data base as being located in areas potentially subject to storm surge flooding in the event of a category 5 hurricane strike. One additional hospital, three additional fire stations, two additional law enforcement entity locations, one additional City government office, and one court facility are listed as being in this storm surge zone. One additional nursing home and several other residential care facilities are also in this zone. When Hurricane Floyd was predicted to be a category 5 hurricane directly striking the Charleston area, several hospitals, nursing homes, and local governments with facilities within 10 miles of the Ocean evacuated their normal operating locations and relocated equipment and records to more in-land areas on higher ground. It is possible that many critical facilities could be damaged to the extent that their operations may need to temporarily relocate to alternative facilities post-event of a hurricane of this magnitude.

The survey distributed during 2017 queried jurisdictional respondents as to their perception of the vulnerability of the critical facilities in the Region by hazard type. The analysis of the questionnaires indicated that the critical facilities in the Region are most vulnerable to earthquakes, followed by hurricanes, terrorist incidents, flooding, tornadoes, sea level rise, hazardous materials, tsunamis, wildfires, and dam failures, in this order. This indicates that earthquakes should be considered as events to which the critical facilities in the Region are potentially highly vulnerable. Summary information regarding anticipated earthquake damages to critical facilities are discussed in the building vulnerability earthquake subsection of this section of this plan. Seismic resistance analyses of critical facilities, particularly those constructed of unreinforced masonry or those constructed prior to 1985 (year during which building codes including seismic provisions were routinely enforced throughout the Region), is recommended to determine structures that may be candidates for seismic retrofits.

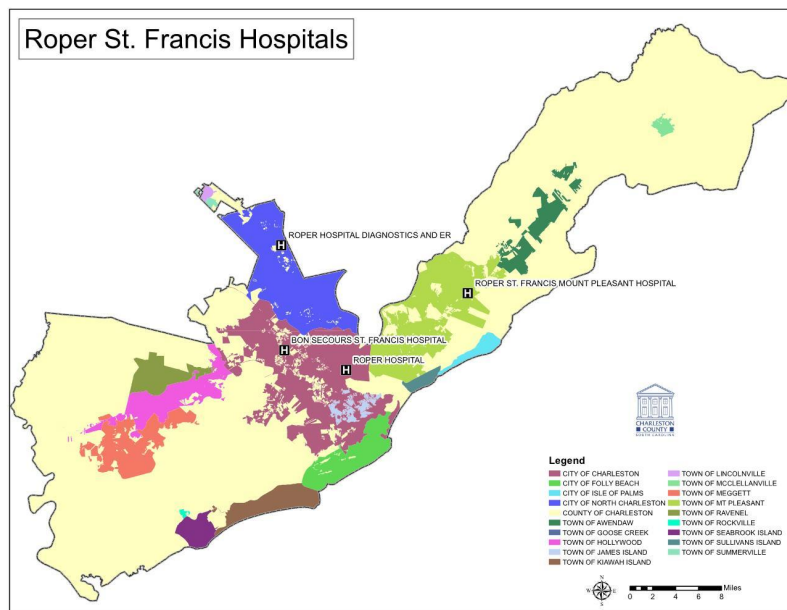
Local governments within Charleston County recognize that it is not possible to avoid placing critical facilities in hurricane-prone areas, since these facilities are needed to provide essential services, such as responding to fires and/or providing medical assistance and/or law enforcement in an expedient manner in all areas of the County. Consequently, steps have been taken at many of the critical facilities located in areas potentially subject to damage due to hurricanes to reduce the damage potential to the structures to the extent feasible and/or prepare for expedient reopening of facilities post-event. All new critical facilities constructed will be designed to withstand hazards to which they may be subjected, and will include provisions for emergency operations post event. Multiple local fire stations (Awendaw, Mt. Pleasant, St. John's Fire District, North Charleston, City of Charleston, Sullivan's Island) have also been retrofitted with hurricane panels to protect openings from damage associated with wind-borne debris. Charleston County, for example, has constructed its new critical facilities with floor levels higher than required, and also constructed these to withstand wind speeds associated with the worst-case hurricanes.

Many of the critical facilities in the historic district of Charleston have been exposed to multiple serious hurricanes throughout their history, and are of masonry construction that has withstood

exposure to these events. The City of Charleston also generally installs plywood shutters on glazed openings of its buildings in the most vulnerable locations of the Peninsula in the event of a potential hurricane strike, to minimize wind-related damages associated with hurricanes. While it is possible that these historic facilities may receive flood damages as a result of severe hurricane threats, the damages should be repairable in a reasonable time period post-event. Since most of these local government facilities, particularly on the Peninsula of Charleston, are for jurisdictions with multiple buildings located throughout the County, alternative locations for temporary operation are also available, if needed, while repairs to these facilities are performed. Earthquake damages are however, also a possibility for historic government buildings and government buildings constructed prior to building codes required design to withstand earthquakes.

Local governments with utility distribution systems also have plans to enhance the hazard-resistance of their critical assets. For example, the North Charleston Sewer District has plans to install an additional aeration tank and primary clarifier at their treatment plant. The District intends to design these facilities to withstand hazard events, such as floods, earthquakes, high winds, wildfires, and so forth, and to include provisions for emergency operations post-event at these facilities.

Capabilities of critical facilities like hospitals and schools face different risks than municipal jurisdictions. Some of these government entities and partners include Charleston County School District, Charleston County Parks and Recreation Commission, and Roper St. Francis Healthcare. Schools and hospitals act as shelters and their populations are more at risk during a disaster. They also provide emergency needs like food, water and healthcare to those populations. Below are maps of these facilities spread out through the various jurisdictions to assess their risk level. Please Refer to Tables 5-9, 5-11, and 5-13 for the full risk assessment of all jurisdictions on building, infrastructure, and critical facilities.



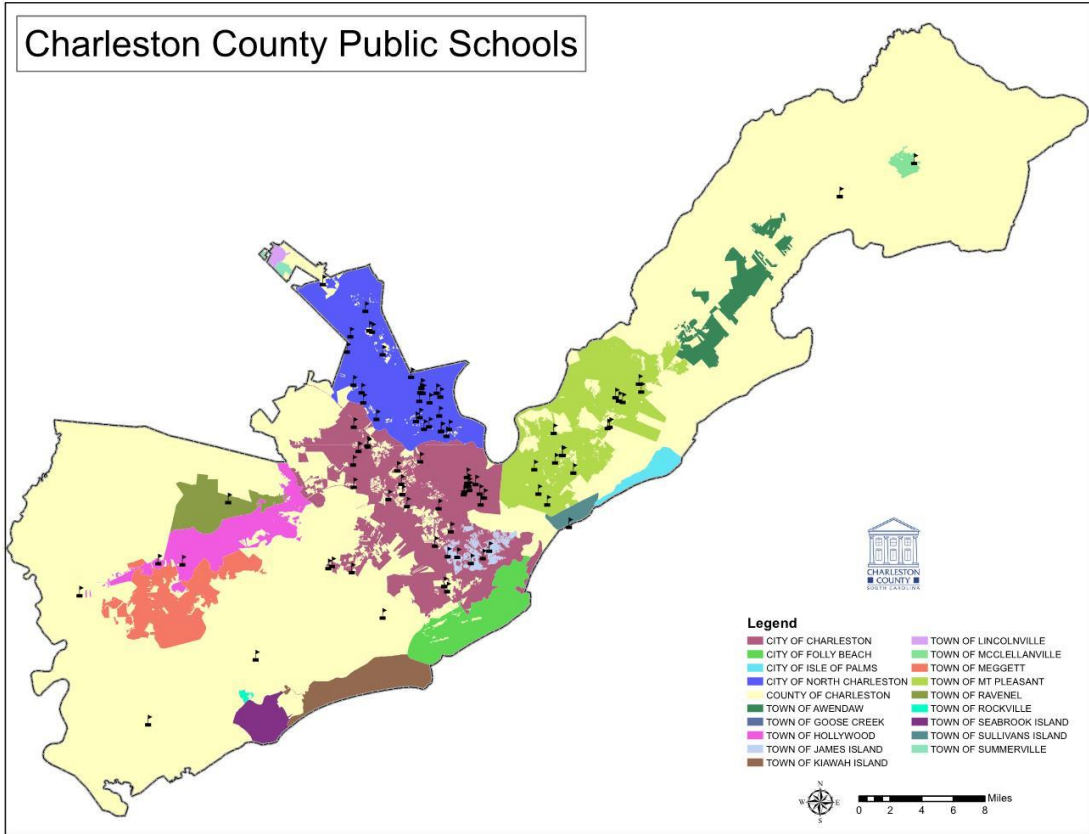


Table 5-1-13

Critical Facility Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
Unincorporated Charleston County	5	3	2	2	3	2	3	3	2	3	3	1

A full list of the capabilities for Charleston County and plan participating partners can be seen in the table below:

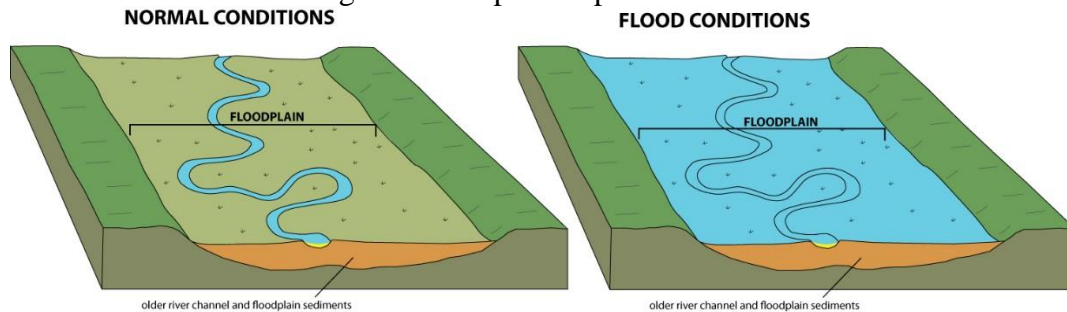
Charleston County Capability Inventory									
	Town of Awendaw	Town of Hollywoood	Town of James Island	Town of Lincolnville	Town of McClellanville	Town of Meggett	Town of Ravenel	Town of Rockville	Town of Seabrook Island
Unincorporated Chas. County									
Comprehensive Plan	Comprehensive Plan						Comprehensive Plan		Comprehensive Plan
Planning Commission									
County Zoning and Land Development Ordinance	Town Zoning Ordinance	Town Zoning Ordinance	Zoning and Land Development Regulations	Town Zoning Ordinance	Town Zoning Ordinance	Town Zoning Ordinance - administered by Charleston County	Zoning Regulations and Map	Town Zoning Ordinance - administered by Charleston County	Development Standards Ordinance
Board of Zoning Appeals	Awendaw Overlay Ordinance						Subdivision Regulations		Beach and Dune Protection Ordinance
Historic Preservation Ordinance	Subdivision Ordinance						Commercial Corridor Overlay District Standards		Beach Management Plan
Beachfront Management Plan	Low Impact Development in Coastal South Carolina: A Planning and Design Guide								Comprehensive Emergency Management Plan
Emergency Operations Plan			Comprehensive Emergency Management Plan						
Charleston County Building and Buildings Regulations Ordinance	Charleston County Building and Buildings Regulations Ordinance	Charleston County Building and Buildings Regulations Ordinance	Charleston County Building and Buildings Regulations Ordinance	Charleston County Building and Buildings Regulations Ordinance	Charleston County Building and Buildings Regulations Ordinance	Charleston County Building and Buildings Regulations Ordinance	Charleston County Building and Buildings Regulations Ordinance	Charleston County Building and Buildings Regulations Ordinance	Charleston County Building and Buildings Regulations Ordinance
Construction Board of Adjustment and Appeals									
Charleston County Flood Damage Prevention and Protection Ordinance	Charleston County Flood Damage Prevention and Protection Ordinance	Charleston County Flood Damage Prevention and Protection Ordinance	Charleston County Flood Damage Prevention and Protection Ordinance	Charleston County Flood Damage Prevention and Protection Ordinance	Charleston County Flood Damage Prevention and Protection Ordinance	Charleston County Flood Damage Prevention and Protection Ordinance	Charleston County Flood Damage Prevention and Protection Ordinance	Charleston County Flood Damage Prevention and Protection Ordinance	Charleston County Flood Damage Prevention and Protection Ordinance
ICC Building Codes	ICC Building Codes	ICC Building Codes	ICC Building Codes	ICC Building Codes	ICC Building Codes	ICC Building Codes	ICC Building Codes	ICC Building Codes	ICC Building Codes
NFIP/CRS Participation	NFIP/CRS Participation	NFIP/CRS Participation	NFIP/CRS Participation	NFIP/CRS Participation	NFIP/CRS Participation	NFIP/CRS Participation	NFIP/CRS Participation	NFIP/CRS Participation	NFIP/CRS Participation
Building Official									
Floodplain Manager									
Damage Assessment - Post Disaster									On-Call Debris Management Contract with Phillips & Jordan
Stormwater Ordinance			Charleston County Stormwater Ordinance		Charleston County Stormwater Ordinance				

City of Charleston	City of Folly Beach	City of Isle of Palms	City of North Charleston	Town of Kiawah Island	Town of Mt Pleasant	Town of Sullivan's Island	Charleston County Parks and Rec	Charleston County School District	Charleston Water System
Comprehensive Plan	Comprehensive Plan	Comprehensive Plan	Comprehensive Plan	Town Emergency Comprehensive Plan	Town of Mount Pleasant Strategic Plan; Theme 5 Incident Management	Comprehensive Plan	Emergency Action Plan - annual review and CAPRA accreditation	Threats and Hazard Identification and Risk Assessment	
Planning Commission	Planning Commission	Planning Commission	Planning Commission	Planning Commission	Town of Mount Pleasant Emergency Operations Plan	Historic Preservation Ordinance (Certified Local Government)	Staff training on Emergency Action Plans		
West Ashley Master Plan	Zoning and Land Development Ordinance (Chapter 160)	Zoning Ordinance	Zoning Ordinance		Resolution 18121 Adopting Emergency Operations Plan	Subdivision Regulations	Budget - 50% taxpayer, 50% revenue based	Flood Boards - Stakeholder Meetings	
Master Drainage Plan (1984)		Zoning Administrator	Zoning Administrator		South Carolina State Wide Mutual Aid				
Zoning Ordinance	Board of Zoning Appeals	Subdivision Regulations	Subdivision Regulations		Stormwater Management Program/ Plan				
Dutch dialogues to examine 4 special areas of the city	Construction Board of Adjustment and Appeals				Drainage System Maintenance SOPs				
Active emergency management training program to include all aspects of preparedness, response and recovery.	Beach and Dune Management Plan	Local Beach Management Plan		Beach Renourishment	Asset Management Program/ Plan for drainage systems				
New City Office of Resilience, Sustainability and Emergency Management	Marshfront Management Plan			Sea Level Rise Report	Drainage Canal Maintenance Program				
	Beach Preservation and Construction Provisions (Chapter 151)			Environmental Committee	Capital Improvements Program/ Plan				
City of Charleston Emergency Operations Plan	Emergency Management Ordinance (Chapter 35) and Emergency Operations Plan			MEOC Members/ Annual Training	Comprehensive Maintenance Program/ Plan	Emergency Operations Plan by Charleston County			Emergency Operations Plan
Building Code Ordinance	Building Regulations (Chapter 150)		Building Ordinance	Building Ordinance	Old Village Drainage Study	Building Ordinance			
City of Charleston Floodplain Ordinance	Flood Damage Prevention Ordinance (Chapter 152)	Floodplain Ordinance	Floodplain Ordinance	Flood Ordinance	Flood Damage Prevention Ordinance (Chapter 152)	Flood Damage Prevention Ordinance	Snee Farm Preliminary Engineering Report - Drainage Study		
ICC Building Codes	ICC Building Codes	ICC Building Codes	ICC Building Codes	ICC Building Codes	ICC Building Codes	ICC Building Codes			
NFIP/CRS Participation	NFIP/CRS Participation	NFIP/CRS Participation	NFIP/CRS Participation	NFIP/CRS Participation	NFIP & CRS Participation	NFIP/CRS Participation			
City of Charleston Vulnerability and Risk Assessment				Damage Assessment Teams	Hazard Mitigation Plan (Charleston Region) - Attachment 6C drainage projects				
US Army Corps of Engineers 3x3 Flood Protection Student of Charleston Peninsula				Debris Removal	Bridge Inspection Program				
Building Official		Building Official	Building Official	Building Official	Water Quality Monitoring Plans				
Floodplain Manager		Floodplain Manager	Floodplain Manager	Floodplain Manager	Civil Emergencies Code of Ordinances (Chapter 41)				
City of Charleston Storm Water Management manual with regulations	Stormwater Management (Chapter 53)	Stormwater Regulations	Stormwater Regulations	Public Works/Engineering (Kiawah Island Community Association)	Waters and Sewers Code of Ordinances (Chapter 51)	Stormwater Ordinance with Charleston County enforcement and implementation assistance			
Special Stormwater regulations for Church Creek Drainage Basin					Stormwater Management Program Code of Ordinances (Chapter 52)				
					Building Regulations Code of Ordinances (Chapter 150)				
					Flood Damage Prevention Ordinance (Chapter 152)				
					Stormwater Management and Water Quality Regulations Code of Ordinances (Chapter 153)				
					Land Development Code of Ordinances (Chapter 155)				
					Zoning Code of Ordinances (Chapter 156)				
					Departmental Specific Operating Procedures for Emergency and Disaster Response/ Recovery Hobcaw Point Drainage Study				

College of Charleston	Cooper River Parks and Playground	James Island PSD	Mt. Pleasant Water Works	North Charleston District	North Charleston Sewer District	Roper St. Francis Healthcare	St. Andrews Parks and Playground	St. Andrews PSD	St. Johns Fire District	St. Pauls Fire District
Facilities have process and procedures in place to conduct pre-storm prevention and mitigation activities (sandbagging, flood gates, securing equipment, etc).	All resources and capabilities are through the City of North Charleston.	Being that we rely on the County for building code enforcement for new construction, we defer to them for code standards and enforce fire and life safety codes.	Emergency Action Plan	Please refer to City of North Charleston as they provide full services.	Self sufficient organization - bring contractors in when needed to handle projects	ensure Roper maintains the capability to defend in place	Ongoing Emergency Action Plan (EAP) training and drills	SOPs and ongoing training with staff on all hazards and special attention to hurricane season	Response to disaster based on Charleston County Emergency Operations Plan for major weather events.	SOPs to address hurricanes - Station 3,7,8 and 9 would be evacuated pending the category and approximate land fall of a hurricane
Have a College (essential personnel) budget administrative change by making the maximum level on our state spending cards at \$10,000.00 for the duration of the emergency. The reporting and expenditure process changes as a result of emergency conditions as documentation of affected facilities follows the FEMA documentation guidelines versus our normal purchasing processes.					Updated Emergency Action Plan with stay behind personnel for our recovery response	currently constructing a new parking lot on Calhoun Street which will have a minor seawall to help protect it from tidal surges	Annual "What to do in case of a Hurricane" training for full time staff (annually in September)	Members of IAFC, State Fire Chief, and NFPA	Departmental SOPs	sop address preparing the stations such as putting on hurricane shutters, covering computers, and electronics, and elevating file cabinets and placing sand bags where required
The planning, prevention, mitigation, response, and recovery phases are annually reviewed as part of the overall update to our Emergency Management Plan.					Members of SCWARN	Each year all emergency and contingency plans are reviewed for completeness and to ensure lessons learned from any significant event during the year are incorporated into our disaster plans.	Weekly safety meetings with essential personnel	Autonomous budget control	International Fire Codes	department maintains a budget line item for purchasing supplies or replacement supplies as needed
Annual employee, Emergency Team, and student training is offered on a consistent basis.							Annual budget includes funds appropriated for Workplace Safety			
Departmental Hurricane and severe weather plans are updated annually as well as the supplies used for protecting equipment, computers, and other office furnishings are restocked.										
Chemical Hygiene Plan										
Radiation Safety Manual										
Biosafety Manual										
Spill Prevention and Response policy										
Workplace Safety and Health program including monthly training in high-risk positions										

5.1.8 – Natural and Beneficial Functions of Floodplains

The Charleston Region is comprised of 68% of floodplains, meaning that the functions of floodplains affect daily life tremendously in addition to the citizens and development in turn affects the floodplains. This relationship can be mutually beneficial or destructive. Understanding the natural benefits and functions of floodplains is crucial to be able to protect them and make educated decisions of hazard mitigation and further community development. Below is an illustration showing how floodplains operate:



The benefits and functions of a floodplain include flood protection, improved water quality, recharged aquifers, improved wildlife habitat, recreational industries (like kayaking and fishing), and sustainable agriculture (Source: *The Nature Conservancy*). See below for more:

Some Natural Functions of Floodplains

WATER RESOURCES

Natural Flood and Erosion Control

- Provide flood storage and conveyance
- Reduce flood velocities
- Reduce peak flows
- Reduce sedimentation

Water Quality Maintenance

- Filter nutrients and impurities from runoff
- Process organic wastes
- Moderate temperature fluctuations

Groundwater Recharge

- Promote infiltration and aquifer recharge
- Reduce frequency and duration of low surface flows

BIOLOGICAL RESOURCES

Biological Productivity

- Rich alluvial soils promote vegetative growth
- Maintain biodiversity
- Maintain integrity of ecosystems

Fish and Wildlife Habitats

- Provide breeding and feeding grounds
- Create and enhance waterfowl habitat
- Protect habitats for rare and endangered species

- A Unified National Program for Floodplain Management
FEMA-248 (1994)

The Charleston Region recognizes that while there has been positive progress in quality water management, there is growing evidence indicating that urbanization and other land uses adversely impact the quality of marine waters. The Charleston County Comprehensive Plan identifies a number of actions that the Charleston Region may take in order to enhance natural and beneficial functions. Several of these functions are as follows:

1. Continue to coordinate with the State to complete research projects and develop water quality management strategies for the Charleston Harbor and other local rivers and estuaries.
2. Explore options for developing a regional geographic information system (GIS) water quality database.
3. Work with all municipalities and SC DHEC to implement an ongoing regional water quality monitoring program.
4. Support the program by SC DHEC to reduce nonpoint source pollution from new development.

5. Consider revision of local storm water standards to require a “zero degradation” approach to storm water management.
6. Require retention of vegetated buffers along shorelines.

The Charleston Region is one of the most biologically rich and diverse habitat areas on the Atlantic Coast. The Charleston area is a temporary or permanent home to rare whooping cranes, endangered woodpeckers, rare piping plovers, wood storks, bald eagles, ducks, pelicans, royal terns, and other water fowl. Charleston County is also home to the rare red wolf, bear, deer, wild turkey, and other wildlife. The number of wildlife management, habitat enhancement, and special conservation projects underway is significant. The Charleston Regional Hazard Mitigation Plan supports several of these efforts:

1. Promote intergovernmental coordination to protect the Regions’ aquatic habitat.
2. Support the management efforts of SC DNR and SC DHEC to protect the Regions’ spawning and nursery habitat and migratory routes for aquatic life.
3. Encourage SC DNR to develop resource management strategies to sustain shellfish resources.
4. Undertake a number of measures to protect the habitat area of species as designated as federally endangered, threatened, or locally identified as rare.
5. Implement measures to preserve farm and forest land open space.

Coordinate with various public and non-profit interests regarding the development of wildlife habitat management plans for specific area of the Region. The Charleston Region also recognizes the importance of preserving farm and forest land, as well as the public and private stewardship of farmland soils and forest resources. This plan includes a number of activities to support this effort:

1. Promote voluntary stewardship of farmland soils.
2. Promote voluntary compliance by private, non-industrial forest resource. Owners with S.C.’s Best Management Practices for Forestry and with the American Forests and Paper Association Sustainability Initiative.
3. Implement a number of measures that will minimize conflicts between forest resource producers and private land owners residing in the vicinity of forest resource lands.
4. Work with the National Forest Service to address management issues at the Francis Marion National Forest.

Many present and future businesses of the Charleston Region are dependent upon groundwater to meet domestic, commercial, and industrial water needs. From its research SC DHEC has concluded that the aquifer systems of the Coastal Plain contain significant groundwater if used wisely, but that it is foreseeable that the resource will be stressed by the demands of a growing population. The Charleston Region recognizes and supports the various activities to take a proactive approach to resolving this issue:

- Support research documenting groundwater resources in the Region and development of a related GIS database.
- Participate with SC DHEC and the Coastal Plain Capacity Use Task Force in future efforts to manage groundwater resources in the South Carolina Coastal Plain.
- Consider Regional actions that would facilitate groundwater use reporting to SC DHEC:

The County of Charleston Comprehensive Plan also discusses the coastal floodplain within Charleston County, specifically indicating the following activities for conservation, use or protection of the floodplains:

- “Prevent disturbances to areas that provide critical flood water storage and filtration functions, including estuarine and palustrine wetlands
- “Prevent excessive clearing and disturbance to natural upland vegetation within the floodplain”
- “Minimize the alteration of natural drainage patterns within the floodplain”

These activities are fully consistent with the activities of the Charleston Regional Hazard Mitigation Plan pertaining to the preservation of natural resources and beneficial functions of floodplains. In addition, many floodplain and wetland areas in Charleston County have previously been set aside and preserved as natural botanical areas (County of Charleston Comprehensive Plan).

Many jurisdictions within Charleston County, including the County and municipalities that contract with them for storm water services, the Town of Mt. Pleasant, the City of Charleston, and the City of North Charleston have enterprise funding systems in place to provide resources needed for implementation and enforcement of water quality and quantity regulations to enhance water quality in the Region. Many of the local jurisdictions have also undertaken storm water or watershed master planning development or updates to address storm water run-off needs. For example, Charleston County undertook a storm water master planning initiative during 2007-2008 to develop recommendations for development trends and storm water systems throughout the County. This planning initiative is fully consistent with the goals and activities discussed in this Charleston Regional Hazard Mitigation Plan, and applicable sections of this plan have been considered as a part of the storm water master planning process. Recommendations from the storm water master planning initiative are also consistent with recommendations included in the Charleston Regional Hazard Mitigation Plan and action plans for applicable government entities.

5.1.9 – Development and Population Trends

According to U.S. Census Bureau data, the combined total population of Charleston County was 396,484 which is a 14.5% increase from 2010 to 2016. In addition, three of the five most populous incorporated places in South Carolina are in Charleston County. These areas are the City of Charleston with a population of 120,083 (24% growth rate since 2000 census), the City of North Charleston with a population of 97,471 (22.4% growth rate), and the Town of Mt. Pleasant with a population of 67,843 (42.5% growth rate) (2010 Census Data).

Since 1970 Charleston County has become an increasingly urban county, as determined by the U.S. Bureau of the Census. In 1970 approximately 18.2% of the population resided in rural areas. As a result of development and movements by rural residents, this percent has declined to approximately 11.9% (2010 Census).

The total population of Charleston County was projected to grow to 387,355 people by 2015. With the estimated population at over 396,000, this showcases how fast growing Charleston County is as it exceeded the expectations from the 2010 U.S. Census. Compared to the number of residents in 1990, this represents a 31% growth in population over 25 years. This projection represents an extension of established demographic trends in the Region. The projection includes growth of the student population, based on long-range plans of local colleges and universities.

The Mt. Pleasant/East Cooper area is projected to be the fastest growing area in the Region, with a 98% population growth projected to occur between 1990 and 2015. The slowest growing areas are projected to be North Charleston, the Charleston Peninsula, and the rural East community. The current County of Charleston Comprehensive Plan, in general, encourages the maintenance of rural uses in areas that are currently rural in nature, and future development in

the more highly developed areas of the County. The following Table 5-14 provides estimated population growth estimates provided by the local governments within Charleston County.

Table 5-1-14

Estimated Population Trends April 1st 2010-July 1st 2018 in Charleston County, SC		
Jurisdiction	Growth Rate Projections	2010-2018 Population Projections
Town of Awendaw	10.04%	1,424
City of Charleston, incl St Andrews Parks and Rec, St. Andrews PSD, some of Charleston Water System, Chas Co Parks and Rec	13.00%	136,208
City of Folly Beach	0.91%	2,641
Town of Hollywood	9.88%	5,180
Town of Lincolnville	115.18%	2,451
City of Isle of Palms	5.00%	4,340
James Island, some of Chas Water System and Chas Co Parks and Rec	7.60%	12,068
Town of Kiawah Island	8.36%	1,762
Town of McClellanville	8.61%	542
Town of Meggett	5.46%	1,293
Town of Mt. Pleasant, incl Mt. Pleasant Water	31.70%	89,338
City of N. Charleston, incl Cooper River Parks, N. Charleston District, N. Chas Sewer District	16.10%	113,237
Town of Ravenel	8.50%	2,674
Town of Rockville	0.90%	138
Town of Seabrook Island	6.70%	1,855
Town of Sullivan's Island	7.25%	1,921

In addition to area-wide efforts to address traffic-related issues associated with growth in the Charleston County area, several communities in the Charleston County area also have ordinances designed to protect their historic building inventory from demolition or have taken other steps to preserve their historical assets.

The local governments within Charleston County are diverse in many ways concerning the amount of land available for development within their jurisdictional limits. For example, areas such as the Peninsula part of the City of Charleston and the Towns of Rockville and Seabrook Island anticipate only limited future development due to the available land being primarily already built-upon. However, other areas, such as the Daniel Island part of the City of Charleston, and the Towns of Hollywood and the portions of Unincorporated Charleston County within the service districts of the St. John's Fire District and the St. Paul's Fire District have ample land available for development, so high levels of future development are expected in these areas, subject to limitations from the Charleston County Development Regulations and

the Charleston County Comprehensive Plan. Other local governments, such as the Towns of Kiawah Island, McClellanville, and Meggett anticipate moderate levels of future development, since they have some land still available for future development. Table 5-15 summarizes the anticipated future development trends for the local governments within the Charleston Region, as provided by the local government entities participating in the Charleston Regional Hazard Mitigation Plan:

Table 5-1-15

Anticipated Future Development Trends Within the Charleston Region				
Jurisdiction	Limited future development expected	Moderate levels of future development expected	High levels of future development expected	Other
Town of Awendaw			X	
City of Charleston	X (Peninsula area)	X (W. Ashley, John's Island, James Island)	X (Daniel Island, Cainhoy)	
Charleston County (Unincorporated)				Charleston County Comprehensive Plan places limits on amount of development in rural areas. Future development trends are also subject to rate of annexations by municipalities.
Charleston Co. PRC			X	
Charleston CPW		X		
Cooper River Parks		X		
City of Folly Beach	X			
Town of Hollywood			X	
Town of Lincolnville		X		
City of Isle of Palms	X			
James Island PSD		X		
Town of Kiawah Island		X		
Town of McClellanville		X		
Town of Meggett		X		
Town of Mt. Pleasant			X	
Mt. Pleasant Water		X		
City of N. Charleston		X		
N. Charleston District	X			
N. Charleston Sewer District		X		
Town of Ravenel				The Town has large areas of undeveloped land and is anticipating quality of development rather than quantity of development.
Town of Rockville	X			
St. Andrews Parks				Do not have plans to develop, however, ½¢ sales tax may provide funding for expansion.
St. Andrews PSD	X			
St. John's Fire District			X	
St. Paul's Fire District				Land available, but restricted by Chas. Co. Comprehensive Plan & Land Use Development Regulations.
Town of Seabrook Island	X			
Town of Sullivan's Island	X			

5.1.10 – Economic Impact

The impact of a hazard event upon the community, economy, and tax base is directly dependent upon the severity of the event. A situation such as Hurricane Hugo with a 20-foot storm surge has the potential impact of loss of life, particularly if hospitals are not accessible due to debris obstructing the transportation arteries or if residents in low lying areas refuse to evacuate when ordered to do so. Loss of property, utility service, and personal security also has a direct impact on the ability of the businesses to conduct commerce. Businesses must be prepared to contend with a reduction in the number of employees who are able to work, even if their physical

facilities are able to continue operation, if the homes of their employees are severely damaged as a result of a hazard event.

The effect on the overall economy after a large-scale disaster can be quite dramatic. A large part of the economy of the Charleston Region depends on tourist dollars. Since the historic buildings of the City of Charleston represent one of the major tourist attractions of the Charleston area, the loss of the historic structures through damages associated with a hazard event could potentially compound the post event decline in tourist visits, if the tourists no longer have a unique reason to select Charleston as their tourist destination. The most likely hazard event to result in this type of catastrophic loss is a major earthquake. Potential economic effects of a major earthquake are separately addressed in this plan at the end of this section. A major hurricane strike would also likely result in catastrophic losses to some historic structures on the Charleston peninsula. A hurricane of the magnitude of Hurricane Hugo striking south of Peninsula Charleston in such a manner as to place the peninsula in the worst quadrant of the hurricane would likely result in greater losses due to flooding and wind-related damages than Hurricane Hugo generated. The longer the clean-up and repair period after a hazard event and the greater the extent of the damage to the historic district structures, the more devastating these types of events are likely to be upon the tourist-related service sector of the economy.

Since small businesses are particularly vulnerable to closure after a major natural hazard event (nationally 30-40% of small businesses do not reopen after a major natural hazard event), initiatives to prepare small businesses for prompt return to operation post-event may further reduce a hazard's economic impact.

Harbor deepening projects are crucial to economic development of the Southeast and the nation as a whole. According to the Post and Courier, 90 percent of U.S. global trade flows by water carriage. The State Ports Authority chief Jim Newsome called the Panama Canal expansion a "3 million container opportunity" for Charleston. The completion of the deepening of the Panama Canal allows larger ships pass through which require deeper ports to operate in.

According to a HAZUS-based study produced for the South Carolina Emergency Management Division, an earthquake of the magnitude of the 1886 earthquake (7.3 on the Richter Scale) would be expected to cause approximately \$10.9 billion in economic losses in the Charleston, Berkeley, and Dorchester County areas. These losses include building losses, direct business interruption losses, and damage to transportation and utility systems. This study recommended further study of the short- and long-term effects of a major earthquake on tourism since the Charleston-area economy is so dependent upon tourism-related businesses. This study also suggests that if an earthquake occurs during high tourist occupancy times the demands on emergency response organizations will likely be greater than the study currently predicts. The study already predicts that an estimated 60,000 people in the State of South Carolina will require short-term shelter and an additional 70,000 households would be displaced as a result of an earthquake of this magnitude. An earthquake event of this magnitude during high tourist occupancy times could precipitate the need for even more shelter space.

The Moore School of Business of The University of South Carolina September 14, 2015 South Carolina State Ports Authority (SCPA) Economic Impact Study clearly defined the economic impact of closing the Port System for any disaster. Approximately 11.9 percent of the statewide economic impact associated with the SCPA is concentrated within the Lowcountry Region of South Carolina. This specifically translates annually into 6.3 billion in total economic output, nearly 23,000 jobs and \$1.2 billion in labor income. It also implies that about 1 out of every 20 jobs in the Lowcountry can be attributed to the SCPA. The manufacturing industry, which represents the primary user base of the SCPA port facilities encompasses roughly 7.7% of the Lowcountry's economy. Based on these figures, any cessation of port operations would result in a daily economic loss from the Lowcountry of \$17.3m in revenue with over \$3 million in labor income.

5.1.11 – Resiliency to Hazards

The ability to recover quickly after a disaster is imperative, but having a plan in the light of disasters is arguably how to make this come to fruition. Resiliency is an integral part of hazard mitigation. It is important for jurisdictions of all sizes, like those found in the Charleston Region, to incorporate resiliency issues, such as preparedness, adaption, mitigation, and response & recovery, into planning documents like a Comprehensive Plan. In the 2017 survey, questions about resiliency were asked to gauge what steps jurisdictions were taking independently to further strengthen the resiliency of the area. Table 5-16 lists all of the questions asked about resiliency in the survey. Many of the jurisdictions in the area do this through the protection of natural benefits, infrastructure maintenance programs, business disruption mitigation planning/business continuity planning, policies to limit development in floodplains, and beach management plans.

Many of these resiliency issues come to the surface due to experiences from disasters such as hurricane threats and flooding events. Some specific issues on preparedness of the jurisdictions in the area learned from these hazards are how flooding affects access to critical facilities such as hospital emergency rooms, how mutual aid agreements are helpful in time of disaster, and how understanding the policy and procedures for a hazard is crucial administratively. Some other lessons learned through hazard mitigation are how preemptive communication to high risk, repetitive loss areas help with preparedness; how identifying challenges to specific regions helps to better allocate resources and educate residence on preparation; how cross-checking contractors periodically can help improve the stability of infrastructure; and how quick communication across jurisdictions is valuable.

With these lessons learned, there comes challenges to then applying them to the policy and procedures before the next disaster strikes. These challenges include updating older infrastructure (especially prevalent in the historic district), public education, resource allocation (both short and long term), funding sources/financial restraint, cooperation from within and between jurisdictions, technological shortcomings, and high turnover of elected and appointed government positions (hard to achieve continuity).

The importance of participating in emergency operation center activities is advantageous to jurisdictions by having a first-hand account disaster preparedness and the intricacies of coordination in the time of adversity. The survey asked jurisdictions what their participation level was in EOC duties. Their responses varied from only to call in incidents to we try but are limited due to staff resources to we attend training events and are present in the EOC during storm events. Some jurisdictions need a higher level of involvement due to their size, risk level, and/or staff capabilities.

Moving up from a community scale to a regional scale, these scopes have different priorities and things to consider. The 2017 survey requested some feedback from the local jurisdictions up to the regional scale. Some suggestions to the County are to increase communication between county and city officials, increase collaboration efforts, state clear expectations from both sides, increase technical assistance on hazard mitigation and resiliency efforts, increase pursuit of federal grant funding, more consistency on regional policies for disaster response, and increasing response time by emergency services to fix infrastructure post disaster.

Some relevant projects being conducted by the jurisdictions to build resistance to hazards range from educational programs to increasing use of social media. Some of these projects link back to lessons learned from experiences with hazards. For example, one jurisdiction has several FEMA-sponsored mitigation programs in place to reduce the impact of flooding and hurricanes to medical critical care emergency operations and increase the resiliency of their physical plant. Proactive asset management by increasing types of infrastructure that are being inspected for vulnerability is another relevant project. Other notable projects are increasing freeboard requirements, introducing a sea level rise strategy, enforcing enclosure restrictions below

elevated structures, and implementing roundtable discussions on developing a sustainable community.

Table 5-1-16 Resiliency Questions Posed to Jurisdictions

Resiliency Questions Posed to Jurisdictions
Does your organization include issues of resiliency (e.g. preparedness, adaptation, mitigation, response & recovery) in your planning documents, such as the Comprehensive Plan, or in other planning efforts? If so, what are some examples of these policies?
Reflecting upon recent hurricane threats and flooding events, what has your jurisdiction/organization learned from a hazard preparedness standpoint from these events? Are some areas of preparedness weaker than others in your jurisdiction?
What challenges does your organization face when it comes to incorporating disaster resiliency into your planning or implementation efforts?
Does your jurisdiction/organization participate in emergency operations center activities or command? Please explain your participation level.
What could be done at the regional scale to mitigate impacts to disasters and disruptions? This could include providing technical assistance, setting regional policies, providing a forum for peer sharing, etc. Is your organization currently involved in any regional efforts?
Please share information about relevant projects related to building resilience to hazards (e.g. preparedness, adaptation, mitigation, response, and recovery efforts) that your community is undertaking (e.g. educational programs, risks programs, increased freeboard requirements, etc.).

**Attachment 5-1-A: Largest Private Sector Employer in Charleston Metro Area
2018**

Largest Private Sector Employers in the Charleston Metro Area		
Company	Product or Service	Employees
The Boeing Company	Aircraft manufacturing	7,000
Roper St. Francis Healthcare	Roper St. Francis and Bon Secours St. Francis Hospitals	5,500
Trident Health System	Hospital system	2,500
Walmart Inc.	Retail merchandise	2,300
Robert Bosch LLC	Antilock brake systems, fuel injectors	2,000
Kiawah Island Golf Resort/The Sanctuary at Kiawah	Resort	1,500
Publix Supermarkets	Retail grocery stores	1,200
Verizon Wireless	Inbound/outbound call center for communications company	1,200
KapStone Charleston Kraft LLC	Manufacture specialty paper & packaging	1,000

Source: Charleston County, SC Economic Development 2018

**Attachment 5-1-B: Largest Public Sector Employer in Charleston Metro Area
2018**

Largest Public Sector Employers in the Charleston Metro Area		
Company	Product or Service	Employees
Joint Base Charleston	Area U.S. military commands	22,000
Medical University of South Carolina	Hospital, post-secondary education, research	13,000
Charleston County School District	Education/public schools	6,500
Charleston County	Local government	2,600
College of Charleston	Higher education	2,000
U.S. Postal Service	Postal service	2,000
City of Charleston	Local government	1,700

Source: Charleston County, SC Economic Development 2018

Attachment 5-1-C: Repetitive Loss Areas within the Charleston Region

Repetitive Loss Areas				
Street	City, State	Zip Code	Jurisdiction	PSD / FD
5th Avenue	Charleston, SC	29407	Chas. County	
Alonzo Rouse Road	Mt. Pleasant, SC	29466-8562	Chas. County	
Arlington Drive	Charleston, SC	29407	Chas. County	St. Andrews
Auburn Drive	Charleston, SC	29406-9049	Chas. County	N. Charleston
Awendaw Landing Road	Awendaw, SC	29429-5957	Chas. County	
Belgrade Ave	Charleston, SC	29407-5715	Chas. County	
Bolton Road	Charleston, SC	29407	Chas. County	St. Andrews
Bonanza Road	Charleston, SC	29414-5104	Chas. County	
Boone Hall Drive	Charleston, SC	29407-3006	Chas. County	
Bradford Avenue	Charleston, SC	29412-4001	Chas. County	James Island
Burnham Court	Charleston, SC	29414-6870	Chas. County	
Butternut St	Charleston, SC	29414-6024	Chas. County	
Capri Drive	Charleston, SC	29407-7606	Chas. County	St. Andrews
Catawba Road	Charleston, SC	29414-5527	Chas. County	
Cessna Ave	Charleston, SC	29407-6808	Chas. County	
Cestus Lane	Charleston, SC	29414-6246	Chas. County	
Chaplins Landing Road	Meggett, SC	29449-5834	Chas. County	
Christian Road	Charleston, SC	29407-3042	Chas. County	
Church Creek Drive	Charleston, SC	29414-6404	Chas. County	
Clearview Drive	Charleston, SC	29412-4511	Chas. County	
Coker Avenue	Charleston, SC	29412	Chas. County	
Cynthia Lane	Charleston, SC	29407-7607	Chas. County	St. Andrews
D Woods	Kiawah Island, SC	29455-5759	Chas. County	
Debbenshire Drive	Charleston, SC	29407	Chas. County	St. Andrews
Deene Street	Charleston, SC	29412	Chas. County	
Dobester Avenue	Charleston, SC	29412-9106	Chas. County	James Island
Doncaster Drive	Charleston, SC	29414	Chas. County	
Etiwan Avenue	Charleston, SC	29414	Chas. County	St. Andrews
E Westchester Drive	Charleston, SC	29414	Chas. County	
Fickling Hill Road	Johns Island, SC	29455-8901	Chas. County	
Flamingo Drive	Charleston, SC	29414-5430	Chas. County	
Folly Road	Charleston, SC	29412-3922	Chas. County	James Island
Forest Lakes Blvd.	Charleston, SC	29414-5963	Chas. County	St. Andrews
Glendale Drive	Charleston, SC	29414-6428	Chas. County	St. Andrews
High Hammock Rd A	Seabrook Island, SC	29455	Chas. County	
High Hammock Rd B	Seabrook Island, SC	29456	Chas. County	
Honeysuckle Lane	Charleston, SC	29412-9712	Chas. County	
Howle Ave	Charleston, SC	29412-2421	Chas. County	
Hutton Place	Charleston, SC	29407-3506	Chas. County	
Limehouse Street	Charleston, SC	29401-2305	Chas. County	
Manigault Place	Charleston, SC	29407-3014	Chas. County	
Marilyn Drive	N. Charleston, SC	29418-5853	Chas. County	
Marshland Drive	Charleston, SC	29414-6214	Chas. County	
Mowler Court	Charleston, SC	29414-7361	Chas. County	
Old Ferry Road	Johns Island, SC	29455	Chas. County	St. Andrews
Old Pond Road	Johns Island, SC	29455-3201	Chas. County	
Pauline Avenue	Charleston, SC	29412-4041	Chas. County	James Island
Pelican Flight Drive	Isle of Palms, SC	29451	Chas. County	

Preston Road	Charleston, SC	29412-9130	Chas. County	
Rantowles Court	Ravenel, SC	29470-5304	Chas. County	
Riverland Drive	Charleston, SC	29412-2722	Chas. County	
Saint Julian Road	Charleston, SC	29405	Chas. County	N. Charleston
Sam Rittenberg Blvd.	Charleston, SC	29407-4621	Chas. County	
Savage Road	Charleston, SC	29414-5652	Chas. County	
Seaward Drive	Charleston, SC	29412-8942	Chas. County	James Island
Shelley Road	Charleston, SC	29407-7022	Chas. County	
Spur Street	N. Charleston, SC	29405-6825	Chas. County	
Sunnyvale Avenue	Charleston, SC	29414-6025	Chas. County	
Swift Avenue	Charleston, SC	29407-6858	Chas. County	
Taborwood Circle	Charleston, SC	29407-4820	Chas. County	
Tennent Street	Charleston, SC	29412-4528	Chas. County	
Trent Street	Charleston, SC	29414-5556	Chas. County	St. Andrews
Two Loch Place	Charleston, SC	29414-6883	Chas. County	
Waterloo Street	Charleston, SC	29412-5058	Chas. County	James Island
Wedgepark Road	Charleston, SC	29407-7836	Chas. County	
Wellington Drive	Charleston, SC	29412	Chas. County	
Woodland Shores Road	Charleston, SC	29412-2427	Chas. County	James Island
Yale Drive	Charleston, SC	29412	Chas. County	James Island

Attachment 5-1-D: Charleston Region Buildings Vulnerable to Flooding Due to Location in the Special Flood Hazard Area (SFHA) Only

Jurisdiction	Total Site-Built Structures	% of Total Site-Built Structures in the SFHA	Mobile Homes in SFHA *	Residential site-built structures in the SFHA		Commercial Structures in the SFHA		Total Structures in the SFHA (including site-built and mobile homes)	
				SFHA	A/AE Zone	V/VE Zone	A/AEZ one	V/VE Zone	A/AW Zone*
Unincorporated	25,875	50	1,100	11,002	1,179	550	80	12,607	1,304
Total Region	163,969	61	2,317	65,863	7,089	5,746	734	73,878	7,871

* Since most mobile homes in Charleston County are treated as vehicles for tax purposes, the determination of “A” or “V” zones for these homes using the Q-3 digital data was not able to be readily performed. All mobile homes in the SFHA are included in the A-zone total for this table, since most jurisdictions in Charleston County restrict mobile homes from the “V” flood zone areas.

Attachment 5-1-E: Charleston Region Buildings Vulnerable to Flooding Due to Year of Construction and Location in the Special Flood Hazard Area (SFHA)

Jurisdiction	Pre-1985 Site-Built Residential Buildings in SFHA	Pre-1985 Commercial Buildings in SFHA	Total Pre-1985 Site-Built Buildings in SFHA	% of All Site-Built Buildings In Jurisdiction Constructed Pre-1985 and in SFHA	Pre-1985 Mobile Homes in SFHA	Total Site-Built Buildings Pre-1985 & Mobile Homes in SFHA
Unincorporated	5,909	269	6,178	44.5	282	6,460
All Regions	32,235	3,173	35,408	43.3	651	36,059

Attachment 5-1-F: Charleston Region Average Valuation of Buildings and Mobile Homes

Jurisdiction	Avg. Site-Built Residential Building Value	Avg. Commercial Building Value	Avg. Mobile Home Value**	Estimated Total Pre-1985 Site-Built and Mobile Home Building Value	Estimated Pre-1985 Site-Built Building And Mobile Home Value in SFHA (mil.\$)
Unincorporated (All)	\$149,863.22	\$251,693.60	\$11,134.78	\$1,557,953,605.00	
Pre-1985 only	\$111,543.65	\$121,900.28	\$2,644.42		\$785,237,226.00
Total Region (All)	\$198,578.22	\$555,034.18	\$8,973.50	\$12,051,164,988.00	
Pre-1985 only	\$147,273.42	\$271,215.00	\$2,400.29		\$6,703,502,398.00

** Valuation data reflected herein is for mobile homes, regardless of age.

Attachment 5-1-G: Charleston Region Average Valuation of Site-Built Buildings by Flood Zone

Jurisdiction	Total Value "A" Zones Site-Built Structures	Total Value "V" Zones Site-Built Structures(mil\$)	Total Value Site-Built Structures Not in the SFHA (mil\$)	Total Value of Site-Built Structures Not Flood-Zone Coded** (mil\$)
Unincorporated	2,111,246,734	327,371,903	1,601,024,142	1,428,003,742
Total Region	18,964,704,553	2,884,575,591	16,939,454,893	14,100,337,511

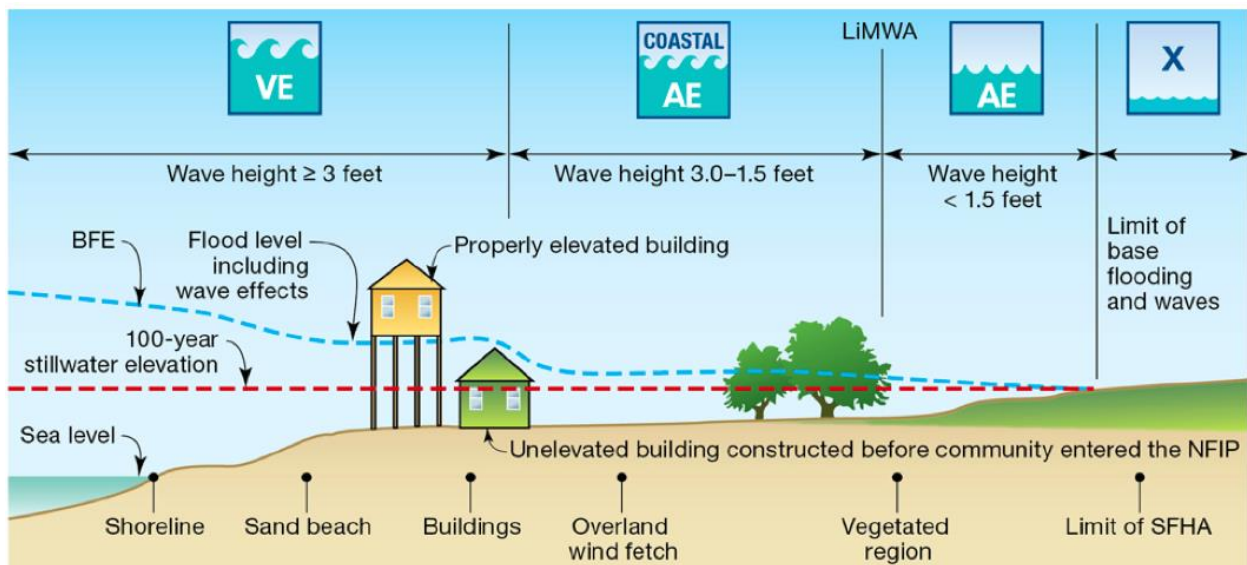
** Valuation data reflected herein is for mobile homes, regardless of age.

5.2(a) – Town of Awendaw

Sea Level Rise

Location

Flooding and tidal flooding is a good indicator of what areas are most at risk for sea level rise and the stressors that accompany it: nuisance flooding, increased storm surge, loss of property. Land in the most susceptible flood zones (AE and VE) will be most affected as sea level continues to rise. Areas of the most susceptibility include Eastern Folly Beach and Morris Island, the tips of Sullivan’s Island, the northeastern coast of James Island near SC-30 and Harbor View Rd., all of Kiawah Island, especially laterally along the banks of the Kiawah River, all of Seabrook and Edisto’s coastline, eastern Isle of Palms and Caper’s Island, all of Awendaw’s coastline, and the northeastern coastline of Murphy Island and the coast of the Dunes West Golf and Resort Club. Below is an illustration of the definitions of the different flood zones:



Amount of Land Area of Charleston County Above Sea Level										
Elevation above spring high water (m)	0.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00
Area of Land (sq. km)	108.6	175.5	223	305.5	344.2	421.8	464.9	587.2	684.4	858.2
Percent of Total Land Cover	4.6%	7.4%	9.4%	12.9%	14.5%	17.8%	19.6%	24.8%	28.9%	36.2%

Occurrences

King tides, which is the above average high tide occurring when once a lunar cycle, are a good predictor of sea level rise. On average there were over twice as many observed tides than predicted tides. The depth averaged more than a foot deeper than expected. There were 28 more king tides than predicted in 2018 and the highest observed tide was over a foot and a half higher than the highest predicted tide. King tides give a community a glimpse into what it will be like to live with a higher sea level. Communities can expect more king tides in the future as sea level continues to rise.

Duration and Depth* of King Tides in Charleston Area from January 2014 – December 2019				
Year	Predicted Number of Tides	Observed Number of Tides	Highest Predicted Tide (ft)	Highest Observed Tide (ft)
2014	28	46	7	7.6
2015	40	111	7.2	8.7
2016	49	82	7.2	7.9
2017	34	111	7	9.9
2018	44	72	6.9	8.8
Average	39	84.4	7.06	8.58
Total	195	422	35.3	42.9

*Depth is based off of the Charleston Harbor Tide Gauge

**Available data from 2014 onwards gathered through MyCoast.org backed by SC DHEC:

<https://mycoast.org/sc/king-tides>

Sea Level Rise/King Tide Probability for each Jurisdiction	
Jurisdiction	Probability
Town of Awendaw	76-100%

Wildfire

Location

Wildfire is a potentially serious threat in the Charleston Region, particularly in areas with a high density of vegetation and areas within or surrounding the Francis Marion National Forest. Areas where there is an urban-wild land interface like (St. John’s Fire District) are also at risk. Even urban areas within the Region pose the threat of wildfires, since they are defined as uncontrolled fires, which most fires are. For the purpose of this plan, all areas, buildings and facilities are considered to be equally exposed.

Historical Occurrences

The table below shows the amount of fires and acres buried each fiscal year from 2012 to 2019.

Wildfire Events from 2013-2019							
Year	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019
Fires	19	15	9	6	23	6	Unknown
Acres	656.6	37.5	349.9	134.8	249.2	30.2	Unknown

Source: South Carolina Forestry Commission

Below is a table summarizing fire incidents from 2013 to 2019 recorded by the Consolidated 9-1-1 system.

Fire Incidents from May 1, 2013 – April 30, 2019							
As Reported by Charleston County Consolidated 9-1-1							
Category	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	
Outside Fires	893	542	632	999	657	573	
Trail/Rail Fires	3	1	2	1	3	0	
Marine Fires	13	5	11	11	21	7	
Vehicle Fire	102	90	111	111	112	124	

Total	1011	638	756	1122	793	704	11,366
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Wildfire Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of Awendaw	26-50%

Severe Storm

Location

A thunderstorm event is an atmospheric hazard, and has no geographic boundaries. They can occur in all regions of the United States however, thunderstorms are most common in the central and southern states because atmospheric conditions are more favorable for generating thunderstorms. Since thunderstorms are unpredictable, all jurisdictions are equally exposed to these hazards.

Historical Occurrences

Severe Storm Events (Thunderstorm Winds) 1956 – April 2019		
TOTAL: 4 Events	Average Wind Speed: 53	Total Damage: \$0

Source: NOAA Storm Events Database

Severe Storm (Hail) Incidents in Charleston County 1957 – April 2019		
Total 7 Events	Average Size: 0.09125	Total Damage: \$0

Source: NOAA Storm Events Database

Probability

Since thunderstorms are unpredictable and can occur any day of the year, all jurisdictions are equally exposed to these hazards, and there is a 100% chance that the area will be hit by severe weather in any given year. The likelihood of hail events depends on the severity of the storm. There have been 16 hail events over the past four years, averaging 4 hail events per year. The vulnerability and impact of the hazard is discussed later in the Plan.

Severe Storm Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of Awendaw	76-100%

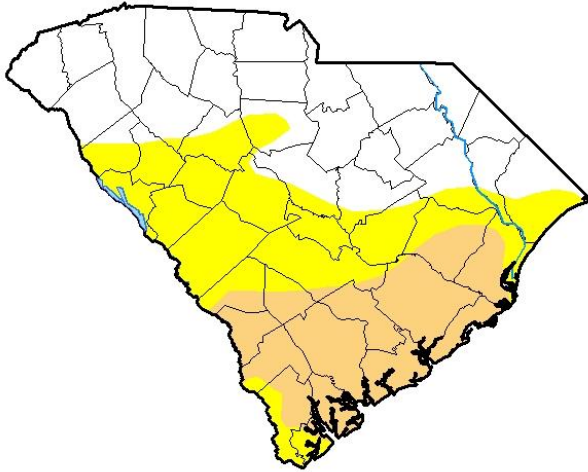
Drought

Location

Droughts typically cover a large area and cannot be confined to any geographic boundary. For this purpose, the whole Charleston Region is vulnerable to the threat of a drought.

U.S. Drought Monitor South Carolina

April 30, 2019
(Released Thursday, May 2, 2019)
Valid 8 a.m. EDT



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	45.71	54.29	23.20	0.00	0.00	0.00
Last Week 04-23-2019	46.10	53.90	23.13	0.00	0.00	0.00
3 Months Ago 01-29-2019	100.00	0.00	0.00	0.00	0.00	0.00
Start of Calendar Year 01-01-2019	100.00	0.00	0.00	0.00	0.00	0.00
Start of Water Year 09-25-2018	89.90	10.10	1.52	0.00	0.00	0.00
One Year Ago 05-01-2018	60.27	39.73	23.91	0.00	0.00	0.00

Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:

Brad Rippey
U.S. Department of Agriculture



<http://droughtmonitor.unl.edu/>

(An example of the extent of drought that the State experienced in late April 2019)

Historical Occurrences

Year	Number of weeks of Drought Events between May 1, 2013 – April 30, 2019						Description
	None	D0 Abnormally Dry	D1 Moderate Drought	D2 Severe Drought	D3 Extreme Drought	D4 Exceptional Drought	
1999-2000	35	17	2	0	0	0	
2000-2001	17	35	19	5	0	0	
2001-2002	4	48	38	32	19	0	
2002-2003	18	34	20	18	13	0	
2003-2004	46	6	0	0	0	0	
2004-2005	32	20	5	0	0	0	
2005-2006	47	5	0	0	0	0	
2006-2007	27	25	3	0	0	0	
2007-2008	0	53	35	12	0	0	
2008-2009	15	37	22	0	0	0	
2009-2010	38	14	2	0	0	0	
2010-2011	29	23	0	0	0	0	
2011-2012	0	53	50	46	39	3	
2012-2013	7	45	20	9	5	0	
2013-2014	32	20	0	0	0	0	The Region experienced 20 weeks in drought stage. 32 weeks of no drought stage were reported and 20 weeks of D0 drought from October to December.
2014-2015	37	15	0	0	0	0	The Region experienced only 15 weeks of D0 drought. During weeks when drought was experienced, only approximately 10-20 percent of the county was

							affected. 37 weeks of the year, the Region experienced no drought.
2015-2016	36	16	0	0	0	0	The Region experienced 16 weeks of D0 drought. During weeks when drought was experienced, only approximately 10-20 percent of the county was affected. 36 weeks of the year, the Region experienced no drought.
2016-2017	38	14	6	0	0	0	The Region experienced 20 weeks of drought stage. During these 20 weeks, the drought stage remained at D0 for 14 weeks and D1 for 6 weeks. 38 weeks of the year, the Region experienced no drought.
2017-2018	23	29	14	4	0	0	The Region experienced 29 weeks of drought stage D0 and 14 weeks of D1. In addition, 4 weeks were spent at D2; there were 23 weeks where the Region experienced no drought.
2018-2019	26	26	10	0	0	0	The Region experienced 36 total drought weeks. 26 weeks were spent at D0 and an additional 10 weeks were spent at D1. The Region was no experiencing a drought for 26 weeks.

Source: U.S. Drought Monitor

According to the U.S. Drought Monitor, the Charleston Region was in the D4 (Exceptional Drought) category for a number of weeks in early 2012 with a Palmer Drought Index of at least -5.0 (Extreme Drought). It is possible for severe and exceptional drought periods to return to the Charleston Region.

Drought Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of Awendaw	26-50%

Winter Weather

Location

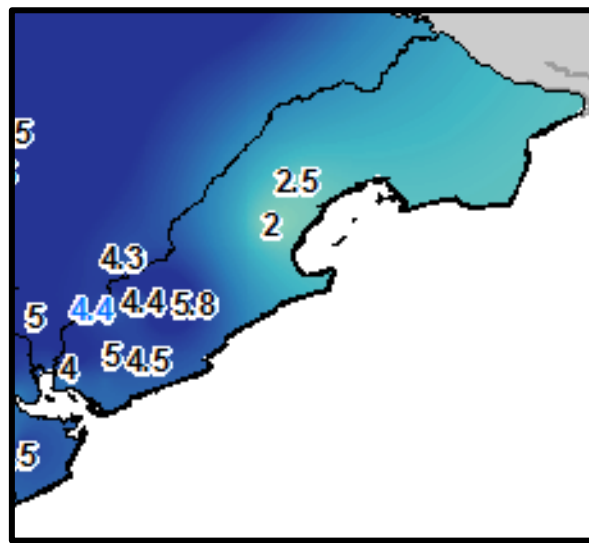
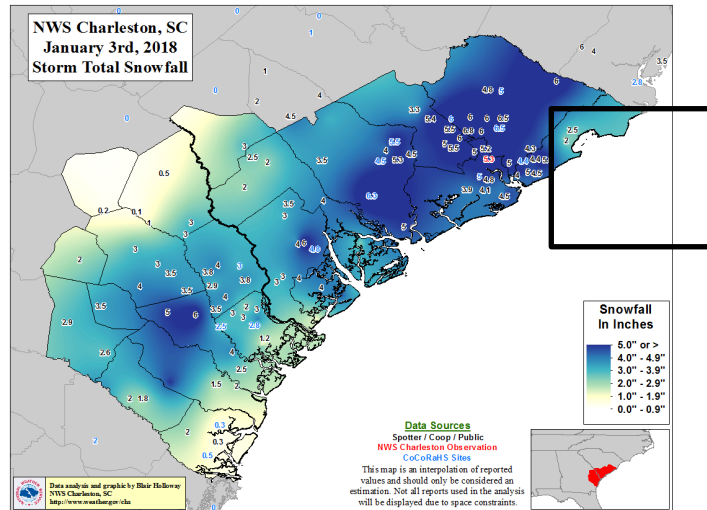
While the Region does not regularly encounter extreme winter storms, some aspects of winter weather occur in the Region annually. With the random nature of this hazard, all jurisdictions are subject to winter weather conditions.

Historical Occurrences

Winter Weather Events Through April 2019	
Total of 10 Events	\$233,000

Source: NOAA Climate Data

A rare winter storm affected southeast South Carolina on January 3, 2018. The storm produced a variety of wintry precipitation, including snow, sleet and freezing rain. Charleston Airport (KCHS) measured 5.3 inches of snow, the 3rd greatest daily snowfall on record, just 0.1 inches shy of the 5.4 inches that fell during the 1973 storm (NWS, 2019).



Winter Weather Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of Awendaw	51-75%

5.2(b) - Awendaw Problem Assessment

5.2.1 - Hazard Vulnerability

The analysis for this section is identical to the analysis under “Hazard Vulnerability” for Unincorporated Charleston County.

5.2.2 - Vulnerable Buildings

The analysis for this section is identical to the analysis under “Vulnerable Buildings” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-2-9

Building Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
Jurisdiction	Dam Failure	Drought	Earthquakes	Flooding	Hazardous Material Incidents	Hurricanes	Sea Level Rise	Tornadoes	Terrorist Incidents	Tsunamis	Wildfires	Winter Weather
Town of Awendaw	3	4	3	3	3	2	3	2	2	2	2	3

5.2.3 – Infrastructure Vulnerability

The analysis for this section is identical to the analysis under “Infrastructure Vulnerability” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-2-11

Infrastructure Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
Town of Awendaw	5	5	2	2	3	2	3	3	2	2	1	3

Problem Statements and Vulnerability Based on Jurisdiction	
Jurisdiction	Vulnerability Assessment
Town of Awendaw	<p>The Town of Awendaw is a low lying rural community located along the Intracoastal Waterway, Awendaw Creek and the head waters of the Wando River. The Town is adjacent to the Frances Marion National Forest and Cape Romain Wildlife Refuge. The Town has a scattering of small businesses and residents who have lived here all their lives and recent residents in newer typically waterfront communities. There is a high percentage of mobile homes, limited access to evacuation routes and more low-income/at-risk populations. Hurricane Hugo landed just north of Awendaw resulting in severe flooding and damaging winds. The Town and adjacent Francis Marion National Forest was decimated in Hurricane Hugo. The Town is at risk for hurricanes and is more vulnerable to tornadoes as well as coastal flooding with the amount of mobile homes in the area. Given the proximity to the National Forest, the Town is vulnerable to wildfires. The Town is also vulnerable to earthquakes with it being close to a fault line with most buildings not built to withstand a severe earthquake. The Town is also vulnerable to winter weather as we do not experience it often and are not equipped with snow plows, salt, etc. for ice and snow.</p>

5.2.4 – Known Flood Damages

The analysis for this section is identical to the analysis under “Known Flood Damages” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-2-12

Loss Statistics for Charleston County as of 9/30/2018

Jurisdiction	Total Losses	Closed Losses	Open Losses	CWOP Losses	Total Payments
AWENDAW, TOWN OF	5	3	0	2	59,575.25
<i>FEMA Policy and Claims Statistics Database, 2019</i>					

Town of Awendaw Higher Regulatory Standards
2' freeboard
1/2 foot rise in floodway
Five year cumulative of all permits is included when conducting a substantial review
Maximum residential lot occupancy of 20-30%
35' wetland setback
1 acre minimum along intercostal waterway and creeks

5.2.5 - Past Flood Impacts

The analysis for this section is identical to the analysis under “Past Flood Impacts” for Unincorporated Charleston County.

5.2.6 - Emergency Warning Needs

The analysis for this section is identical to the analysis under “Emergency Warning Needs” for Unincorporated Charleston County.

5.2.7 - Critical Facilities

The analysis for this section is identical to the analysis under “Critical Facilities” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-2-13

Critical Facility Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
Town of Awendaw	5	5	3	3	4	3	3	3	3	3	2	4

A full list of the capabilities for Charleston County and plan participating partners can be seen in the “Critical Facilities” description in Section 5.1(b).

5.2.8 - Natural and Beneficial Functions of Floodplains

The analysis for this section is identical to the analysis under “Natural and Beneficial Functions of Floodplains” for Unincorporated Charleston County.

5.2.9 – Development and Population Trends

The analysis for this section is identical to the analysis under “Development and Population Trends” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-2-14

Estimated Population 2017-2018 in Charleston County SC		
Jurisdiction	Growth Rate 2010-2018	Projected 2018 Population
Town of Awendaw	10.04%	1,424

Source: U.S. Census Bureau, Population Division 2018

Additional summaries of the anticipated future development trends for the local governments within Charleston County, as provided by the local government entities participating in the Charleston Regional Hazard Mitigation Plan, are outlined in “Development and Population Trends” in Section 5.1(b).

5.2.10 – Economic Impact

The analysis for this section is identical to the analysis under “Economic Impact” for Unincorporated Charleston County.

5.2.11 – Resiliency to Hazards

The analysis for this section is identical to the analysis under “Resiliency to Hazards” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Attachment 5-2-C: Repetitive Loss Areas within the Charleston Region

Repetitive Loss Areas			
Street	City, State	Zip Code	Jurisdiction
Awendaw Landing Road	Awendaw, SC	29429-5957	Awendaw, SC

Attachment 5-2-D: Charleston Region Buildings Vulnerable to Flooding Due to Location in the Special Flood Hazard Area (SFHA) Only

Jurisdiction	Total Site-Built Structures	% of Total Site-Built Structures in the SFHA	Mobile Homes in SFHA *	Residential site-built structures in the SFHA		Commercial Structures in the SFHA		Total Structures in the SFHA (including site-built and mobile homes)	
				SFHA	A/AE Zone	V/VE Zone	A/AE Zone	V/VE Zone	A/AW Zone*
Town of Awendaw	677	42	58	226	35	19	3	302	39

* Since most mobile homes in Charleston County are treated as vehicles for tax purposes, the determination of “A” or “V” zones for these homes using the Q-3 digital data was not able to be readily performed. All mobile homes in the SFHA are included in the A-zone total for this

table, since most jurisdictions in Charleston County restrict mobile homes from the “V” flood zone areas.

Attachment 5-2-E: Charleston Region Buildings Vulnerable to Flooding Due to Year of Construction and Location in the Special Flood Hazard Area (SFHA)

Jurisdiction	Pre-1985 Site-Built Residential Buildings in SFHA	Pre-1985 Commercial Buildings in SFHA	Total Pre-1985 Site-Built Buildings in SFHA	% of All Site-Built Buildings In Jurisdiction Constructed Pre-1985 and in SFHA	Pre-1985 Mobile Homes in SFHA	Total Site-Built Buildings Pre-1985 & Mobile Homes in SFHA
Town of Awendaw	72	8	80	31.37	6	86

Attachment 5-2-F: Charleston Region Average Valuation of Buildings and Mobile Homes

Jurisdiction	Avg. Site-Built Residential Building Value	Avg. Commercial Building Value	Avg. Mobile Home Value**	Estimated Total Pre-1985 Site-Built and Mobile Home Building Value	Estimated Pre-1985 Site-Built Building And Mobile Home Value in SFHA (mil.\$)
Town of Awendaw (All)	\$147,404.90	\$160,177.50	\$14,364.90	\$22,754,800.00	
Pre-1985 only	\$92,752.70	\$26,307.69	\$2,700.00		\$7,760,000.00

** Valuation data reflected herein is for mobile homes, regardless of age.

Attachment 5-2-G: Charleston Region Average Valuation of Site-Built Buildings by Flood Zone

Jurisdiction	Total Value "A" Zones Site-Built Structures	Total Value "V" Zones Site-Built Structures(mil\$)	Total Value Site-Built Structures Not in the SFHA (mil\$)	Total Value of Site-Built Structures Not Flood-Zone Coded** (mil\$)
Town of Awendaw	38,661,799	15,213,800	45,691,900	38,955,700

** Valuation data reflected herein is for mobile homes, regardless of age.

5.3(a) - City of Charleston

Flood

Location

Flooding can occur throughout most of the Charleston Region since around 68% resides within a floodplain. Floodplains are designated by the frequency of the flood that is large enough to cover them. Flood frequencies are determined by plotting a graph of the size of all known floods for an area and calculating how often floods occur. The Federal Emergency Management Agency (FEMA) identifies floodplain areas by producing Flood Insurance Rate Maps (FIRM). These maps show all locations near major bodies of water, and show base flood elevations and floodplain boundaries like the 100-year floodplain boundaries. 100-year flood event is a 1% probability of occurring in any given year. The roughly 68% of the areas located in the floodplain are exposed to the threat of floods but that does not mean the other areas are not vulnerable to a flash flood or flooding events. Damaged infrastructure and roadways can limit mobility for citizens. All areas can experience flooding hazards.

Below is a list of areas of concern for flooding.

<i>Jurisdiction Not Serviced by Charleston</i>	
<i>County</i>	<i>Area</i>
City of Charleston	Cainhoy / Daniel Island <ul style="list-style-type: none"> ○ Cooper River and Wando River edges ○ Pinopolis Dam inundation zone
	James Island <ul style="list-style-type: none"> ○ Central Park / Wambaw Creek basin ○ Signal Point basin ○ Westwood / Theresa Drive basin ○ White Chapel Circle neighborhood ○ Charleston Harbor and Stono River edges
	Johns Island <ul style="list-style-type: none"> ○ Barberry Woods neighborhood ○ Stono River edge
	Peninsula <ul style="list-style-type: none"> ○ Spring / Fishburne basin ○ Calhoun West basin ○ High Battery and Low Battery ○ Market Street ○ King Street & Huger Street ○ Ashley River and Cooper River edges ○ Harleston Village neighborhood
	West Ashley <ul style="list-style-type: none"> ○ Church Creek basin ○ Dupont-Wappoo basin ○ Saint Andrews basin ○ Rantowles Creek basin ○ Forest Acres neighborhood ○ Ashley Hall Manor neighborhood ○ Ashley River and Stono River edges

	<ul style="list-style-type: none"> ○ Crescent neighborhood ○ Windermere / South Windermere neighborhoods ○ Oak Forest neighborhoods
	Sherwood Forest neighborhood

Historical Occurrences

Flooding Events Between Jan 1, 1950 – April 30, 2019	
Total: 43 Severe Events	Total Damage: \$2,423,100

*NOAA Storm Events Database

Additionally, NOAA reports that the City of Charleston experienced two flooding events at the Citadel on July 20th, 2018 and December 14th, 2018 that amounted to \$22,500 in property damage in total.

Flooding Probability for each Jurisdiction	
Jurisdiction	Probability
City of Charleston	76-100%

Hazardous Materials

Historical Occurrences

The Charleston Regional Hazard Mitigation Plan began collecting Hazardous Material incident data from the Charleston County Consolidated 9-1-1 system in 2012. Below is a table summarizing hazardous material incidents from 2013-2019.

Hazardous Materials Incidents from May 1, 2013 to April 30, 2019							
As Reported by Charleston County Consolidated 9-1-1							
Category	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	
Hazmat	37	51	18	24	22	15	
Fuel Spill	104	111	102	85	74	67	
Gas Leak/Gas Odor (Natural and LP Gases)	278	201	360	397	395	363	
Total	419	363	480	506	491	445	2704

Hazardous Material Incident Probability for Each Jurisdiction	
Jurisdiction	Probability
City of Charleston	76-100%

Terrorism

Historical Occurrences

The Charleston Region hasn't experienced any major terrorist threats or attacks. Isolated incidents like bomb threats, suspicious packages are reported each year. In January 2008, nine out of ten public safety dispatch operations in Charleston County finalized an

Intergovernmental Agreement to consolidate dispatch operations. The City of Folly Beach still maintains their own Dispatch Center but have 9-1-1 calls transferred to them.

Suspicious Packages and Bomb Threat							
From May 1, 2013 – April, 30 2019							
As reported by Charleston County Consolidated 9-1-1 Center							
Category	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	
Bomb Threat	21	2	5	12	17	24	
Bomb Threat (Suspected Caller)	2	0	0	1	1	0	
Ordinance/Explosive Found	8	5	8	14	12	10	
Suspicious Package	66	110	111	95	131	81	
Suspicious Package with Leakage Residue	1	1	4	2	6	1	
Total	98	118	128	124	167	116	751

Terrorism Probability for Each Jurisdiction	
Jurisdiction	Probability
City of Charleston	26-50%

Severe Storm

Location

A thunderstorm event is an atmospheric hazard, and has no geographic boundaries. They can occur in all regions of the United States however, thunderstorms are most common in the central and southern states because atmospheric conditions are more favorable for generating thunderstorms. Since thunderstorms are unpredictable, all jurisdictions are equally exposed to these hazards.

Historical Occurrences

Severe Storm Events (Thunderstorm Winds) 1956 – April 2019		
TOTAL: 17 Events	Average Wind Speed: 51	Total Damage: \$18,000

Source: NOAA Storm Events Database

Severe Storm (Hail) Incidents in Charleston County 1957 – April 2019		
Total 21 Events	AVERAGE SIZE: 1.13238	TOTAL DAMAG E: \$0

Source: NOAA Storm Events Database

Probability

Since thunderstorms are unpredictable and can occur any day of the year, all jurisdictions are equally exposed to these hazards, and there is a 100% chance that the area will be hit by severe weather in any given year. The likelihood of hail events depends on the severity of the storm. There have been 16 hail events over the past four years, averaging 4 hail events per year. The vulnerability and impact of the hazard is discussed later in the Plan.

Severe Storm Probability for Each Jurisdiction	
Jurisdiction	Probability
City of Charleston	76-100%

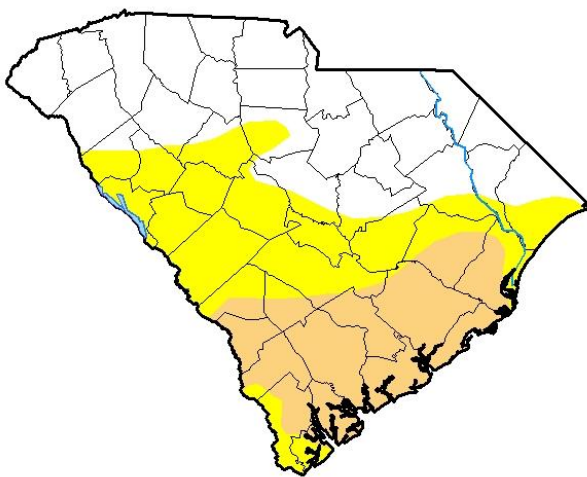
Drought

Location

Droughts typically cover a large area and cannot be confined to any geographic boundary. For this purpose, the whole Charleston Region is vulnerable to the threat of a drought.

U.S. Drought Monitor South Carolina

April 30, 2019
(Released Thursday, May. 2, 2019)
Valid 8 a.m. EDT



	Drought Conditions (Percent Area)					
	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	45.71	54.29	23.20	0.00	0.00	0.00
Last Week 04-23-2019	46.10	53.90	23.13	0.00	0.00	0.00
3 Months Ago 01-29-2019	100.00	0.00	0.00	0.00	0.00	0.00
Start of Calendar Year 01-01-2019	100.00	0.00	0.00	0.00	0.00	0.00
Start of Water Year 09-25-2018	89.90	10.10	1.52	0.00	0.00	0.00
One Year Ago 05-01-2018	60.27	39.73	23.91	0.00	0.00	0.00

Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:

Brad Rippey
U.S. Department of Agriculture



<http://droughtmonitor.unl.edu/>

(An example of the extent of drought that the State experienced in late April 2019)

Historical Occurrences

Year	Number of weeks of Drought Events between May 1, 2013 – April 30, 2019						Description
	Category						
	None	D0 Abnormally Dry	D1 Moderate Drought	D2 Severe Drought	D3 Extreme Drought	D4 Exceptional Drought	
1999-2000	35	17	2	0	0	0	
2000-2001	17	35	19	5	0	0	
2001-2002	4	48	38	32	19	0	
2002-2003	18	34	20	18	13	0	
2003-2004	46	6	0	0	0	0	
2004-2005	32	20	5	0	0	0	
2005-2006	47	5	0	0	0	0	
2006-2007	27	25	3	0	0	0	
2007-2008	0	53	35	12	0	0	

2008-2009	15	37	22	0	0	0	
2009-2010	38	14	2	0	0	0	
2010-2011	29	23	0	0	0	0	
2011-2012	0	53	50	46	39	3	
2012-2013	7	45	20	9	5	0	
2013-2014	32	20	0	0	0	0	The Region experienced 20 weeks in drought stage. 32 weeks of no drought stage were reported and 20 weeks of D0 drought from October to December.
2014-2015	37	15	0	0	0	0	The Region experienced only 15 weeks of D0 drought. During weeks when drought was experienced, only approximately 10-20 percent of the county was affected. 37 weeks of the year, the Region experienced no drought.
2015-2016	36	16	0	0	0	0	The Region experienced 16 weeks of D0 drought. During weeks when drought was experienced, only approximately 10-20 percent of the county was affected. 36 weeks of the year, the Region experienced no drought.
2016-2017	38	14	6	0	0	0	The Region experienced 20 weeks of drought stage. During these 20 weeks, the drought stage remained at D0 for 14 weeks and D1 for 6 weeks. 38 weeks of the year, the Region experienced no drought.
2017-2018	23	29	14	4	0	0	The Region experienced 29 weeks of drought stage D0 and 14 weeks of D1. In addition, 4 weeks were spent at D2; there were 23 weeks where the Region experienced no drought
2018-2019	26	26	10	0	0	0	The Region experienced 36 total drought weeks. 26 weeks were spent at D0 and an additional 10 weeks were spent at D1. The Region was no experiencing a drought for 26 weeks.

Source: U.S. Drought Monitor

According to the U.S. Drought Monitor, the Charleston Region was in the D4 (Exceptional Drought) category for a number of weeks in early 2012 with a Palmer Drought Index of at least -5.0 (Extreme Drought). It is possible for severe and exceptional drought periods to return to the Charleston Region.

Drought Probability for Each Jurisdiction	
Jurisdiction	Probability
City of Charleston	26-50%

Winter Weather

Location

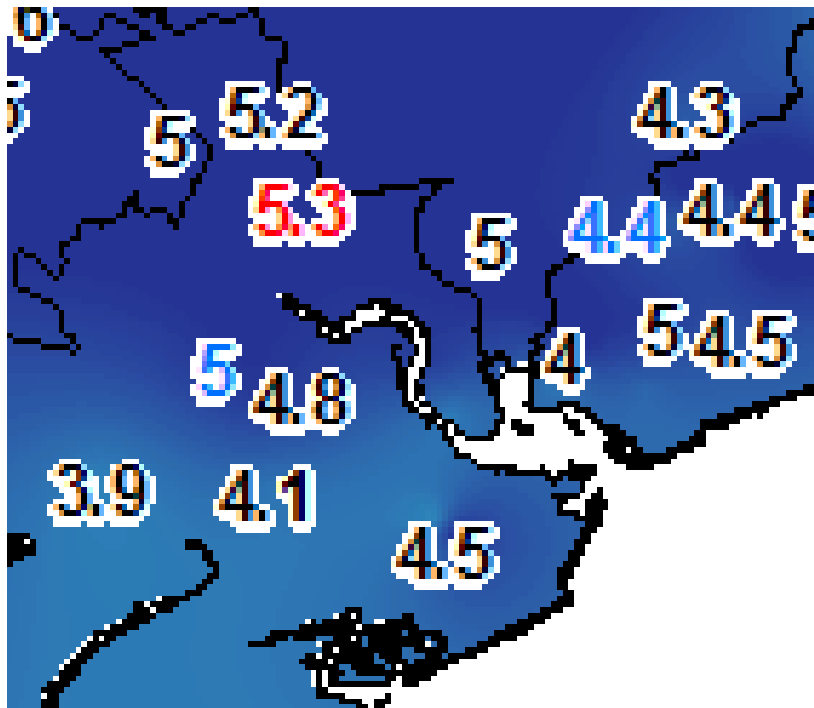
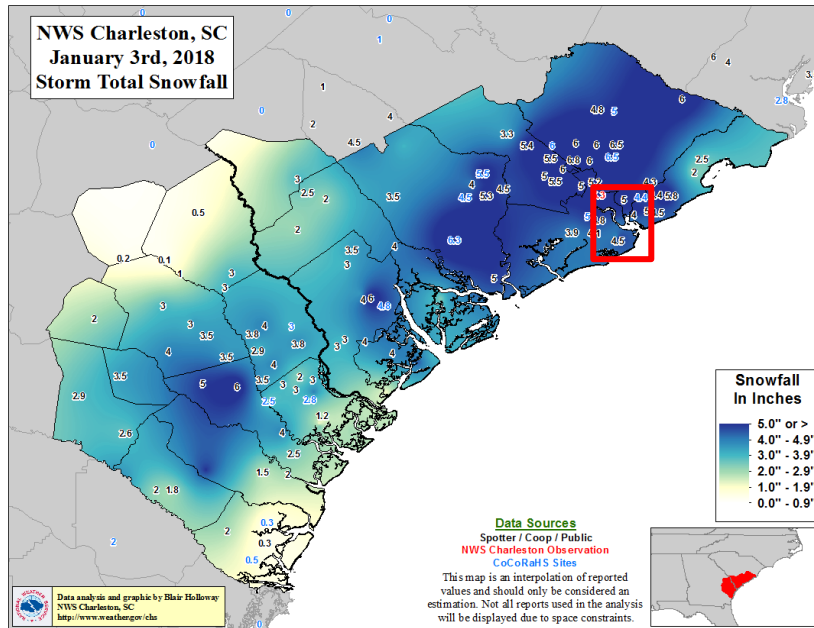
While the Region does not regularly encounter extreme winter storms, some aspects of winter weather occur in the Region annually. With the random nature of this hazard, all jurisdictions are subject to winter weather conditions.

Historical Occurrences

Winter Weather Events Through April 2019	
Total of 10 Events	Total Damage \$233,000

Source: NOAA Climate Data

A rare winter storm affected southeast South Carolina on January 3, 2018. The storm produced a variety of wintry precipitation, including snow, sleet and freezing rain. Charleston Airport (KCHS) measured 5.3 inches of snow, the 3rd greatest daily snowfall on record, just 0.1 inches shy of the 5.4 inches that fell during the 1973 storm (NWS, 2019).



Winter Weather Probability for Each Jurisdiction	
Jurisdiction	Probability
City of Charleston	51-75%

5.3(b) - City of Charleston Problem Assessment

5.3.1 - Hazard Vulnerability

The analysis for this section is identical to the analysis under “Hazard Vulnerability” for Unincorporated Charleston County.

5.3.2 – Vulnerable Buildings

The analysis for this section is identical to the analysis under “Vulnerable Buildings” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-3-9

Building Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
Jurisdiction	Dam Failure	Drought	Earthquakes	Flooding	Hazardous Material Incidents	Hurricanes	Sea Level Rise	Tornadoes	Terrorist Incidents	Tsunamis	Wildfires	Winter Weather
City of Charleston	2	4	2	2	3	2	3	4	2	4	3	-

5.3.3 – Infrastructure Vulnerability

The analysis for this section is identical to the analysis under “Infrastructure Vulnerability” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-3-11

Infrastructure Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
City of Charleston	4	4	1	1	1	1	1	1	3	3	5	5

Problem Statements and Vulnerability Based on Jurisdiction	
Jurisdiction	Vulnerability Assessment
City of Charleston	<p>The assessment of the overall hazard vulnerability is mostly moderate for the City of Charleston. Vulnerability depends on if man-made (intentional) vs. caused (pollution) vs. natural and the location or target of disaster. Many assets are lower priority targets for man-made incidents or the vulnerability may be age related due to construction under lower standards or age related material failures. For the City, the largest problem areas are the downtown peninsular area where flooding and the effects of sea level rise are seen on a weekly basis. The City has also accumulated many repetitive loss properties in recent years (2015-2018). The City is also very vulnerable to hurricanes with residential buildings sitting on the Battery. As the city’s population grows and more tourists and out of state residents settle in the Lowcountry, this poses a vulnerability to our population to be educated on the hazards affecting the City. Earthquakes is another vulnerable hazard in respect to infrastructure and buildings. The City is spread across 4 islands or areas with bridge access required - safety and accessibility of citizens is at risk with an earthquake. This coastal community is also vulnerable to tsunamis.</p>

5.3.4 – Known Flood Damages

The analysis for this section is identical to the analysis under “Known Flood Damages” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-3-12

Loss Statistics for Charleston County as of 9/30/2018					
Jurisdiction	Total Losses	Closed Losses	Open Losses	CWOP Losses	Total Payments
CHARLESTON COUNTY*	4,914	2,770	8	2,136	50,597,589.93
<i>FEMA Policy and Claims Statistics Database, 2019</i>					

City of Charleston Higher Regulatory Standards
Freeboard – currently one foot, expect two feet to be effective later this year
Foundation protection – require compacted fill and protection from erosion and scour
Cumulative substantial improvements – five year requirement
Building code – currently enforce the International Code Series, currently BCEGS classification 3
Manufactured home parks – no elevation exemption for manufactured homes

5.3.5 – Past Flood Impacts

The analysis for this section is identical to the analysis under “Past Flood Impacts” for Unincorporated Charleston County.

5.3.6 – Emergency Warning Needs

The analysis for this section is identical to the analysis under “Emergency Warning Needs” for Unincorporated Charleston County.

5.3.7 – Critical Facilities

The analysis for this section is identical to the analysis under “Critical Facilities” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-3-13

Critical Facility Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
City of Charleston	5	5	2	2	3	2	2	2	3	2	3	4

A full list of the capabilities for Charleston County and plan participating partners can be seen in the “Critical Facilities” description in Section 5.1(b).

5.3.8 – Natural and Beneficial Functions of Floodplains

The analysis for this section is identical to the analysis under “Natural and Beneficial Functions of Floodplains” for Unincorporated Charleston County.

5.3.9 – Development and Population Trends

The analysis for this section is identical to the analysis under “Development and Population Trends” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-3-14

Estimated Population 2017-2018 in Charleston County SC		
Jurisdiction	Growth Rate 2010-2017	Projected 2017 Population
City of Charleston	13.00%	136,208

Source: U.S. Census Bureau, Population Division 2018

Additional summaries of the anticipated future development trends for the local governments within Charleston County, as provided by the local government entities participating in the Charleston Regional Hazard Mitigation Plan, are outlined in “Development and Population Trends” in Section 5.1(b).

5.3.10 – Economic Impact

The analysis for this section is identical to the analysis under “Economic Impact” for Unincorporated Charleston County.

5.3.11 – Resiliency to Hazards

The analysis for this section is identical to the analysis under “Resiliency to Hazards” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Attachment 5-3-C: Repetitive Loss Areas within the Charleston Region

Repetitive Loss Areas			
Street	City, State	Zip Code	Jurisdiction
Aiken Street	Charleston, SC	29401	City of Chas.
Arabian Drive	Charleston, SC	29407	City of Chas.
Ashley Avenue	Charleston, SC	29401	City of Chas.
Ashley Hall Road	Charleston, SC	29401	City of Chas.
Balsam Street	Charleston, SC	29407	City of Chas.
Barre Street	Charleston, SC	29401	City of Chas.
Beaufain Street	Charleston, SC	29401	City of Chas.
Bennett Street	Charleston, SC	29401	City of Chas.
Broad Street	Charleston, SC	29401	City of Chas.
Broughton Street	Charleston, SC	29407	City of Chas.

Repetitive Loss Areas			
Street	City, State	Zip Code	Jurisdiction
Brownswood Road	Johns Island, SC	29464	City of Chas.
Bull Street	Charleston, SC	29401	City of Chas.
Burningtree Road	Charleston, SC	29412-2630	City of Chas.
Calhoun Street	Charleston, SC	29401	City of Chas.
Capri Drive	Charleston, SC	29407	City of Chas.
Cestus Lane	Charleston, SC	29407	City of Chas.
Chadwick Drive	Charleston, SC	29407	City of Chas.
Church Street	Charleston, SC	29401	City of Chas.
Colleton Drive	Charleston, SC	29407	City of Chas.
Curtiss Avenue	Charleston, SC	29401	City of Chas.
Debbenshire Drive	Charleston, SC	29407-3010	City of Chas.
Dolmaine Drive	Charleston, SC	29407	City of Chas.
East Bay Street	Charleston, SC	29401	City of Chas.
Endo Street	Charleston, SC	29407	City of Chas.
Fairway Drive	Charleston, SC	29412	City of Chas.
Falkirk Drive	Charleston, SC	29407-6513	City of Chas.
Fenwick Drive	Charleston, SC	29407	City of Chas.
Fishburne Street	Charleston, SC	29401	City of Chas.
Fleming Road	Charleston, SC	29412	City of Chas.
Franklin Street	Charleston, SC	29401-1909	City of Chas.
Gadsden Street	Charleston, SC	29401	City of Chas.
Gibbes Street	Charleston, SC	29401	City of Chas.
Gordon Street	Charleston, SC	29401	City of Chas.
Hasell Street	Charleston, SC	29401	City of Chas.
Heathwood Street	Charleston, SC	29407	City of Chas.
Juniper Street	Charleston, SC	29407	City of Chas.
King Street	Charleston, SC	29403	City of Chas.
Lamboll Street	Charleston, SC	29401	City of Chas.
Market Street	Charleston, SC	29401	City of Chas.
Meeting Street	Charleston, SC	29401	City of Chas.
Montague Street	Charleston, SC	29401	City of Chas.
Mowler Court	Charleston, SC	29414-7361	City of Chas.
Murray Boulevard	Charleston, SC	29401	City of Chas.
Nicholson Street	Charleston, SC	29407	City of Chas.
North Hanover Street	Charleston, SC	29401	City of Chas.
North Market Street	Charleston, SC	29401	City of Chas.
Nunan Street	Charleston, SC	29401	City of Chas.
Oak Forest Drive	Charleston, SC	29407	City of Chas.
Olivia Drive	Charleston, SC	29418	City of Chas.

Repetitive Loss Areas			
Street	City, State	Zip Code	Jurisdiction
Ophir Drive	Charleston, SC	29407	City of Chas.
Orange Grove Road	Charleston, SC	29407	City of Chas.
Pitt Street	Charleston, SC	29401	City of Chas.
Pratt Street	Charleston, SC	29401	City of Chas.
President Street	Charleston, SC	29401	City of Chas.
Queen Street	Charleston, SC	29401-1950	City of Chas.
Rebellion Road	Charleston, SC	29407	City of Chas.
Rutledge Avenue	Charleston, SC	29401	City of Chas.
Saint Dennis Street	Charleston, SC	29407	City of Chas.
Saint Phillip Street	Charleston, SC	29401	City of Chas.
Sandcroft Drive	Charleston, SC	29407	City of Chas.
Savage Street	Charleston, SC	29401	City of Chas.
Shoreham Road	Charleston, SC	29412-9364	City of Chas.
Smith Street	Charleston, SC	29401	City of Chas.
South Battery Drive	Charleston, SC	29401	City of Chas.
South Market Street	Charleston, SC	29401	City of Chas.
South Sherwood Drive	Charleston, SC	29407	City of Chas.
South Street	Charleston, SC	29401	City of Chas.
State Street	Charleston, SC	29401	City of Chas.
Sunnyvale Drive	Charleston, SC	29407	City of Chas.
Thomas Street	Charleston, SC	29401	City of Chas.
Tradd Street	Charleston, SC	29401	City of Chas.
Trapman Street	Charleston, SC	29401	City of Chas.
Vanderhorst Street	Charleston, SC	29401	City of Chas.
Water Street	Charleston, SC	29401	City of Chas.
Wentworth Street	Charleston, SC	29401	City of Chas.
Windermere Boulevard	Charleston, SC	29407	City of Chas.
Wolk Drive	Charleston, SC	29414	City of Chas.
Yew Street	Charleston, SC	29407	City of Chas.

Attachment 5-3-D: Charleston Region Buildings Vulnerable to Flooding Due to Location in the Special Flood Hazard Area (SFHA) Only

Jurisdiction	Total Site-Built Structures	% of Total Site-Built Structures in the SFHA	Mobile Homes in SFHA *	Residential site-built structures in the SFHA		Commercial Structures in the SFHA		Total Structures in the SFHA (including site-built and mobile homes)	
				A/AE Zone	V/VE Zone	A/AEZ one	V/VEZone	A/AW Zone*	V/VEZone
City of Chas	49,654	54	63	22,092	1,408	3,017	264	25,170	1,674

* Since most mobile homes in Charleston County are treated as vehicles for tax purposes, the determination of “A” or “V” zones for these homes using the Q-3 digital data was not able to be readily performed. All mobile homes in the SFHA are included in the A-zone total for this table, since most jurisdictions in Charleston County restrict mobile homes from the “V” flood zone areas.

Attachment 5-3-E: Charleston Region Buildings Vulnerable to Flooding Due to Year of Construction and Location in the Special Flood Hazard Area (SFHA)

Jurisdiction	Pre-1985 Site-Built Residential Buildings in SFHA	Pre-1985 Commercial Buildings in SFHA	Total Pre-1985 Site-Built Buildings in SFHA	% of All Site-Built Buildings In Jurisdiction Constructed Pre-1985 and in SFHA	Pre-1985 Mobile Homes in SFHA	Total Site-Built Buildings Pre-1985 & Mobile Homes in SFHA
City of Chas	12,858	1,920	14,778	61.09	24	14,802

Attachment 5-3-F: Charleston Region Average Valuation of Buildings and Mobile Homes

Jurisdiction	Avg. Site-Built Residential Building Value	Avg. Commercial Building Value	Avg. Mobile Home Value**	Estimated Total Pre-1985 Site-Built and Mobile Home Building Value	Estimated Pre-1985 Site-Built Building And Mobile Home Value in SFHA (mil.\$)
City of Charleston (All)	\$192,419.88	\$545,835.97	\$5,991.90	\$4,803,656,255.00	
Pre-1985	\$182,207.05	\$306,197.72	\$2,263.64		\$3,235,824,276.00

** Valuation data reflected herein is for mobile homes, regardless of age.

Attachment 5-3-G: Charleston Region Average Valuation of Site-Built Buildings by Flood Zone

Jurisdiction	Total Value "A" Zones Site-Built Structures	Total Value "V" Zones Site-Built Structures(mil\$)	Total Value Site-Built Structures Not in the SFHA (mil\$)	Total Value of Site-Built Structures Not Flood-Zone Coded** (mil\$)
City of Chas	6,187,693,314	820,469,290	4,742,639,308	3,754,298,694

** Valuation data reflected herein is for mobile homes, regardless of age.

5.4(a) - City of Folly Beach

Hurricane

Location

Hurricanes and tropical storms threaten the entire Atlantic and Gulf coast of the United States, as well as the Pacific coast. Hurricanes that originate in the Gulf of Mexico can still impact the Charleston Region. With about 68% of the Charleston Region in the floodplain and some jurisdictions located 100% in the floodplain and with the community being a coastal community, the Region is vulnerable to hurricanes and tropical storms and their aftermaths. Since hurricane landing patterns are unpredictable until the storm has formed and is within a short time from landing, the Region can not presume that past strike history will continue into the future, and all areas within the Region are subject to these types of events.

Occurrences

Hurricane Events between August 11 1940 - April 30 2013			
Name	Category	Date	Damage Description
August 11th, 1940 (Name classification started after 1950)	2	August 11th, 1940	Estimated damage to the city was \$1 million. Sullivan's Island and the City of the Isle of Palms suffered minor damage.
Hurricane Hazel	4	October 15th, 1954	Folly Beach, Sullivan's Island, and the Isle of Palms suffered light property damage and slight beach erosion. The City of Charleston experienced no serious damage.
Hurricane Gracie	3	September 29th, 1959	The total damage inflicted by the storm was estimated at \$14 million. High water marks, which were reported near the Town of Edisto Beach, South Carolina, ranged from 7.3 to 11.9 feet.
Hurricane David	3	August 29th - September 7th, 1979	Flooding and minor damage in the City of Charleston.
Hurricane Hugo	4	September 19th, 1989	Tidal surges north of the city were recorded at 19.8 feet and 11.8 feet in the Peninsula City. The hurricane struck at high tide. Its recorded diameter was over 500 miles, Four (4) people were killed and scores injured. Estimated damage of \$7 billion for the total area.
Hurricane Bertha	2	July 12th, 1996	This hurricane came close but did not cause any significant damage. Some coastal areas experienced moderate beach erosion. Tourism estimated loss revenue of 20 million dollars.
Hurricane Fran	3	September 5th, 1996	The storm didn't directly hit the Charleston Region but remnants of this hurricane created power outages with economic losses estimated at 20 million dollars.
Hurricane Bonnie	3	August 26th, 1998	Remnants of this hurricane produced winds that knocked down several trees in the Town of Mount Pleasant as it headed for the North Carolina Coast.
Hurricane Floyd	2	September 15th, 1999	Sustained winds of 58 miles per hour were recorded in downtown Charleston with gusts up to 85 miles per hour. Generally 3-5 inches of rainfall occurred. An estimated \$10.5 million in damages occurred in the Charleston region.
Hurricane Irene	1	October 17th, 1999	This hurricane dropped 3 to 5 inches of rain created minor street flooding. Minor beach erosion. Trees knocked down and power outages in the area.
Tropical Storm Gordon		September 18th, 2000	Remnants of the storm dropped 6-10 inches of rain. Minor beach erosion occurred as a result of this storm.
Tropical Storm Claudette		July 14th, 2003	Two and a half inches of rain, a tree was downed, 11 traffic accidents.
Tropical Depression Seven		July 25th, 2003	Expected to receive as much as 6 inches of rain and wind gusts up to 35 mph from this storm.
Tropical Storm Henri		September 6th, 2003	Folly Beach, Sullivan's Island, and Isle of Palms experienced beach erosion from remnants of the storm, which was predicted to also bring up to 5 inches of rain to the Charleston area.
Hurricane Isabel	2	September 17th, 2003	This storm created 8 foot surf at Kiawah Island and had wind gusts of 40 mph offshore and 20 mph in downtown Charleston when it passed offshore. Coastal erosion was expected, as tides were 6 to 12 inches above normal.
Tropical Storm Alex		August 2nd, 2004	Minor beach erosion was reported on Folly Beach.
Tropical Storm Bonnie		August 12th, 2004	The remnants of this storm caused a tornado and several incidents of wind damage in the Awendaw area.
Hurricane Charley	1	August 14-15th, 2004	An estimated 4 inches of rain fell in 2 hours in the Northern part of Charleston County on August 14, 2004, flooding low lying areas and areas with poor drainage. Storm surge was estimated at 4-6 feet from Oyster Landing to the Cape Romain Wildlife Refuge in the northern portions of Charleston County. Minor property and tree damage occurred as a result of this storm. The storm caused an estimated damage of \$2 million in South Carolina.
Hurricane Gaston	1	August 29th, 2004	Sustained winds of 75 mph. The storm brought a 4 foot storm surge into Bull's Bay, which caused an estimated \$4.8 million in damages to homes, primarily in areas east of the Cooper River creating debris with an estimated clean-up cost of \$2.2 million county-wide, and left nearly all of the customers of South Carolina Electric and Gas without electrical power. Total estimated damages, per the National Weather Service, were \$7.6 million in Charleston County.

Tropical Storm Frances		September 6th, 2004	This storm created nearly 6 ft. surf. Dropped nearly 5 inches of rain, winds of 35 mph, minor damage and flooding.
Tropical Depression Jeanne		September 27th, 2004	Resulted in 40 ft. of beach erosion on the north end of Folly Beach. Maximum wind gusts in Charleston County from this storm were 41 mph in downtown Charleston and at the Charleston airport. Maximum wind gusts at Folly Beach were 38 mph. Non-tornadic damage was limited to a few trees falling on cars.
Tropical Storm Ophelia		September 13th, 2005	Loss of Life, Beach Erosion, minor damage.
Tropical Storm Tammy		October 5th, 2005	Significant Beach Erosion, flooding, minor damage.
Tropical Storm Alberto		June 13th, 2006	Remnants of the storm produced a tornado that touched down near Awendaw, knocking down trees. Street flooding occurred in Charleston and North Charleston as a result of this storm.
Tropical Storm Ernesto		August 31st, 2006	Mt. Pleasant received 6.65 inches of rainfall from this storm system. Street flooding occurred in the City of Charleston and 40 mph gusts.
Tropical Storm Barry		June 2nd, 2007	Remnants of the storm produced heavy rains, strong winds, rough surf, and 3 inches of rain. Loss of electricity to 13,900 customers of SCE&G and Berkeley Electric Cooperative, mostly in the Summerville area, which caused vessels to break their lines, and flood streets, particularly on the Charleston Peninsula. Wind gusts up to 60 mph were recorded.
Tropical Storm Hanna		September 5th, 2008	Resulting in strong wind and localized heavy rain.
Tropical Storm Irene		August 25th, 2011	The Charleston County Folly Beach Park received significant erosion-related damages as a result of this storm, including beach areas and structures.
Tropical Storm Lee		September 6th, 2011	Charleston County sustained scattered showers, thunderstorms, and winds up to 22 mph with a half-inch of rain in some areas.
Tropical Storm Beryl		May 27th, 2012	The region saw tropical storm forced winds, heavy rainfall, and fallen trees as result of the storm.
Tropical Storm Sandy		October 27th, 2012	The storm produced forced winds of 40 mph.

Hurricane Events between May 1, 2013 – January 31, 2019

Name	Category	Date	Damage Description
Tropical Storm Andrea		June 6, 2013	Heavy rainfall 3-7 inches
Tropical Storm Arthur		July 3, 2014	Tropical storm watch was posted for Santee River to Bogue Banks, NC. Wind gusts up to 42 mph (68 km/h) along coastal areas, resulting in scattered power outages
Tropical Storm Ana		May 7-8, 2015	Tropical storm warning from South Santee River to Surf City, NC. Produced a small storm surge along Charleston County coast.
Hurricane Joaquin	4	October 1-5, 2015	Did not make landfall in the US, but caused catastrophic flooding in South Carolina and intense flooding and power outages in Charleston County. South Carolina Governor Haley declared a State of Emergency.
Hurricane Matthew	1	October 7-8, 2016	Once a Category 5 hurricane before ripping through Haiti and eastern Cuba, Hurricane Matthew had downgraded to a Category 1 by the time it hit South Carolina. Even so, 830,000 South Carolinians lost power, 355,000 evacuated from their homes, and 4 lost their lives.
Hurricane Irma	1	9/11-9/12/2017	Once a Category 5 hurricane before ripping through the Caribbean, Hurricane Irma had downgraded to a Category 1, and eventually a tropical storm, by the time the system impacted South Carolina. Even so, over 100,000 South Carolinians lost power, 3 lost their lives, and Charleston recorded its third highest storm surge ever (10ft).
Hurricane Florence	1	9/14/2018	Once a Category 4 hurricane before making landfall north of Charleston County, this storm impacted Charleston County as a tropical depression. No lives were lost in Charleston County although thousands of residents lost power during the storm's peak.

Hurricane Michael	4	10/11/2018	Making landfall as a Category 4 hurricane in Florida's Bay County, this storm impacted Charleston County by bringing 50 mph winds which dismantled many trees and power lines plus a storm surge measured at 2.07 ft in Charleston Harbor. Charleston County saw no lost lives, although the storm directly caused 16 casualties and 43 indirectly, according to the NOAA.
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Hurricane Probability for each Jurisdiction	
Jurisdiction	Probability
City of Folly Beach	51-75%

Flood

Location

Flooding can occur throughout most of the Charleston Region since around 68% resides within a floodplain. Floodplains are designated by the frequency of the flood that is large enough to cover them. Flood frequencies are determined by plotting a graph of the size of all known floods for an area and calculating how often floods occur. The Federal Emergency Management Agency (FEMA) identifies floodplain areas by producing Flood Insurance Rate Maps (FIRM). These maps show all locations near major bodies of water, and show base flood elevations and floodplain boundaries like the 100-year floodplain boundaries. 100-year flood event is a 1% probability of occurring in any given year. The roughly 68% of the areas located in the floodplain are exposed to the threat of floods but that does not mean the other areas are not vulnerable to a flash flood or flooding events. Damaged infrastructure and roadways can limit mobility for citizens. All areas can experience flooding hazards.

Below is a list of areas of concern for flooding.

Jurisdiction Not Serviced by Charleston County	
Jurisdiction	Area
City of Folly Beach	Tabby Lane
	9 th , 10 th , 11 th Block East Arctic
	6 th , 7 th Block East Ashley
	12 th Block East Ashley
	9 th , 10 th , 11 th Block East Cooper
	10 th Block East Erie
	Seacrest Lane
	4 th Block East Indian
	2 nd , 3 rd Block East Erie
	1 st , 2 nd , 3 rd block East Huron
	1 st block East Indian
	Center Street between Ashley and Arctic Ave
	1 st , 2 nd , 3 rd 4 th Block West Indian
	Shadow Race Lane, Sandbar Lane, and Michigan Avenue
	2 nd Block West Hudson
5 th , 6 th , 9 th and 10 th Block West Ashley Ave	
9 th Street West and Red Sunset	

	Folly Road at Folly Creek Bridge (north side of bridge) during storms and King tides
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Historical Occurrences

Flooding Events Between Jan 1, 1950 – April 30, 2019	
Total: 3 Events	Total Damage: \$20,000

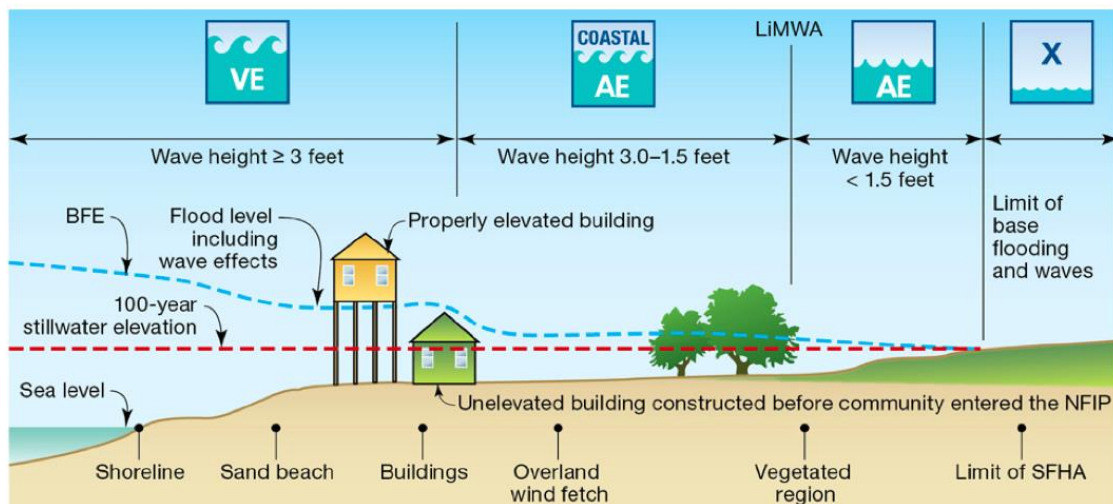
These flooding events were mainly the result from heavy rain or severe weather (thunderstorms, tropical storms, heavy rain) incidents that caused flooding in the Charleston Region. Charleston broke its record for number of annual-flood days last year. The previous record of 38 days, observed in 2015, was exceeded by 12 days for a total of 50 annual-flood days in 2016. Compared to 1995, trends in flooding during 2016 have increased by 130 percent on average.

Flooding Probability for each Jurisdiction	
Jurisdiction	Probability
City of Folly Beach	76-100%

Sea Level Rise

Location

Flooding and tidal flooding is a good indicator of what areas are most at risk for sea level rise and the stressors that accompany it: nuisance flooding, increased storm surge, loss of property. Land in the most susceptible flood zones (AE and VE) will be most affected as sea level continues to rise. Areas of the most susceptibility include Eastern Folly Beach and Morris Island.



Amount of Land Area of Charleston County Above Sea Level										
Elevation above spring high water (m)	0.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00
Area of Land (sq. km)	108.6	175.5	223	305.5	344.2	421.8	464.9	587.2	684.4	858.2
Percent of Total Land Cover	4.6%	7.4%	9.4%	12.9%	14.5%	17.8%	19.6%	24.8%	28.9%	36.2%

Occurrences

King tides, which is the above average high tide occurring when once a lunar cycle, are a good predictor of sea level rise. On average there were over twice as many observed tides than predicted tides. The depth averaged more than a foot deeper than expected. There were 28 more king tides than predicted in 2018 and the highest observed tide was over a foot and a half higher than the highest predicted tide. King tides give a community a glimpse into what it will be like to live with a higher sea level. Communities can expect more king tides in the future as sea level continues to rise.

Duration and Depth* of King Tides in Charleston Area from January 2014 – December 2019				
Year	Predicted Number of Tides	Observed Number of Tides	Highest Predicted Tide (ft)	Highest Observed Tide (ft)
2014	28	46	7	7.6
2015	40	111	7.2	8.7
2016	49	82	7.2	7.9
2017	34	111	7	9.9
2018	44	72	6.9	8.8
Average	39	84.4	7.06	8.58
Total	195	422	35.3	42.9

*Depth is based off of the Charleston Harbor Tide Gauge

**Available data from 2014 onwards gathered through MyCoast.org backed by SC DHEC:

<https://mycoast.org/sc/king-tides>

Sea Level Rise/King Tide Probability for each Jurisdiction	
Jurisdiction	Probability
City of Folly Beach	76-100%

Tsunami

Location

A tsunami poses the threat on all coastal communities even though tsunamis are generally considered to be a significant hazard threat primarily for land areas near the Pacific Ocean, and are considered to be a rare phenomenon in the Atlantic Ocean. Historical evidence does

indicate that tsunamis have affected the Eastern United States but are not the result of traditional sources of tsunami waves (i.e., subduction zones such as the Cascadia Subduction Zone in the Pacific Ocean). They are typically the result of slumping or land sliding associated with local earthquakes or with wave action associated with strong storms such as hurricanes. Other possible causes of tsunami-like activity along the East Coast could include explosive decompression of underwater methane deposits, the impact of a heavenly body (i.e., an asteroid, comet or oceanic meteor splashdown), or a large underwater explosion. The Charleston County area is not an “at-risk” area for a significant type of Atlantic Ocean tsunamis. Consequently, the Charleston County area would not generally be expected to experience a tsunami but as with any coastal community along the Atlantic Ocean, there is still an extremely remote chance of events happening that can cause a tsunami.

Historical Occurrences

With the report of 1 event with limited information on damage and extent which was likely tied to the record earthquake that occurred on August 31st, 1886, the Charleston Region hasn’t experienced any tsunami events since. Through the National Climatic Data Center from National Oceanic and Atmospheric Administration (NOAA), the database shows zero events from the years 2008 through April 30th, 2019.

Tsunami Probability for Each Jurisdiction	
Jurisdiction	Probability
City of Folly Beach	0-25%

Rip Current

Location

The Charleston Region stretches nearly 100 miles along the Atlantic Ocean. The Region’s beaches are prone to rip currents daily leaving citizens who enjoy the beaches vulnerable to this threat. This type of hazard does not cost damage to buildings or infrastructure but it continues to take lives of residents and visitors on an annual basis. Since majority of people in the Region will experience being around the water at some point, the whole Region can be affected.

Historical Occurrences

According to the National Oceanic and Atmospheric Administration (NOAA) and the National Climatic Data Center (NCDC), rip currents will be listed in Storm Data only when they cause a drowning(s), near-drowning(s), result in numerous rescues (i.e., 5 or more at one beach community), or damage watercraft. Events associated with other surf-related currents, such as long-shore or tidal currents, will not be included in Storm Data as Rip Current events. Rip currents can occur any time and any place along beaches or in other bodies of water.

Charleston County Severe Rip Tide Occurrences from January 1, 1950 – April 30th, 2019
Total: 5 Rip Current Events with 0 Deaths and 3 Reported Injuries

Rip Current Probability for Each Jurisdiction	
Jurisdiction	Probability
City of Folly Beach	76-100%

Severe Storm

Location

A thunderstorm event is an atmospheric hazard, and has no geographic boundaries. They can occur in all regions of the United States however, thunderstorms are most common in the central and southern states because atmospheric conditions are more favorable for generating thunderstorms. Since thunderstorms are unpredictable, all jurisdictions are equally exposed to these hazards.

Historical Occurrences

Severe Storm Events (Thunderstorm Winds) 1956 – April 2019		
TOTAL: 7 Events	Average Wind Speed: 54	Total Damage: \$32,000

Source: NOAA Storm Events Database

Severe Storm (Hail) Incidents in Charleston County 1957 – April 2019		
Total: 3 Events	AVERAGE SIZE: 0.88	TOTAL DAMAG E: \$ 0

Source: NOAA Storm Events Database

Severe Storm (Lightning) Incidents in Charleston County 1998 – April 2019	
Total: 1 Event	Total Damage: \$3,000

Probability

Since thunderstorms are unpredictable and can occur any day of the year, all jurisdictions are equally exposed to these hazards, and there is a 100% chance that the area will be hit by severe weather in any given year. The likelihood of hail events depends on the severity of the storm. There have been 16 hail events over the past four years, averaging 4 hail events per year. The vulnerability and impact of the hazard is discussed later in the Plan.

Severe Storm Probability for Each Jurisdiction	
Jurisdiction	Probability
City of Folly Beach	76-100%

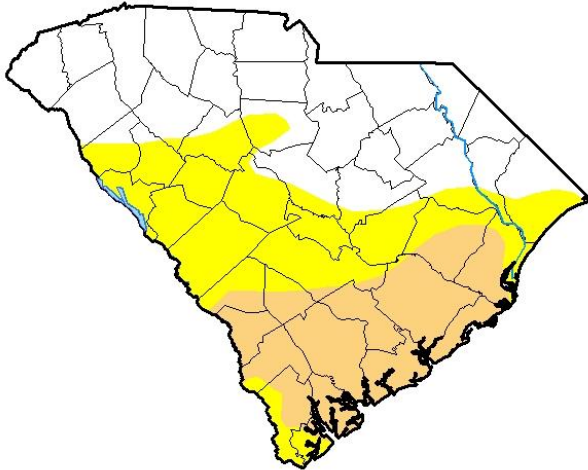
Drought

Location

Droughts typically cover a large area and cannot be confined to any geographic boundary. For this purpose, the whole Charleston Region is vulnerable to the threat of a drought.

U.S. Drought Monitor South Carolina

April 30, 2019
(Released Thursday, May 2, 2019)
Valid 8 a.m. EDT



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	45.71	54.29	23.20	0.00	0.00	0.00
Last Week 04-23-2019	46.10	53.90	23.13	0.00	0.00	0.00
3 Months Ago 01-29-2019	100.00	0.00	0.00	0.00	0.00	0.00
Start of Calendar Year 01-01-2019	100.00	0.00	0.00	0.00	0.00	0.00
Start of Water Year 09-25-2018	89.90	10.10	1.52	0.00	0.00	0.00
One Year Ago 05-01-2018	60.27	39.73	23.91	0.00	0.00	0.00

Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:

Brad Rippey
U.S. Department of Agriculture



<http://droughtmonitor.unl.edu/>

(An example of the extent of drought that the State experienced in late April 2019)

Historical Occurrences

Year	Number of weeks of Drought Events between May 1, 2013 – April 30, 2019						Description
	None	D0 Abnormally Dry	D1 Moderate Drought	D2 Severe Drought	D3 Extreme Drought	D4 Exceptional Drought	
1999-2000	35	17	2	0	0	0	
2000-2001	17	35	19	5	0	0	
2001-2002	4	48	38	32	19	0	
2002-2003	18	34	20	18	13	0	
2003-2004	46	6	0	0	0	0	
2004-2005	32	20	5	0	0	0	
2005-2006	47	5	0	0	0	0	
2006-2007	27	25	3	0	0	0	
2007-2008	0	53	35	12	0	0	
2008-2009	15	37	22	0	0	0	
2009-2010	38	14	2	0	0	0	
2010-2011	29	23	0	0	0	0	
2011-2012	0	53	50	46	39	3	
2012-2013	7	45	20	9	5	0	
2013-2014	32	20	0	0	0	0	The Region experienced 20 weeks in drought stage. 32 weeks of no drought stage were reported and 20 weeks of D0 drought from October to December.
2014-2015	37	15	0	0	0	0	The Region experienced only 15 weeks of D0 drought. During weeks when drought was experienced, only approximately 10-20 percent of the county was affected. 37 weeks of the year, the Region experienced no drought.
2015-2016	36	16	0	0	0	0	The Region experienced 16 weeks of D0 drought. During weeks when drought was experienced, only approximately 10-20 percent of the county was

							affected. 36 weeks of the year, the Region experienced no drought.
2016-2017	38	14	6	0	0	0	The Region experienced 20 weeks of drought stage. During these 20 weeks, the drought stage remained at D0 for 14 weeks and D1 for 6 weeks. 38 weeks of the year, the Region experienced no drought.
2017-2018	23	29	14	4	0	0	The Region experienced 29 weeks of drought stage D0 and 14 weeks of D1. In addition, 4 weeks were spent at D2; there were 23 weeks where the Region experienced no drought
2018-2019	26	26	10	0	0	0	The Region experienced 36 total drought weeks. 26 weeks were spent at D0 and an additional 10 weeks were spent at D1. The Region was no experiencing a drought for 26 weeks.

Source: U.S. Drought Monitor

According to the U.S. Drought Monitor, the Charleston Region was in the D4 (Exceptional Drought) category for a number of weeks in early 2012 with a Palmer Drought Index of at least -5.0 (Extreme Drought). It is possible for severe and exceptional drought periods to return to the Charleston Region.

Drought Probability for Each Jurisdiction	
Jurisdiction	Probability
City of Folly Beach	26-50%

Winter Weather

Location

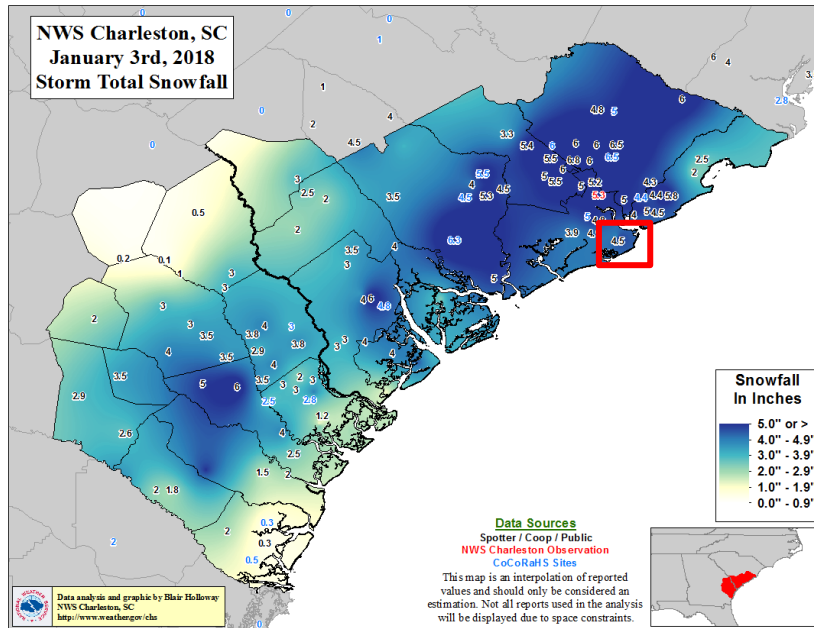
While the Region does not regularly encounter extreme winter storms, some aspects of winter weather occur in the Region annually. With the random nature of this hazard, all jurisdictions are subject to winter weather conditions.

Historical Occurrences

Winter Weather Events Through April 2019	
Total of 10 Events	Total Damage: \$233,000

Source: NOAA Climate Data

A rare winter storm affected southeast South Carolina on January 3, 2018. The storm produced a variety of wintry precipitation, including snow, sleet and freezing rain. Charleston Airport (KCHS) measured 5.3 inches of snow, the 3rd greatest daily snowfall on record, just 0.1 inches shy of the 5.4 inches that fell during the 1973 storm (NWS, 2019).



Winter Weather Probability for Each Jurisdiction	
Jurisdiction	Probability
City of Folly Beach	51-75%

5.4(b) – City of Folly Beach Problem Assessment

5.4.1 – Hazard Vulnerability

The analysis for this section is identical to the analysis under “Hazard Vulnerability” for Unincorporated Charleston County.

5.4.2 – Vulnerable Buildings

The analysis for this section is identical to the analysis under “Vulnerable Buildings” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-9

Building Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
Jurisdiction	Dam Failure	Drought	Earthquakes	Flooding	Hazardous Material Incidents	Hurricanes	Sea Level Rise	Tornadoes	Terrorist Incidents	Tsunamis	Wildfires	Winter Weather
City of Folly Beach	5	3	2	1	3	1	1	1	3	1	3	3

5.4.3 – Infrastructure Vulnerability

The analysis for this section is identical to the analysis under “Infrastructure Vulnerability” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-4-11

Infrastructure Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
City of Folly Beach	5	5	3	1	3	1	1	3	1	1	5	4

Problem Statements and Vulnerability Based on Jurisdiction	
Jurisdiction	Vulnerability Assessment
City of Folly Beach	City of Folly Beach is coastal beach town with many low lying areas and dated buildings. Sea level rise, hurricanes and flooding are the top vulnerabilities for the City. There is one access and one potable water supply to the Island from HWY 171 and a flooded roadway or failed bridge could be catastrophic. Also rip currents can occur on windy days and can be life threatening. This coastal community is also vulnerable to tsunamis.

5.4.4 – Known Flood Damages

The analysis for this section is identical to the analysis under “Known Flood Damages” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-4-12

Loss Statistics for Charleston County as of 9/30/2018					
Jurisdiction	Total Losses	Closed Losses	Open Losses	CWOP Losses	Total Payments

FOLLY BEACH, CITY OF	1,244	894	2	348	17,387,774.07
FEMA Policy and Claims Statistics Database, 2019					

City of Folly Beach Higher Regulatory Standards
2' freeboard
Increase beach (40') and marsh (15') set-backs.
V-zone standards for design and construction for the whole jurisdiction regardless of flood zone for insurance purposes.
IMPC adopted by the jurisdiction.
35' height limit above BFE.
15% open space requirement for new development.
90% Single family zoning
35% max lot coverage of impervious surfaces.
No impervious driveways allowed in the jurisdiction.
Automatic sprinklers systems required for Multi Family and commercial in the commercial district.

5.4.5 - Past Flood Impacts

The analysis for this section is identical to the analysis under “Past Flood Impacts” for Unincorporated Charleston County.

5.4.6 - Emergency Warning Needs

The analysis for this section is identical to the analysis under “Emergency Warning Needs” for Unincorporated Charleston County.

5.4.7 - Critical Facilities

The analysis for this section is identical to the analysis under “Critical Facilities” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-4-13

Critical Facility Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
City of Folly Beach	5	5	4	4	4	4	4	3	4	-	5	3

A full list of the capabilities for Charleston County and plan participating partners can be seen in the “Critical Facilities” description in Section 5.1(b).

5.4.8 – Natural and Beneficial Functions of Floodplains

The analysis for this section is identical to the analysis under “Natural and Beneficial Functions of Floodplains” for Unincorporated Charleston County.

5.4.9 – Development and Population Trends

The analysis for this section is identical to the analysis under “Development and Population Trends” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-4-14

Estimated Population 2017-2018 in Charleston County SC		
Jurisdiction	Growth Rate 2010-2018	Projected 2018 Population
City of Folly Beach	0.91%	2,641

Source: U.S. Census Bureau, Population Division 2018

Additional summaries of the anticipated future development trends for the local governments within Charleston County, as provided by the local government entities participating in the Charleston Regional Hazard Mitigation Plan, are outlined in “Development and Population Trends” in Section 5.1(b).

5.4.10 – Economic Impact

The analysis for this section is identical to the analysis under “Economic Impact” for Unincorporated Charleston County.

5.4.11 – Resiliency to Hazards

The analysis for this section is identical to the analysis under “Resiliency to Hazards” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Attachment 5-4-C: Repetitive Loss Areas within the Charleston Region

Repetitive Loss Areas			
Street	City, State	Zip Code	Jurisdiction
East Arctic Avenue	Folly Beach, SC	29439	Folly Beach
East Ashley Avenue	Folly Beach, SC	29439	Folly Beach
West Ashley Avenue	Folly Beach, SC	29439	Folly Beach
East Cooper Avenue	Folly Beach, SC	29439	Folly Beach
East Indian Avenue	Folly Beach, SC	29439	Folly Beach

Attachment 5-4-D: Charleston Region Buildings Vulnerable to Flooding Due to Location in the Special Flood Hazard Area (SFHA) Only

Jurisdiction	Total Site-Built Structures	% of Total Site-Built Structures in the SFHA	Mobile Homes in SFHA *	Residential site-built structures in the SFHA	Commercial Structures in the SFHA	Total Structures in the SFHA (including site-built and mobile homes)

			SFHA	A/A E Zone	V/VE Zone	A/AEZone e	V/VEZone e	A/AW Zone*	V/VEZone e
Folly Beach	2,552	88	0	985	1,17 3	50	37	1,03 5	1,210

* Since most mobile homes in Charleston County are treated as vehicles for tax purposes, the determination of “A” of “V” zones for these homes using the Q-3 digital data was not able to be readily performed. All mobile homes in the SFHA are included in the A-zone total for this table, since most jurisdictions in Charleston County restrict mobile homes from the “V” flood zone areas.

Attachment 5-4-E: Charleston Region Buildings Vulnerable to Flooding Due to Year of Construction and Location in the Special Flood Hazard Area (SFHA)

Jurisdiction	Pre-1985 Site-Built Residential Buildings in SFHA	Pre-1985 Commercial Buildings in SFHA	Total Pre-1985 Site-Built Buildings in SFHA	% of All Site-Built Buildings In Jurisdiction Constructed Pre-1985 and in SFHA	Pre-1985 Mobile Homes in SFHA	Total Site-Built Buildings Pre-1985 & Mobile Homes in SFHA
Folly Beach	901	57	958	98.97	0	958

Attachment 5-4-F: Charleston Region Average Valuation of Buildings and Mobile Homes

Jurisdiction	Avg. Site-Built Residential Building Value	Avg. Commercial Building Value	Avg. Mobile Home Value**	Estimated Total Pre-1985 Site-Built and Mobile Home Building Value	Estimated Pre-1985 Site-Built Building And Mobile Home Value in SFHA (mil.\$)
Folly Beach (All)	\$196,004.72	\$80,930.12	N/A	\$111,144,499.00	
Pre-1985 only	\$117,748.45	\$74,406.67	\$0.00		\$110,362,899.00

** Valuation data reflected herein is for mobile homes, regardless of age.

Attachment 5-4-G: Charleston Region Average Valuation of Site-Built Buildings by Flood Zone

Jurisdiction	Total Value “A” Zones Site-Built Structures	Total Value “V” Zones Site-Built Structures(mil\$)	Total Value Site-Built Structures Not in the SFHA (mil\$)	Total Value of Site-Built Structures Not Flood-Zone Coded** (mil\$)
Folly Beach	176,129,399	265,334,399	21,185,300	0

** Valuation data reflected herein is for mobile homes, regardless of age.

5.5(a) - Town of Hollywood

Flood

Location

Flooding can occur throughout most of the Charleston Region since around 68% resides within a floodplain. Floodplains are designated by the frequency of the flood that is large enough to cover them. Flood frequencies are determined by plotting a graph of the size of all known floods for an area and calculating how often floods occur. The Federal Emergency Management Agency (FEMA) identifies floodplain areas by producing Flood Insurance Rate Maps (FIRM). These maps show all locations near major bodies of water, and show base flood elevations and floodplain boundaries like the 100-year floodplain boundaries. 100-year flood event is a 1% probability of occurring in any given year. The roughly 68% of the areas located in the floodplain are exposed to the threat of floods but that does not mean the other areas are not vulnerable to a flash flood or flooding events. Damaged infrastructure and roadways can limit mobility for citizens. All areas can experience flooding hazards.

Below is a list from each participant in the plan for areas of concern for flooding.

<i>Jurisdictions Serviced by Charleston County</i>	<i>Area</i>
Town of Hollywood	Baptist Hill Road and Toogoodoo Road
	Toogoodoo and Kings Path
	Toogoodoo and Sam King
	Toogoodoo and Erica Place

Historical Occurrences

Flooding Events Between Jan 1, 1950 – April 30, 2019	
Total: 1 Severe Event	Total Damage: \$ 0

These flooding events were mainly the result from heavy rain or severe weather (thunderstorms, tropical storms, heavy rain) incidents that caused flooding in the Charleston Region. Charleston broke its record for number of annual-flood days last year. The previous record of 38 days, observed in 2015, was exceeded by 12 days for a total of 50 annual-flood days in 2016. Compared to 1995, trends in flooding during 2016 have increased by 130 percent on average.

Probability

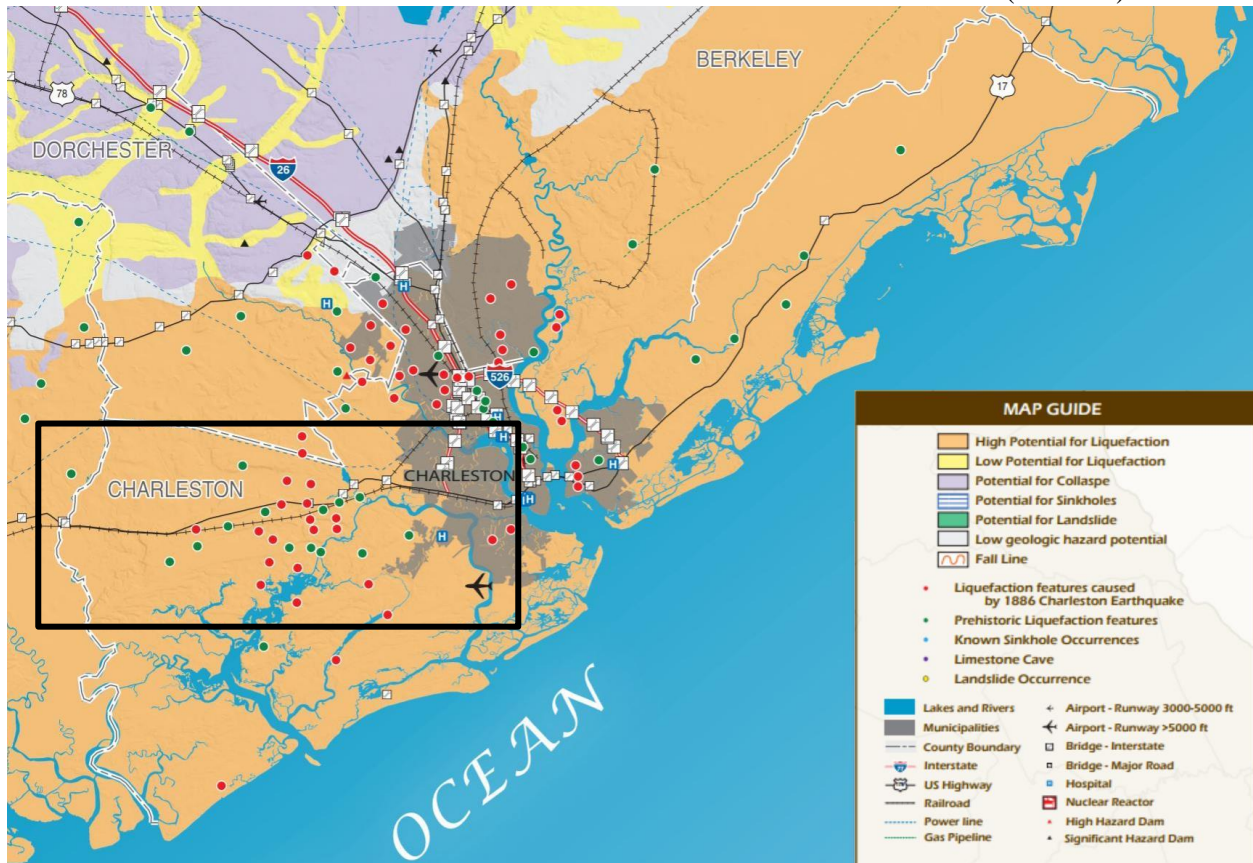
Since about 68% of the Region is within the floodplain, those areas are highly likely to experience a flood event at any given point in a given year. Some portions of all jurisdictions (City of North Charleston, Hollywood, Mt. Pleasant) except for Lincolnville have some areas that would experience coastal flooding. Areas that are inland and/or have less area that is coastal, have a high probability of flooding. The vulnerability and impact of the hazard is discussed later in the Plan.

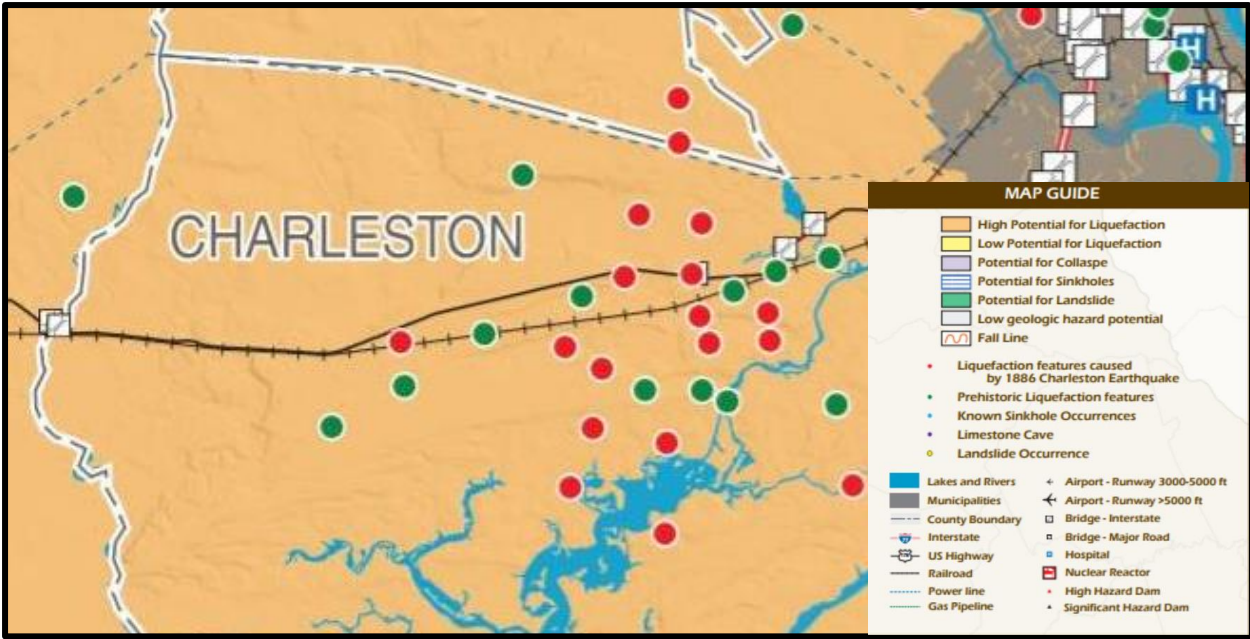
Flooding Probability for each Jurisdiction	
Jurisdiction	Probability
Town of Hollywood	51-75%

Earthquake

Location

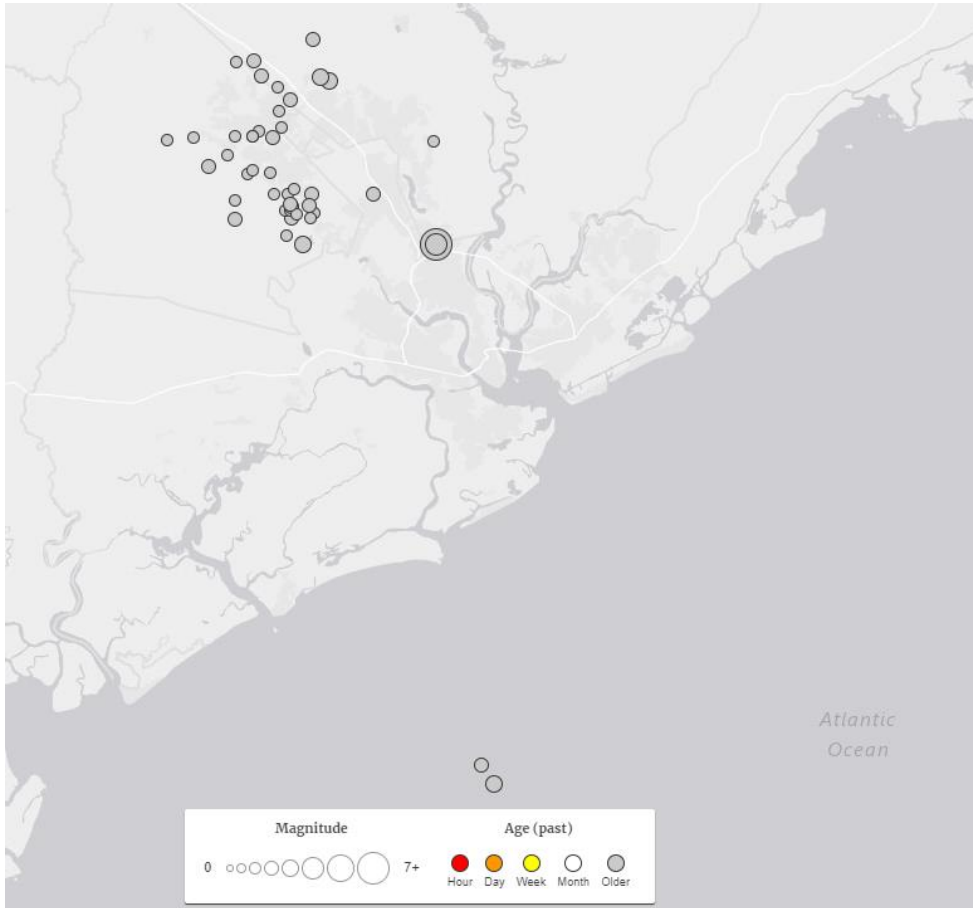
Earthquakes are not an uncommon occurrence in South Carolina. The majority of earthquakes worldwide occur at plate boundaries when plates stick and then jump past each other. The cause of earthquakes in South Carolina is not so clear; the quakes are located within a plate rather than at a plate boundary. In South Carolina, approximately 70 percent of the earthquakes occur in the Coastal Plain and most are located around three areas west and north of Charleston: Ravenel-Adams Run-Hollywood, Middleton Place - Summerville, and Bowman. Geologically, Charleston lies in one of the most seismically active areas in the Eastern United States. This seismic cluster is known as the Middleton Place - Summerville Seismic Zone (MPSSZ).





Source: SC DNR Geologic Hazard of the South Carolina Coastal Plain 2012

Historical Occurrences



Source: USGS Latest Earthquakes 1800-to-date

Time*	Depth	Magnitude	Location
1817-01-08T09:00:00.000Z	h	5	South Carolina
1886-09-01T02:51:00.000Z		7.03	South Carolina

Time*	Depth	Magnitude	Location
1959-08-03T06:08:37.200Z	1	4.4	South Carolina
1974-11-22T05:25:55.500Z	18	4.7	South Carolina
1977-01-18T18:29:13.500Z	5	3	South Carolina
1977-12-15T07:15:55.000Z	9	2.5	South Carolina
1977-12-15T19:16:43.100Z	9	3	South Carolina
1978-09-07T22:53:22.300Z	11	2.7	South Carolina
1979-12-07T05:43:35.000Z	15	2.9	South Carolina
1980-09-01T05:44:42.300Z	6	2.7	South Carolina
1981-03-19T04:33:55.720Z	0.1	2.5	South Carolina
1982-03-01T03:33:13.560Z	6.7	3	South Carolina
1983-11-06T09:02:19.820Z	9.6	3.3	South Carolina
1986-09-17T09:33:49.460Z	7.7	2.6	South Carolina
1988-01-23T01:57:16.390Z	7.4	3.3	South Carolina
1989-01-02T16:35:16.270Z	4.9	2.6	South Carolina
1990-02-07T07:41:39.920Z	9.3	2.7	South Carolina
1990-05-11T18:23:33.950Z	6.1	2.6	South Carolina
1990-11-13T15:22:13.010Z	3.4	3.2	South Carolina
1992-08-21T16:31:55.160Z	10	4.1	South Carolina
1995-04-17T13:45:57.800Z	10	3.9	South Carolina
1999-03-29T14:49:36.510Z	5	2.9	South Carolina
2002-11-08T13:29:03.190Z	3.9	3.5	South Carolina
2002-11-11T23:39:29.720Z	2.4	4	South Carolina

Time*	Depth	Magnitude	Location
2003-02-28T07:02:36.500Z	4.3	2.6	7km SW of Ladson, South Carolina
2003-03-02T17:18:26.500Z	6.5	2.9	7km SW of Ladson, South Carolina
2003-05-05T10:53:49.900Z	11.4	3.1	4km NNW of Summerville, South Carolina
2003-06-12T23:33:17.200Z	10.4	2.6	5km WSW of Centerville, South Carolina
2003-07-19T14:22:21.300Z	5.7	2.5	7km SSW of Ladson, South Carolina
2003-10-14T10:45:38.600Z	7.2	2.5	5km S of Centerville, South Carolina
2003-12-22T23:50:26.000Z	5.6	3	8km SSW of Ladson, South Carolina
2004-05-01T04:16:28.300Z	10.7	2.7	3km ENE of Goose Creek, South Carolina
2004-07-20T09:13:14.400Z	10.3	3.1	7km WSW of Centerville, South Carolina
2004-08-18T03:43:42.400Z	7.7	2.5	0km NE of Summerville, South Carolina
2004-11-25T22:58:45.900Z	12.9	2.7	4km NNW of Summerville, South Carolina
2005-11-19T20:02:20.000Z	5	2.6	South Carolina
2008-12-16T12:42:17.520Z	15.39	3.6	5km N of Sangaree, South Carolina
2009-01-29T21:11:27.200Z	6.45	2.5	2km SW of Summerville, South Carolina
2009-05-06T17:07:17.090Z	2.02	2.5	2km N of Summerville, South Carolina
2009-08-29T10:37:13.700Z	4.93	3.2	2km NE of Summerville, South Carolina
2010-05-12T09:03:36.760Z	1.26	2.8	6km SSW of Ladson, South Carolina
2011-10-15T07:02:32.820Z	8.05	2.5	4km WSW of Summerville, South Carolina
2011-12-21T21:38:57.670Z	12.33	2.6	7km SW of Centerville, South Carolina
2012-01-04T07:56:03.800Z	4.94	2.6	3km SSW of Centerville, South Carolina
2012-07-31T04:53:09.290Z	8.21	2.8	5km S of Centerville, South Carolina
2013-09-19T19:14:11.170Z	11.44	2.5	8km WSW of Summerville, South Carolina

Time*	Depth	Magnitude	Location
2014-03-19T22:38:03.330Z	6.91	3	0km S of Centerville, South Carolina

*Sourced from USGS Latest Earthquakes 1800-to-date

The most significant historical earthquakes in Charleston was the 1886 Charleston earthquake. The August 31, 1886 earthquake, with an estimated magnitude of 7.3 struck the Summerville/Charleston area and is the largest historical earthquake to have occurred in the eastern United States and the most destructive, killing 60 people and causing \$5 to \$6 million dollars (1886 dollars) worth of damage. The Charleston Region lies within the meizoseismal area (area of maximum damage) of the 1886 earthquake, but the effects of the 1886 earthquake were felt throughout the eastern United States. The 1886 earthquake had more than 300 aftershocks that occurred for 35 years after the initial earthquake (South Carolina Seismic Network, 1996, July). The 7.3 magnitude earthquake that occurred in 1886 killed 100 people and destroyed or damaged most of the buildings in Charleston and Summerville. The seismic history of the 1886 quake indicates that it erupts on the average every 500 years. But moderate quakes can and do occur here, and not so rarely. Two 3.6 temblors and one 3.2 temblor have rattled Summerville between 2008 and 2013. Also in 2002, a 4.4 magnitude quake erupted in the ocean off Kiawah Island. Summerville had two 4.1 quakes in the 1990s. They did not do much more than rattle nerves. But a 5 magnitude quake would be 10 times stronger, and some 800 of them occur across the globe every year. Moderate quakes are a great concern to emergency managers. Currently, though, the County has not experienced an earthquake exceeding a 2.5 magnitude since March 2014.

Earthquake Probability for each Jurisdiction	
Jurisdiction	Probability
Town of Hollywood	26-50%

Wildfire

Location

Wildfire is a potentially serious threat in the Charleston Region, particularly in areas with a high density of vegetation and areas within or surrounding the Francis Marion National Forest. Areas where there is an urban-wild land interface like (St. John’s Fire District) are also at risk. Even urban areas within the Region pose the threat of wildfires, since they are defined as uncontrolled fires, which most fires are. For the purpose of this plan, all areas, buildings and facilities are considered to be equally exposed.

Historical Occurrences

The table below shows the amount of fires and acres buried each fiscal year from 2012 to 2019.

Wildfire Events from 2013-2019							
Year	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019
Fires	19	15	9	6	23	6	Unknown
Acres	656.6	37.5	349.9	134.8	249.2	30.2	Unknown

Source: South Carolina Forestry Commission

Below is a table summarizing fire incidents from 2013 to 2019 recorded by the Consolidated 9-1-1 system.

Fire Incidents from May 1, 2013 – April 30, 2019							
As Reported by Charleston County Consolidated 9-1-1							
Category	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	
Outside Fires	893	542	632	999	657	573	
Trail/Rail Fires	3	1	2	1	3	0	

Marine Fires	13	5	11	11	21	7	
Vehicle Fire	102	90	111	111	112	124	
Total	1011	638	756	1122	793	704	11,366

Wildfire Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of Hollywood	26-50%

Severe Storm

Location

A thunderstorm event is an atmospheric hazard, and has no geographic boundaries. They can occur in all regions of the United States however, thunderstorms are most common in the central and southern states because atmospheric conditions are more favorable for generating thunderstorms. Since thunderstorms are unpredictable, all jurisdictions are equally exposed to these hazards.

Historical Occurrences

Severe Storm Events (Thunderstorm Winds) 1956 – April 2019		
TOTAL: 9 Events	Average Wind Speed: 50.5	Total Damage: \$ 11,000

Source: NOAA Storm Events Database

Severe Storm (Hail) Incidents in Charleston County 1957 – April 2019		
Total: 2 Events	AVERAGE SIZE: 0.875	TOTAL DAMAGES: \$ 0

Source: NOAA Storm Events Database

Severe Storm Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of Hollywood	76-100%

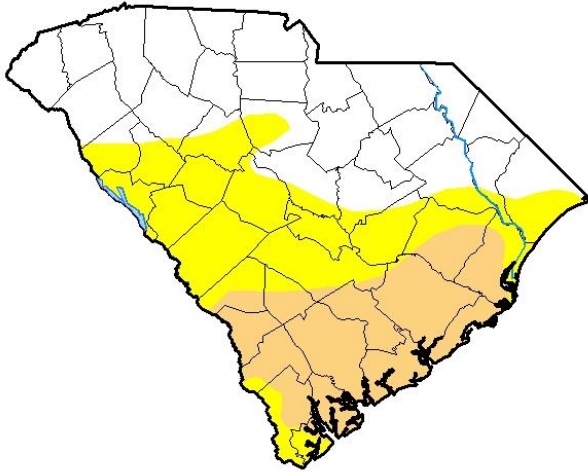
Drought

Location

Droughts typically cover a large area and cannot be confined to any geographic boundary. For this purpose, the whole Charleston Region is vulnerable to the threat of a drought.

U.S. Drought Monitor South Carolina

April 30, 2019
(Released Thursday, May 2, 2019)
Valid 8 a.m. EDT



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	45.71	54.29	23.20	0.00	0.00	0.00
Last Week 04-23-2019	46.10	53.90	23.13	0.00	0.00	0.00
3 Months Ago 01-29-2019	100.00	0.00	0.00	0.00	0.00	0.00
Start of Calendar Year 01-01-2019	100.00	0.00	0.00	0.00	0.00	0.00
Start of Water Year 09-25-2018	89.90	10.10	1.52	0.00	0.00	0.00
One Year Ago 05-01-2018	60.27	39.73	23.91	0.00	0.00	0.00

Intensity:
 D0 Abnormally Dry D3 Extreme Drought
 D1 Moderate Drought D4 Exceptional Drought
 D2 Severe Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:
Brad Rippey
U.S. Department of Agriculture



<http://droughtmonitor.unl.edu/>

(An example of the extent of drought that the State experienced in late April 2019)

Historical Occurrences

Year	Number of weeks of Drought Events between May 1, 2013 – April 30, 2019						Description
	None	D0 Abnormally Dry	D1 Moderate Drought	D2 Severe Drought	D3 Extreme Drought	D4 Exceptional Drought	
1999-2000	35	17	2	0	0	0	
2000-2001	17	35	19	5	0	0	
2001-2002	4	48	38	32	19	0	
2002-2003	18	34	20	18	13	0	
2003-2004	46	6	0	0	0	0	
2004-2005	32	20	5	0	0	0	
2005-2006	47	5	0	0	0	0	
2006-2007	27	25	3	0	0	0	
2007-2008	0	53	35	12	0	0	
2008-2009	15	37	22	0	0	0	
2009-2010	38	14	2	0	0	0	
2010-2011	29	23	0	0	0	0	
2011-2012	0	53	50	46	39	3	
2012-2013	7	45	20	9	5	0	
2013-2014	32	20	0	0	0	0	The Region experienced 20 weeks in drought stage. 32 weeks of no drought stage were reported and 20 weeks of D0 drought from October to December.
2014-2015	37	15	0	0	0	0	The Region experienced only 15 weeks of D0 drought. During weeks when drought was experienced, only approximately 10-20 percent of the county was affected. 37 weeks of the year, the Region experienced no drought.

2015-2016	36	16	0	0	0	0	The Region experienced 16 weeks of D0 drought. During weeks when drought was experienced, only approximately 10-20 percent of the county was affected. 36 weeks of the year, the Region experienced no drought.
2016-2017	38	14	6	0	0	0	The Region experienced 20 weeks of drought stage. During these 20 weeks, the drought stage remained at D0 for 14 weeks and D1 for 6 weeks. 38 weeks of the year, the Region experienced no drought.
2017-2018	23	29	14	4	0	0	The Region experienced 29 weeks of drought stage D0 and 14 weeks of D1. In addition, 4 weeks were spent at D2; there were 23 weeks where the Region experienced no drought.
2018-2019	26	26	10	0	0	0	The Region experienced 36 total drought weeks. 26 weeks were spent at D0 and an additional 10 weeks were spent at D1. The Region was no experiencing a drought for 26 weeks.

Source: U.S. Drought Monitor

According to the U.S. Drought Monitor, the Charleston Region was in the D4 (Exceptional Drought) category for a number of weeks in early 2012 with a Palmer Drought Index of at least -5.0 (Extreme Drought). It is possible for severe and exceptional drought periods to return to the Charleston Region.

Drought Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of Hollywood	26-50%

Winter Weather

Location

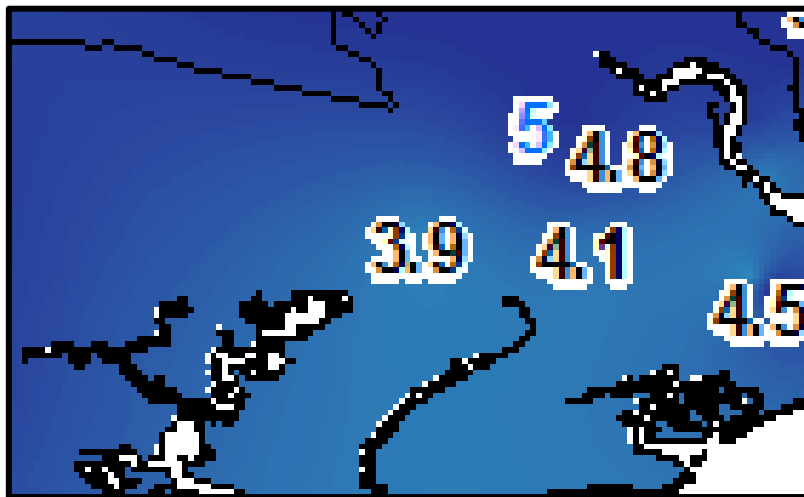
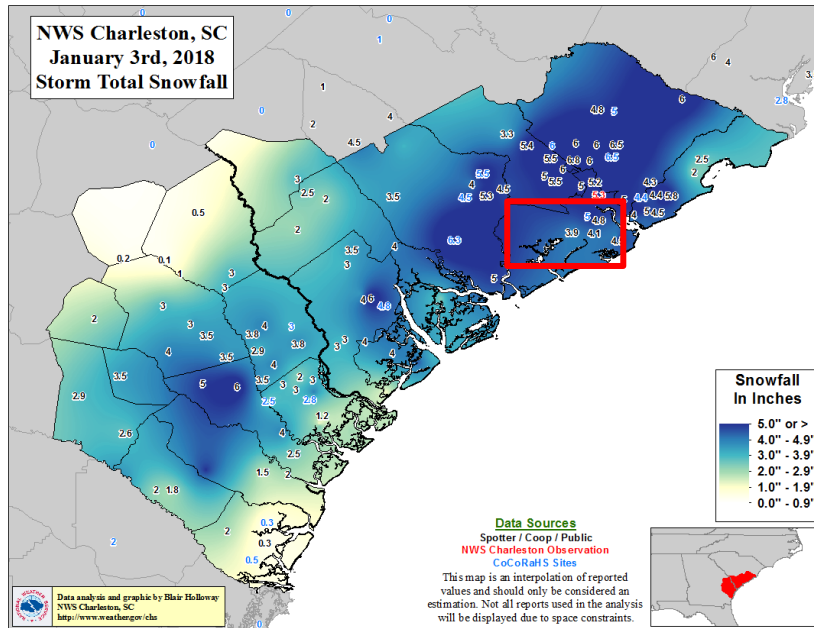
While the Region does not regularly encounter extreme winter storms, some aspects of winter weather occur in the Region annually. With the random nature of this hazard, all jurisdictions are subject to winter weather conditions.

Historical Occurrences

Winter Weather Events Through April 2019	
Total of 10 Events	Total Damage \$233,000

Source: NOAA Climate Data

A rare winter storm affected southeast South Carolina on January 3, 2018. The storm produced a variety of wintry precipitation, including snow, sleet and freezing rain. Charleston Airport (KCHS) measured 5.3 inches of snow, the 3rd greatest daily snowfall on record, just 0.1 inches shy of the 5.4 inches that fell during the 1973 storm (NWS, 2019).



Winter Weather Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of Hollywood	51-75%

5.5(b) - Hollywood Problem Assessment

5.5.1 - Hazard Vulnerability

The analysis for this section is identical to the analysis under “Hazard Vulnerability” for Unincorporated Charleston County.

5.5.2 - Vulnerable Buildings

The analysis for this section is identical to the analysis under “Vulnerable Buildings” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-5-9

Building Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
Jurisdiction	Dam Failure	Drought	Earthquakes	Flooding	Hazardous Material Incidents	Hurricanes	Sea Level Rise	Tornadoes	Terrorist Incidents	Tsunamis	Wildfires	Winter Weather
Town of Hollywood	5	3	4	3	4	2	5	3	5	5	3	3

5.5.3 – Infrastructure Vulnerability

The analysis for this section is identical to the analysis under “Infrastructure Vulnerability” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-5-11

Infrastructure Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
Town of Hollywood	5	5	4	3	4	2	5	5	3	5	3	4

Problem Statements and Vulnerability Based on Jurisdiction	
Jurisdiction	Vulnerability Assessment
Town of Hollywood	This is a small rural community. Flooding is a concern as it lies on the bank of the Wadmalaw / Stono River. Also, the community lies in the Toogoodoo River and watershed. It is also vulnerable to hurricanes and tornadoes with mobile homes as well as minority populations and low income households. The Town has many areas at or below Base Flood Elevations. There is not a list of homes that are a repetitive loss.

5.5.4 – Known Flood Damages

The analysis for this section is identical to the analysis under “Known Flood Damages” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-5-12

Loss Statistics for Charleston County as of 9/30/2018					
Jurisdiction	Total Losses	Closed Losses	Open Losses	CWOP Losses	Total Payments
HOLLYWOOD, TOWN OF	17	9	0	8	194,427.11

FEMA Policy and Claims Statistics Database, 2019

Town of Hollywood Higher Regulatory Standards
2' freeboard
1/2 foot rise in floodway
Five year cumulative of all permits is included when conducting a substantial review

5.5.5 – Past Flood Impacts

The analysis for this section is identical to the analysis under “Past Flood Impacts” for Unincorporated Charleston County.

5.5.6 – Emergency Warning Needs

The analysis for this section is identical to the analysis under “Emergency Warning Needs” for Unincorporated Charleston County.

5.5.7 – Critical Facilities

The analysis for this section is identical to the analysis under “Critical Facilities” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-5-13

Critical Facility Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
Town of Hollywood	5	4	3	3	4	2	5	5	3	5	3	2

A full list of the capabilities for Charleston County and plan participating partners can be seen in the “Critical Facilities” description in Section 5.1(b).

5.5.8 – Natural and Beneficial Functions of Floodplains

The analysis for this section is identical to the analysis under “Natural and Beneficial Functions of Floodplains” for Unincorporated Charleston County.

5.5.9 – Development and Population Trends

The analysis for this section is identical to the analysis under “Development and Population Trends” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-5-14

Estimated Population 2017-2018 in Charleston County SC		
Jurisdiction	Growth Rate 2010-2018	Projected 2018 Population
Town of Hollywood	9.88%	5,180

Source: U.S. Census Bureau, Population Division 2018

Additional summaries of the anticipated future development trends for the local governments within Charleston County, as provided by the local government entities participating in the

Charleston Regional Hazard Mitigation Plan, are outlined in “Development and Population Trends” in Section 5.1(b).

5.5.10 – Economic Impact

The analysis for this section is identical to the analysis under “Economic Impact” for Unincorporated Charleston County.

5.5.11 – Resiliency to Hazards

The analysis for this section is identical to the analysis under “Resiliency to Hazards” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Attachment 5-5-D: Charleston Region Buildings Vulnerable to Flooding Due to Location in the Special Flood Hazard Area (SFHA) Only

Jurisdiction	Total Site-Built Structures	% of Total Site-Built Structures in the SFHA	Mobile Homes in SFHA*	Residential site-built structures in the SFHA		Commercial Structures in the SFHA		Total Structures in the SFHA (including site-built and mobile homes)	
				A/AE Zone	V/VE Zone	A/AEZone	V/VEZone	A/AW Zone*	V/VEZone
Hollywood	2,298	22	31	478	0	25	0	534	0

* Since most mobile homes in Charleston County are treated as vehicles for tax purposes, the determination of “A” or “V” zones for these homes using the Q-3 digital data was not able to be readily performed. All mobile homes in the SFHA are included in the A-zone total for this table, since most jurisdictions in Charleston County restrict mobile homes from the “V” flood zone areas.

Attachment 5-5-E: Charleston Region Buildings Vulnerable to Flooding Due to Year of Construction and Location in the Special Flood Hazard Area (SFHA)

Jurisdiction	Pre-1985 Site-Built Residential Buildings in SFHA	Pre-1985 Commercial Buildings in SFHA	Total Pre-1985 Site-Built Buildings in SFHA	% of All Site-Built Buildings In Jurisdiction Constructed Pre-1985 and in SFHA	Pre-1985 Mobile Homes in SFHA	Total Site-Built Buildings Pre-1985 & Mobile Homes in SFHA
Hollywood	92	10	102	12.13	8	110

Attachment 5-5-F: Charleston Region Average Valuation of Buildings and Mobile Homes

Jurisdiction	Avg. Site-Built Residential Building Value	Avg. Commercial Building Value	Avg. Mobile Home Value**	Estimated Total Pre-1985 Site-Built and Mobile Home Building Value	Estimated Pre-1985 Site-Built Building And Mobile Home Value in SFHA (mil.\$)
Hollywood (<i>All</i>)	\$189,026.89	\$143,967.10	\$12,704.34	\$66,611,824.00	
Pre-1985	\$79,659.98	\$72,906.59	\$3,089.11		\$11,000,200.00

** Valuation data reflected herein is for mobile homes, regardless of age.

Attachment 5-5-G: Charleston Region Average Valuation of Site-Built Buildings by Flood Zone

Jurisdiction	Total Value "A" Zones Site-Built Structures	Total Value "V" Zones Site-Built Structures(mil\$)	Total Value Site-Built Structures Not in the SFHA (mil\$)	Total Value of Site-Built Structures Not Flood-Zone Coded** (mil\$)
Hollywood	172,300,301	0	254,343,124	200,802,824

** Valuation data reflected herein is for mobile homes, regardless of age.

5.6(a) - City of Isle of Palms

Hurricane

Location

Hurricanes and tropical storms threaten the entire Atlantic and Gulf coast of the United States, as well as the Pacific coast. Hurricanes that originate in the Gulf of Mexico can still impact the Charleston Region. With about 68% of the Charleston Region in the floodplain and some jurisdictions located 100% in the floodplain and with the community being a coastal community, the Region is vulnerable to hurricanes and tropical storms and their aftermaths. Since hurricane landing patterns are unpredictable until the storm has formed and is within a short time from landing, the Region can not presume that past strike history will continue into the future, and all areas within the Region are subject to these types of events.

Occurrences

Hurricane Events between August 11 1940 - April 30 2013			
Name	Category	Date	Damage Description
August 11th, 1940 (Name classification started after 1950)	2	August 11th, 1940	Estimated damage to the city was \$1 million. Sullivan's Island and the City of the Isle of Palms suffered minor damage.
Hurricane Hazel	4	October 15th, 1954	Folly Beach, Sullivan's Island, and the Isle of Palms suffered light property damage and slight beach erosion. The City of Charleston experienced no serious damage.
Hurricane Gracie	3	September 29th, 1959	The total damage inflicted by the storm was estimated at \$14 million. High water marks, which were reported near the Town of Edisto Beach, South Carolina, ranged from 7.3 to 11.9 feet.
Hurricane David	3	August 29th - September 7th, 1979	Flooding and minor damage in the City of Charleston.
Hurricane Hugo	4	September 19th, 1989	Tidal surges north of the city were recorded at 19.8 feet and 11.8 feet in the Peninsula City. The hurricane struck at high tide. Its recorded diameter was over 500 miles, Four (4) people were killed and scores injured. Estimated damage of \$7 billion for the total area.
Hurricane Bertha	2	July 12th, 1996	This hurricane came close but did not cause any significant damage. Some coastal areas experienced moderate beach erosion. Tourism estimated loss revenue of 20 million dollars.
Hurricane Fran	3	Septemer 5th, 1996	The storm didn't directly hit the Charleston Region but remnants of this hurricane created power outages with economic losses estimated at 20 million dollars.
Hurricane Bonnie	3	August 26th, 1998	Remnants of this hurricane produced winds that knocked down several trees in the Town of Mount Pleasant as it headed for the North Carolina Coast.

Hurricane Floyd	2	September 15th, 1999	Sustained winds of 58 miles per hour were recorded in downtown Charleston with gusts up to 85 miles per hour. Generally 3-5 inches of rainfall occurred. An estimated \$10.5 million in damages occurred in the Charleston region.
Hurricane Irene	1	October 17th, 1999	This hurricane dropped 3 to 5 inches of rain created minor street flooding. Minor beach erosion. Trees knocked down and power outages in the area.
Tropical Storm Gordon		September 18th, 2000	Remnants of the storm dropped 6-10 inches of rain. Minor beach erosion occurred as a result of this storm.
Tropical Storm Claudette		July 14th, 2003	Two and a half inches of rain, a tree was downed, 11 traffic accidents.
Tropical Depression Seven		July 25th, 2003	Expected to receive as much as 6 inches of rain and wind gusts up to 35 mph from this storm.
Tropical Storm Henri		September 6th, 2003	Folly Beach, Sullivan's Island, and Isle of Palms experienced beach erosion from remnants of the storm, which was predicted to also bring up to 5 inches of rain to the Charleston area.
Hurricane Isabel	2	September 17th, 2003	This storm created 8 foot surf at Kiawah Island and had wind gusts of 40 mph offshore and 20 mph in downtown Charleston when it passed offshore. Coastal erosion was expected, as tides were 6 to 12 inches above normal.
Tropical Storm Alex		August 2nd, 2004	Minor beach erosion was reported on Folly Beach.
Tropical Storm Bonnie		August 12th, 2004	The remnants of this storm caused a tornado and several incidents of wind damage in the Awendaw area.
Hurricane Charley	1	August 14-15th, 2004	An estimated 4 inches of rain fell in 2 hours in the Northern part of Charleston County on August 14, 2004, flooding low lying areas and areas with poor drainage. Storm surge was estimated at 4-6 feet from Oyster Landing to the Cape Romain Wildlife Refuge in the northern portions of Charleston County. Minor property and tree damage occurred as a result of this storm. The storm caused an estimated damage of \$2 million in South Carolina.
Hurricane Gaston	1	August 29th, 2004	Sustained winds of 75 mph. The storm brought a 4 foot storm surge into Bull's Bay, which caused an estimated \$4.8 million in damages to homes, primarily in areas east of the Cooper River creating debris with an estimated clean-up cost of \$2.2 million county-wide, and left nearly all of the customers of South Carolina Electric and Gas without electrical power. Total estimated damages, per the National Weather Service, were \$7.6 million in Charleston County.
Tropical Storm Frances		September 6th, 2004	This storm created nearly 6 ft. surf. Dropped nearly 5 inches of rain, winds of 35 mph, minor damage and flooding.
Tropical Depression Jeanne		September 27th, 2004	Resulted in 40 ft. of beach erosion on the north end of Folly Beach. Maximum wind gusts in Charleston County from this storm were 41 mph in downtown Charleston and at the Charleston airport. Maximum wind gusts at Folly Beach were 38 mph. Non-tornadic damage was limited to a few trees falling on cars.
Tropical Storm Ophelia		September 13th, 2005	Loss of Life, Beach Erosion, minor damage.
Tropical Storm Tammy		October 5th, 2005	Significant Beach Erosion, flooding, minor damage.
Tropical Storm Alberto		June 13th, 2006	Remnants of the storm produced a tornado that touched down near Awendaw, knocking down trees. Street flooding occurred in Charleston and North Charleston as a result of this storm.
Tropical Storm Ernesto		August 31st, 2006	Mt. Pleasant received 6.65 inches of rainfall from this storm system. Street flooding occurred in the City of Charleston and 40 mph gusts.
Tropical Storm Barry		June 2nd, 2007	Remnants of the storm produced heavy rains, strong winds, rough surf, and 3 inches of rain. Loss of electricity to 13,900 customers of SCE&G and Berkeley Electric Cooperative, mostly in the Summerville area, which caused vessels to break their lines, and flood streets, particularly on the Charleston Peninsula. Wind gusts up to 60 mph were recorded.
Tropical Storm Hanna		September 5th, 2008	Resulting in strong wind and localized heavy rain.
Tropical Storm Irene		August 25th, 2011	The Charleston County Folly Beach Park received significant erosion-related damages as a result of this storm, including beach areas and structures.
Tropical Storm Lee		September 6th, 2011	Charleston County sustained scattered showers, thunderstorms, and winds up to 22 mph with a half-inch of rain in some areas.
Tropical Storm Beryl		May 27th, 2012	The region saw tropical storm forced winds, heavy rainfall, and fallen trees as result of the storm.
Tropical Storm Sandy		October 27th, 2012	The storm produced forced winds of 40 mph.

Hurricane Events between May 1, 2013 – January 31, 2019

Name	Category	Date	Damage Description
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Tropical Storm Andrea		June 6, 2013	Heavy rainfall 3-7 inches
Tropical Storm Arthur		July 3, 2014	Tropical storm watch was posted for Santee River to Bogue Banks, NC. Wind gusts up to 42 mph (68 km/h) along coastal areas, resulting in scattered power outages
Tropical Storm Ana		May 7-8, 2015	Tropical storm warning from South Santee River to Surf City, NC. Produced a small storm surge along Charleston County coast.
Hurricane Joaquin	4	October 1-5, 2015	Did not make landfall in the US, but caused catastrophic flooding in South Carolina and intense flooding and power outages in Charleston County. South Carolina Governor Haley declared a State of Emergency.
Hurricane Matthew	1	October 7-8, 2016	Once a Category 5 hurricane before ripping through Haiti and eastern Cuba, Hurricane Matthew had downgraded to a Category 1 by the time it hit South Carolina. Even so, 830,000 South Carolinians lost power, 355,000 evacuated from their homes, and 4 lost their lives.
Hurricane Irma	1	9/11-9/12/2017	Once a Category 5 hurricane before ripping through the Caribbean, Hurricane Irma had downgraded to a Category 1, and eventually a tropical storm, by the time the system impacted South Carolina. Even so, over 100,000 South Carolinians lost power, 3 lost their lives, and Charleston recorded its third highest storm surge ever (10ft).
Hurricane Florence	1	9/14/2018	Once a Category 4 hurricane before making landfall north of Charleston County, this storm impacted Charleston County as a tropical depression. No lives were lost in Charleston County although thousands of residents lost power during the storm's peak.
Hurricane Michael	4	10/11/2018	Making landfall as a Category 4 hurricane in Florida's Bay County, this storm impacted Charleston County by bringing 50 mph winds which dismantled many trees and power lines plus a storm surge measured at 2.07 ft in Charleston Harbor. Charleston County saw no lost lives, although the storm directly caused 16 casualties and 43 indirectly, according to the NOAA.

Hurricane Probability for each Jurisdiction	
Jurisdiction	Probability
City of Isle of Palms	26-50%

Flood

Location

Flooding can occur throughout most of the Charleston Region since around 68% resides within a floodplain. Floodplains are designated by the frequency of the flood that is large enough to cover them. Flood frequencies are determined by plotting a graph of the size of all known floods for an area and calculating how often floods occur. The Federal Emergency Management Agency (FEMA) identifies floodplain areas by producing Flood Insurance Rate Maps (FIRM). These maps show all locations near major bodies of water, and show base flood elevations and floodplain boundaries like the 100-year floodplain boundaries. 100-year flood event is a 1% probability of occurring in any given year. The roughly 68% of the areas located in the floodplain are exposed to the threat of floods but that does not mean the other areas are not vulnerable to a flash flood or flooding events. Damaged infrastructure and roadways can limit mobility for citizens. All areas can experience flooding hazards.

Below is a list from each participant in the plan for areas of concern for flooding.

<i>Jurisdiction Not Serviced by Charleston County</i>	<i>Area</i>
City of Isle of Palm	Forest Trail subdivision
	41 st Avenue at Waterway Boulevard
	25 th Avenue at Waterway Boulevard
	Driftwood Lane
	19 th Avenue at Myrtle Boulevard
	Merritt Boulevard
	Palm at 32 nd Avenue
	Palm and Charleston Blvd.

Historical Occurrences

Flooding Events Between Jan 1, 1950 – April 30, 2019	
Total: 3 Events	Total Damage: \$728,550

These flooding events were mainly the result from heavy rain or severe weather (thunderstorms, tropical storms, heavy rain) incidents that caused flooding in the Charleston Region. Charleston broke its record for number of annual-flood days last year. The previous record of 38 days, observed in 2015, was exceeded by 12 days for a total of 50 annual-flood days in 2016. Compared to 1995, trends in flooding during 2016 have increased by 130 percent on average.

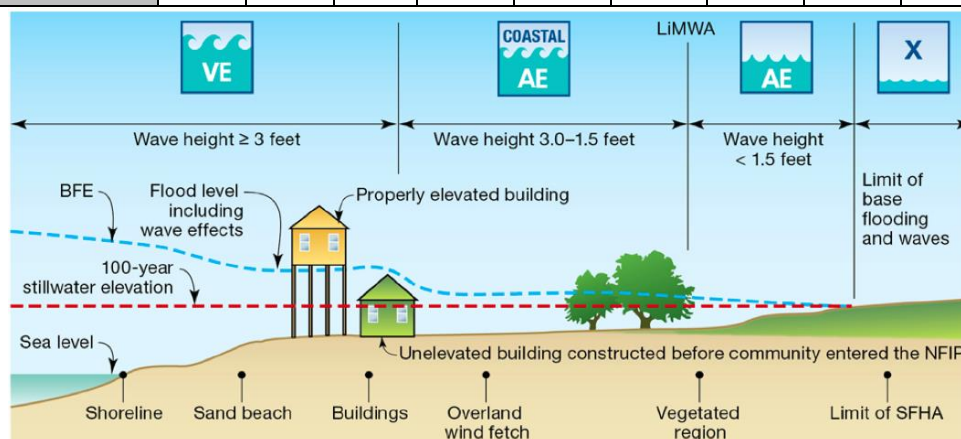
Flooding Probability for each Jurisdiction	
Jurisdiction	Probability
City of Isle of Palms	76-100%

Sea Level Rise

Location

Flooding and tidal flooding is a good indicator of what areas are most at risk for sea level rise and the stressors that accompany it: nuisance flooding, increased storm surge, loss of property. Land in the most susceptible flood zones (AE and VE) will be most affected as sea level continues to rise. Areas of the most susceptibility include Eastern Folly Beach and Morris Island, the tips of Sullivan’s Island, the northeastern coast of James Island near SC-30 and Harbor View Rd., all of Seabrook and Edisto’s coastline, eastern Isle of Palms and Caper’s Island, all of Awendaw’s coastline, and the northeastern coastline of Murphy Island and the coast of the Dunes West Golf and Resort Club. Below is an illustration of the definitions of the different flood zones:

Amount of Land Area of Charleston County Above Sea Level										
Elevation above spring high water (m)	0.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00
Area of Land (sq. km)	108.6	175.5	223.9	305.5	344.2	421.8	464.9	587.2	684.4	858.2
Percent of Total Land Cover	4.6%	7.4%	9.4%	12.9%	14.5%	17.8%	19.6%	24.8%	28.9%	36.2%



Occurrences

King tides, which is the above average high tide occurring when once a lunar cycle, are a good predictor of sea level rise. On average there were over twice as many observed tides than predicted tides. The depth averaged more than a foot deeper than expected. There were 28 more king tides than predicted in 2018 and the highest observed tide was over a foot and a half higher than the highest predicted tide. King tides give a community a glimpse into what it will be like to live with a higher sea level. Communities can expect more king tides in the future as sea level continues to rise.

Duration and Depth* of King Tides in Charleston Area from January 2014 – December 2019				
Year	Predicted Number of Tides	Observed Number of Tides	Highest Predicted Tide (ft)	Highest Observed Tide (ft)
2014	28	46	7	7.6
2015	40	111	7.2	8.7

2016	49	82	7.2	7.9
2017	34	111	7	9.9
2018	44	72	6.9	8.8
Average	39	84.4	7.06	8.58
Total	195	422	35.3	42.9

*Depth is based off of the Charleston Harbor Tide Gauge

**Available data from 2014 onwards gathered through MyCoast.org backed by SC DHEC:

<https://mycoast.org/sc/king-tides>

Sea Level Rise/King Tide Probability for each Jurisdiction	
Jurisdiction	Probability
City of Isle of Palms	76-100%

Tsunami

Location

A tsunami poses the threat on all coastal communities even though tsunamis are generally considered to be a significant hazard threat primarily for land areas near the Pacific Ocean, and are considered to be a rare phenomenon in the Atlantic Ocean. Historical evidence does indicate that tsunamis have affected the Eastern United States but are not the result of traditional sources of tsunami waves (i.e., subduction zones such as the Cascadia Subduction Zone in the Pacific Ocean). They are typically the result of slumping or land sliding associated with local earthquakes or with wave action associated with strong storms such as hurricanes. Other possible causes of tsunami-like activity along the East Coast could include explosive decompression of underwater methane deposits, the impact of a heavenly body (i.e., an asteroid, comet or oceanic meteor splashdown), or a large underwater explosion. The Charleston County area is not an “at-risk” area for a significant type of Atlantic Ocean tsunamis. Consequently, the Charleston County area would not generally be expected to experience a tsunami but as with any coastal community along the Atlantic Ocean, there is still an extremely remote chance of events happening that can cause a tsunami.

Historical Occurrences

With the report of 1 event with limited information on damage and extent which was likely tied to the record earthquake that occurred on August 31st, 1886, the Charleston Region hasn’t experienced any tsunami events since. Through the National Climatic Data Center from National Oceanic and Atmospheric Administration (NOAA), the database shows zero events from the years 2008 through April 30th, 2019.

Tsunami Probability for Each Jurisdiction	
Jurisdiction	Probability
City of Isle of Palms	0-25%

Rip Current

Location

The Charleston Region stretches nearly 100 miles along the Atlantic Ocean. The Region’s beaches are prone to rip currents daily leaving citizens who enjoy the beaches vulnerable to this threat. This type of hazard does not cost damage to buildings or infrastructure but it continues to take lives of residents and visitors on an annual basis. Since majority of people in

the Region will experience being around the water at some point, the whole Region can be affected.

Historical Occurrences

According to the National Oceanic and Atmospheric Administration (NOAA) and the National Climatic Data Center (NCDC), rip currents will be listed in Storm Data only when they cause a drowning(s), near-drowning(s), result in numerous rescues (i.e., 5 or more at one beach community), or damage watercraft. Events associated with other surf-related currents, such as long-shore or tidal currents, will not be included in Storm Data as Rip Current events. Rip currents can occur any time and any place along beaches or in other bodies of water.

Charleston County Severe Rip Tide Occurrences from January 1, 1950 – April 30th, 2019		
Total: 11 Rip Current Events with 1 Deaths and 4 Reported Injuries		
<i>Source: NOAA Storm Events Database</i>		

Probability

Since the Charleston Region is located along the coast, the ocean presents a strong threat to the communities close and away from it. With the beach being a popular location for many in the Region, we can claim that the whole Region is exposed to the threat of a rip current during a beach visit. Rip currents occur every day posing a low to high risk threat. There is a 100% chance that a rip current could occur every day leaving a 100% chance coastal jurisdictions such as the City of Isle of Palms, Town of Sullivan’s Island, Town of Kiawah, and Town of Seabrook, City of Folly Beach, along with Charleston County Parks and Recreation which has beachside parks, could experience this hazard. The vulnerability and impact of the hazard is discussed later in the Plan.

Rip Current Probability for Each Jurisdiction	
Jurisdiction	Probability
City of Isle of Palms	76-100%

Severe Storm

Location

A thunderstorm event is an atmospheric hazard, and has no geographic boundaries. They can occur in all regions of the United States however, thunderstorms are most common in the central and southern states because atmospheric conditions are more favorable for generating thunderstorms. Since thunderstorms are unpredictable, all jurisdictions are equally exposed to these hazards.

Historical Occurrences

Severe Storm Events (Thunderstorm Winds) 1956 – April 2019		
TOTAL: 6 Events	Average Wind Speed:	Total Damage: \$0
	53.833	

Source: NOAA Storm Events Database

Severe Storm (Hail) Incidents in Charleston County 1957 – April 2019		
Total: 5 Events	AVERAGE SIZE: 1.8	TOTAL DAMAGE: \$30,000

Source: NOAA Storm Events Database

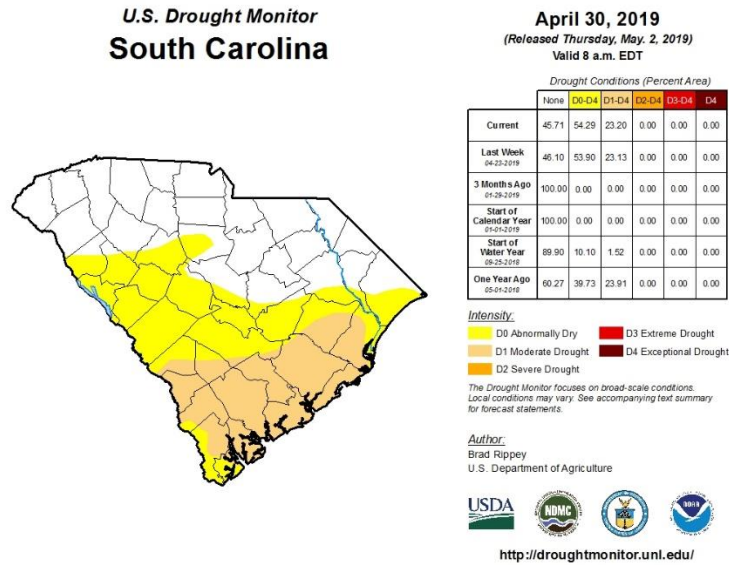
Severe Storm (Lightning) Incidents in Charleston County 1998 – April 2019	
Total: 4 Events	Total Damage: \$15,000

Severe Storm Probability for Each Jurisdiction	
Jurisdiction	Probability
City of Isle of Palms	76-100%

Drought

Location

Droughts typically cover a large area and cannot be confined to any geographic boundary. For this purpose, the whole Charleston Region is vulnerable to the threat of a drought.



(An example of the extent of drought that the State experienced in late April 2019)

Historical Occurrences

Year	Number of weeks of Drought Events between May 1, 2013 – April 30, 2019						Description
	None	D0 Abnormally Dry	D1 Moderate Drought	D2 Severe Drought	D3 Extreme Drought	D4 Exceptional Drought	
1999-2000	35	17	2	0	0	0	
2000-2001	17	35	19	5	0	0	
2001-2002	4	48	38	32	19	0	
2002-2003	18	34	20	18	13	0	
2003-2004	46	6	0	0	0	0	
2004-2005	32	20	5	0	0	0	

2005-2006	47	5	0	0	0	0	
2006-2007	27	25	3	0	0	0	
2007-2008	0	53	35	12	0	0	
2008-2009	15	37	22	0	0	0	
2009-2010	38	14	2	0	0	0	
2010-2011	29	23	0	0	0	0	
2011-2012	0	53	50	46	39	3	
2012-2013	7	45	20	9	5	0	
2013-2014	32	20	0	0	0	0	The Region experienced 20 weeks in drought stage. 32 weeks of no drought stage were reported and 20 weeks of D0 drought from October to December.
2014-2015	37	15	0	0	0	0	The Region experienced only 15 weeks of D0 drought. During weeks when drought was experienced, only approximately 10-20 percent of the county was affected. 37 weeks of the year, the Region experienced no drought.
2015-2016	36	16	0	0	0	0	The Region experienced 16 weeks of D0 drought. During weeks when drought was experienced, only approximately 10-20 percent of the county was affected. 36 weeks of the year, the Region experienced no drought.
2016-2017	38	14	6	0	0	0	The Region experienced 20 weeks of drought stage. During these 20 weeks, the drought stage remained at D0 for 14 weeks and D1 for 6 weeks. 38 weeks of the year, the Region experienced no drought.
2017-2018	23	29	14	4	0	0	The Region experienced 29 weeks of drought stage D0 and 14 weeks of D1. In addition, 4 weeks were spent at D2; there were 23 weeks where the Region experienced no drought
2018-2019	26	26	10	0	0	0	The Region experienced 36 total drought weeks. 26 weeks were spent at D0 and an additional 10 weeks were spent at D1. The Region was no experiencing a drought for 26 weeks.

Source: U.S. Drought Monitor

According to the U.S. Drought Monitor, the Charleston Region was in the D4 (Exceptional Drought) category for a number of weeks in early 2012 with a Palmer Drought Index of at least -5.0 (Extreme Drought). It is possible for severe and exceptional drought periods to return to the Charleston Region.

Drought Probability for Each Jurisdiction	
Jurisdiction	Probability
City of Isle of Palms	26-50%

Winter Weather

Location

While the Region does not regularly encounter extreme winter storms, some aspects of winter weather occur in the Region annually. With the random nature of this hazard, all jurisdictions are subject to winter weather conditions.

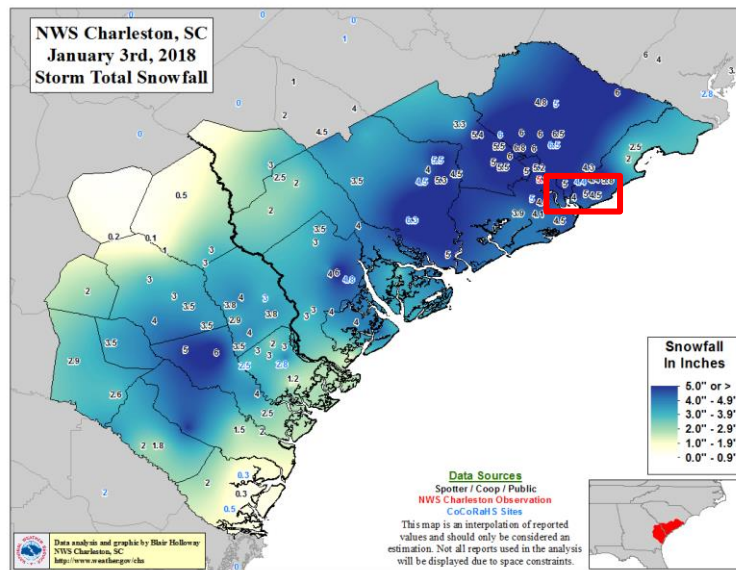
Historical Occurrences

Winter Weather Events Through April 2019	
Total of 10 Events	Total Damage \$233,000

Source: NOAA Climate Data

A rare winter storm affected southeast South Carolina on January 3, 2018. The storm produced a variety of wintry precipitation, including snow, sleet and freezing rain. Charleston

Airport (KCHS) measured 5.3 inches of snow, the 3rd greatest daily snowfall on record, just 0.1 inches shy of the 5.4 inches that fell during the 1973 storm (NWS, 2019).



Winter Weather Probability for Each Jurisdiction	
Jurisdiction	Probability
City of Isle of Palms	51-75%

5.6(b) - City of Isle of Palms Problem Assessment

5.6.1 - Hazard Vulnerability

The analysis for this section is identical to the analysis under “Hazard Vulnerability” for Unincorporated Charleston County.

5.6.2 - Vulnerable Buildings

The analysis for this section is identical to the analysis under “Vulnerable Buildings” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-6-9

Building Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
Jurisdiction	Dam Failure	Drought	Earthquakes	Flooding	Hazardous Material Incidents	Hurricanes	Sea Level Rise	Tornadoes	Terrorist Incidents	Tsunamis	Wildfires	Winter Weather
City of Isle of Palms	4	5	2	2	4	2	2	2	4	3	4	4

5.6.3 – Infrastructure Vulnerability

The analysis for this section is identical to the analysis under “Infrastructure Vulnerability” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-6-11

Infrastructure Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
City of Isle of Palms	4	4	3	2	4	2	2	4	2	2	4	4

Problem Statements and Vulnerability Based on Jurisdiction	
Jurisdiction	Vulnerability Assessment
City of Isle of Palms	The City of Isle of Palms is a low-lying coastal barrier island community that is vulnerable to sea level rise, storm surge, erosion and hurricanes. It is an upper middle class tourist destination with a mix of buildings used as primary homes, secondary homes, and resort rentals. Flooding can occur from storm events, heavy rain or unusually high tides, with any combination of these compounding the issue. There are two ways to access the island. This coastal community is also vulnerable to tsunamis.

5.6.4 – Known Flood Damages

The analysis for this section is identical to the analysis under “Known Flood Damages” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-6-12

Loss Statistics for Charleston County as of 9/30/2018

Jurisdiction	Total Losses	Closed Losses	Open Losses	CWOP Losses	Total Payments
ISLE OF PALMS, CITY OF	2,562	2,009	0	553	63,324,936.22

FEMA Policy and Claims Statistics Database, 2019

City of Isle of Palms Higher Regulatory Standards
1' Freeboard

5.6.5 - Past Flood Impacts

The analysis for this section is identical to the analysis under “Past Flood Impacts” for Unincorporated Charleston County.

5.6.6 - Emergency Warning Needs

The analysis for this section is identical to the analysis under “Emergency Warning Needs” for Unincorporated Charleston County.

5.6.7 - Critical Facilities

The analysis for this section is identical to the analysis under “Critical Facilities” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-6-13

Critical Facility Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
City of Isle of Palms	4	5	3	3	4	3	3	3	3	3	4	5

A full list of the capabilities for Charleston County and plan participating partners can be seen in the “Critical Facilities” description in Section 5.1(b).

5.6.8 - Natural and Beneficial Functions of Floodplains

The analysis for this section is identical to the analysis under “Natural and Beneficial Functions of Floodplains” for Unincorporated Charleston County.

5.6.9 - Development and Population Trends

The analysis for this section is identical to the analysis under “Development and Population Trends” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-6-14

Estimated Population 2017-2018 in Charleston County SC		
Jurisdiction	Growth Rate 2010-2018	Projected 2018 Population
City of Isle of Palms	5.00%	4,340

Source: U.S. Census Bureau, Population Division 2018

Additional summaries of the anticipated future development trends for the local governments within Charleston County, as provided by the local government entities participating in the Charleston Regional Hazard Mitigation Plan, are outlined in “Development and Population Trends” in Section 5.1(b).

5.6.10 – Economic Impact

The analysis for this section is identical to the analysis under “Economic Impact” for Unincorporated Charleston County.

5.6.11 – Resiliency to Hazards

The analysis for this section is identical to the analysis under “Resiliency to Hazards” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Attachment 5-6-C: Repetitive Loss Areas within the Charleston Region

Repetitive Loss Areas			
Street	City, State	Zip Code	Jurisdiction
19th Avenue	Isle of Palms, SC	29451	IOP
24th Avenue	Isle of Palms, SC	29451	IOP
25th Avenue	Isle of Palms, SC	29451	IOP
30th Avenue	Isle of Palms, SC	29451	IOP
33rd Avenue	Isle of Palms, SC	29451	IOP
41st Avenue	Isle of Palms, SC	29451	IOP
Beachwood East	Isle of Palms, SC	29451	IOP
Cameron Boulevard	Isle of Palms, SC	29451	IOP
Forest Trail	Isle of Palms, SC	29451	IOP
Hartnett Boulevard	Isle of Palms, SC	29451	IOP
Ocean Boulevard	Isle of Palms, SC	29451	IOP
Palm Boulevard	Isle of Palms, SC	29451	IOP
Sandwedge Lane	Isle of Palms, SC	29451	IOP
Lake Village Lane	Isle of Palms, SC	29451	IOP
Waterway Boulevard	Isle of Palms, SC	29451	IOP

Attachment 5-6-D: Charleston Region Buildings Vulnerable to Flooding Due to Location in the Special Flood Hazard Area (SFHA) Only

Jurisdiction	Total Site-Built Structures	% of Total Site-Built Structures in the SFHA	Mobile Homes in SFHA*	Residential site-built structures in the SFHA		Commercial Structures in the SFHA		Total Structures in the SFHA (including site-built and mobile homes)	
				A/AE Zone	V/VE Zone	A/AE Zone	V/VE Zone	A/AW Zone*	V/VE Zone
Isle of Palms	4,735	99	0	3,358	1,033	228	82	3,586	1,115

* Since most mobile homes in Charleston County are treated as vehicles for tax purposes, the determination of “A” or “V” zones for these homes using the Q-3 digital data was not able to be readily performed. All mobile homes in the SFHA are included in the A-zone total for this table, since most jurisdictions in Charleston County restrict mobile homes from the “V” flood zone areas.

Attachment 5-6-E: Charleston Region Buildings Vulnerable to Flooding Due to Year of Construction and Location in the Special Flood Hazard Area (SFHA)

Jurisdiction	Pre-1985 Site-Built Residential Buildings in SFHA	Pre-1985 Commercial Buildings in SFHA	Total Pre-1985 Site-Built Buildings in SFHA	% of All Site-Built Buildings In Jurisdiction Constructed Pre-1985 and in SFHA	Pre-1985 Mobile Homes in SFHA	Total Site-Built Buildings Pre-1985 & Mobile Homes in SFHA
Isle of Palms	2,065	14	2,079	99.71	0	2,079

Attachment 5-6-F: Charleston Region Average Valuation of Buildings and Mobile Homes

Jurisdiction	Avg. Site-Built Residential Building Value	Avg. Commercial Building Value	Avg. Mobile Home Value**	Estimated Total Pre-1985 Site-Built and Mobile Home Building Value	Estimated Pre-1985 Site-Built Building And Mobile Home Value in SFHA (mil.\$)
Isle of Palms (All)	\$321,633.46	\$161,714.70	\$0.00	\$442,085,602.00	
Pre-1985 only	\$213,100.29	\$78,740.00	\$0.00		\$441,202,602.00

** Valuation data reflected herein is for mobile homes, regardless of age.

Attachment 5-6-G: Charleston Region Average Valuation of Site-Built Buildings by Flood Zone

Jurisdiction	Total Value "A" Zones Site-Built Structures	Total Value "V" Zones Site-Built Structures(mil\$)	Total Value Site-Built Structures Not in the SFHA (mil\$)	Total Value of Site-Built Structures Not Flood-Zone Coded** (mil\$)
Isle of Palms	1,061,230,787	402,333,599	8,672,200	6,216,400

** Valuation data reflected herein is for mobile homes, regardless of age.

5.7(a) - Town of James Island

Flood

Location

Flooding can occur throughout most of the Charleston Region since around 68% resides within a floodplain. Floodplains are designated by the frequency of the flood that is large enough to cover them. Flood frequencies are determined by plotting a graph of the size of all known floods for an area and calculating how often floods occur. The Federal Emergency Management Agency (FEMA) identifies floodplain areas by producing Flood Insurance Rate Maps (FIRM). These maps show all locations near major bodies of water, and show base flood elevations and floodplain boundaries like the 100-year floodplain boundaries. 100-year flood event is a 1% probability of occurring in any given year. The roughly 68% of the areas located in the floodplain are exposed to the threat of floods but that does not mean the other areas are not vulnerable to a flash flood or flooding events. Damaged infrastructure and roadways can limit mobility for citizens. All areas can experience flooding hazards.

Below is a list from each participant in the plan for areas of concern for flooding.

Flood Prone Areas in Charleston County	
Jurisdictions Serviced by Charleston	
County	Area
Town of James Island	Lighthouse Point (tidal)
	Oakcrest (stormwater)
	Seaside to Honey Hill area (Stormwater)
	Harborview by James Island Connector (Tidal)
	Battery Island Drive (Tidal)
	Whitehouse Plantation (Stormwater and Tidal)
	Fort Johnson Road at various places (Stormwater)
	McCall's Corner (Stormwater)
	Bayfront (Stormwater)
	Wambaw (Stormwater)

Historical Occurrences

Flooding Events Between Jan 1, 1950 – April 30, 2019	
Total: 3 Events	Total Damage: \$ 728,550

These flooding events were mainly the result from heavy rain or severe weather (thunderstorms, tropical storms, heavy rain) incidents that caused flooding in the Charleston Region. Charleston broke its record for number of annual-flood days last year. The previous record of 38 days, observed in 2015, was exceeded by 12 days for a total of 50 annual-flood days in 2016. Compared to 1995, trends in flooding during 2016 have increased by 130 percent on average.

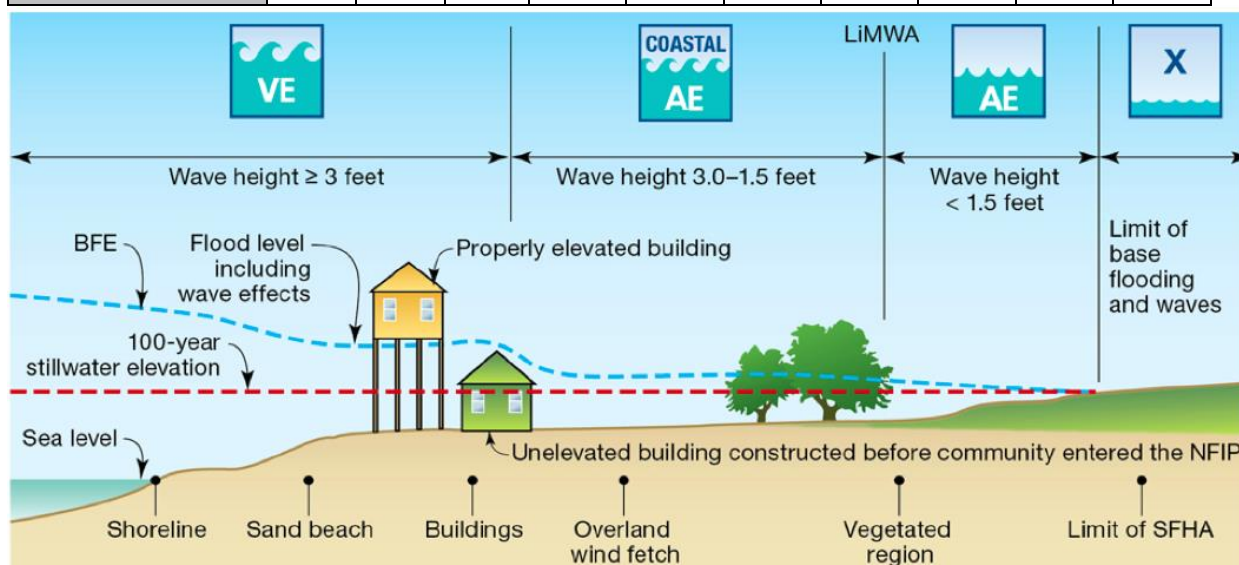
Flooding Probability for each Jurisdiction	
Jurisdiction	Probability
Town of James Island	76-100%

Sea Level Rise

Location

Flooding and tidal flooding is a good indicator of what areas are most at risk for sea level rise and the stressors that accompany it: nuisance flooding, increased storm surge, loss of property. Land in the most susceptible flood zones (AE and VE) will be most affected as sea level continues to rise. Areas of the most susceptibility include Eastern Folly Beach and Morris Island, the tips of Sullivan’s Island, the northeastern coast of James Island near SC-30 and Harbor View Rd., all of Seabrook and Edisto’s coastline, eastern Isle of Palms and Caper’s Island, all of Awendaw’s coastline, and the northeastern coastline of Murphy Island and the coast of the Dunes West Golf and Resort Club. Below is an illustration of the definitions of the different flood zones:

Amount of Land Area of Charleston County Above Sea Level										
Elevation above spring high water (m)	0.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00
Area of Land (sq. km)	108.6	175.5	223	305.5	344.2	421.8	464.9	587.2	684.4	858.2
Percent of Total Land Cover	4.6%	7.4%	9.4%	12.9%	14.5%	17.8%	19.6%	24.8%	28.9%	36.2%



Occurrences

King tides, which is the above average high tide occurring when once a lunar cycle, are a good predictor of sea level rise. On average there were over twice as many observed tides than predicted tides. The depth averaged more than a foot deeper than expected. There were 28 more king tides than predicted in 2018 and the highest observed tide was over a foot and a half higher than the highest predicted tide. King tides give a community a glimpse into what it will be like to live with a higher sea level. Communities can expect more king tides in the future as sea level continues to rise.

Duration and Depth* of King Tides in Charleston Area from January 2014 – December 2019				
Year	Predicted Number of Tides	Observed Number of Tides	Highest Predicted Tide (ft)	Highest Observed Tide (ft)
2014	28	46	7	7.6
2015	40	111	7.2	8.7
2016	49	82	7.2	7.9
2017	34	111	7	9.9
2018	44	72	6.9	8.8
Average	39	84.4	7.06	8.58
Total	195	422	35.3	42.9

*Depth is based off of the Charleston Harbor Tide Gauge

**Available data from 2014 onwards gathered through MyCoast.org backed by SC DHEC: <https://mycoast.org/sc/king-tides>

Sea Level Rise/King Tide Probability for each Jurisdiction	
Jurisdiction	Probability
Town of James Island	51-75%

Severe Storm

Location

A thunderstorm event is an atmospheric hazard, and has no geographic boundaries. They can occur in all regions of the United States however, thunderstorms are most common in the central and southern states because atmospheric conditions are more favorable for generating thunderstorms. Since thunderstorms are unpredictable, all jurisdictions are equally exposed to these hazards.

Historical Occurrences

Severe Storm Events (Thunderstorm Winds) 1956 – April 2019		
TOTAL: 11 Events	Average Wind Speed: 52	Total Damage: \$9,750

Source: NOAA Storm Events Database

Severe Storm (Hail) Incidents in Charleston County 1957 – April 2019		
Total: 22 Events	AVERAGE SIZE:	TOTAL DAMAG E:
	.877	\$500

Source: NOAA Storm Events Database

Severe Storm (Lightning) Incidents in Charleston County 1998 – April 2019	
Total: 1 Event	Total Damage:
	\$5,000

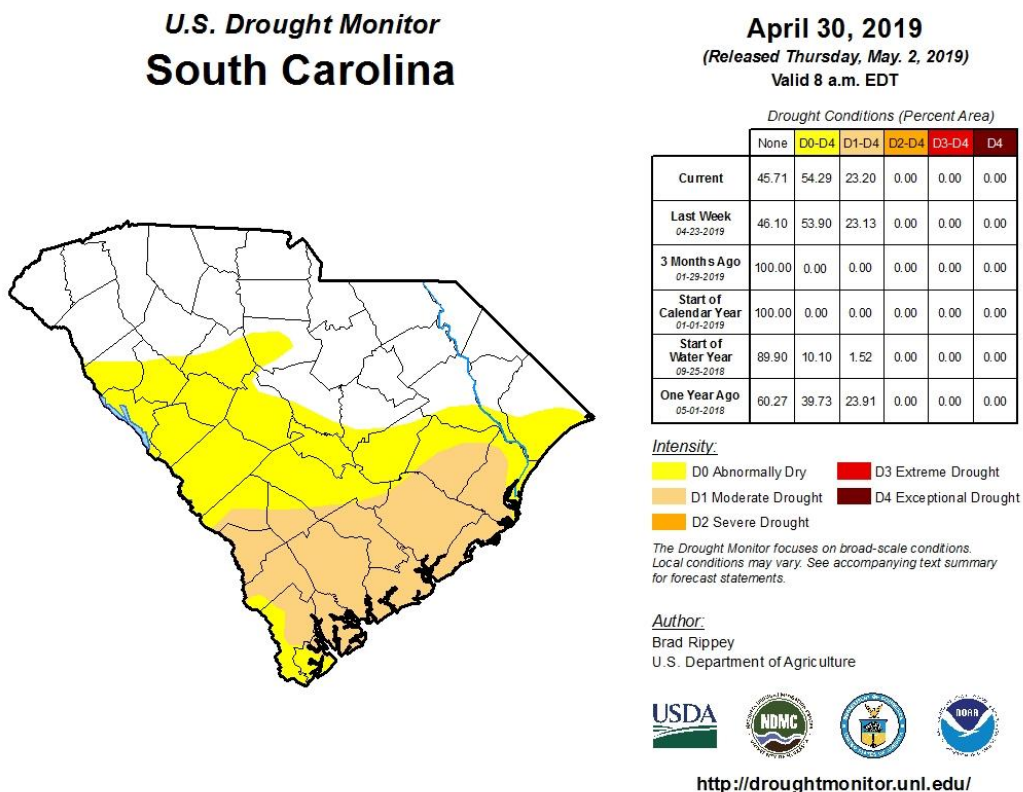
Source: NOAA Storm Events Database

Severe Storm Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of James Island	76-100%

Drought

Location

Droughts typically cover a large area and cannot be confined to any geographic boundary. For this purpose, the whole Charleston Region is vulnerable to the threat of a drought.



(An example of the extent of drought that the State experienced in late April 2019)

Historical Occurrences

Year	Number of weeks of Drought Events between May 1, 2013 – April 30, 2019						Description
	None	D0 Abnormally Dry	D1 Moderate Drought	D2 Severe Drought	D3 Extreme Drought	D4 Exceptional Drought	
1999-2000	35	17	2	0	0	0	

2000-2001	17	35	19	5	0	0	
2001-2002	4	48	38	32	19	0	
2002-2003	18	34	20	18	13	0	
2003-2004	46	6	0	0	0	0	
2004-2005	32	20	5	0	0	0	
2005-2006	47	5	0	0	0	0	
2006-2007	27	25	3	0	0	0	
2007-2008	0	53	35	12	0	0	
2008-2009	15	37	22	0	0	0	
2009-2010	38	14	2	0	0	0	
2010-2011	29	23	0	0	0	0	
2011-2012	0	53	50	46	39	3	
2012-2013	7	45	20	9	5	0	
2013-2014	32	20	0	0	0	0	The Region experienced 20 weeks in drought stage. 32 weeks of no drought stage were reported and 20 weeks of D0 drought from October to December.
2014-2015	37	15	0	0	0	0	The Region experienced only 15 weeks of D0 drought. During weeks when drought was experienced, only approximately 10-20 percent of the county was affected. 37 weeks of the year, the Region experienced no drought.
2015-2016	36	16	0	0	0	0	The Region experienced 16 weeks of D0 drought. During weeks when drought was experienced, only approximately 10-20 percent of the county was affected. 36 weeks of the year, the Region experienced no drought.
2016-2017	38	14	6	0	0	0	The Region experienced 20 weeks of drought stage. During these 20 weeks, the drought stage remained at D0 for 14 weeks and D1 for 6 weeks. 38 weeks of the year, the Region experienced no drought.
2017-2018	23	29	14	4	0	0	The Region experienced 29 weeks of drought stage D0 and 14 weeks of D1. In addition, 4 weeks were spent at D2; there were 23 weeks where the Region experienced no drought
2018-2019	26	26	10	0	0	0	The Region experienced 36 total drought weeks. 26 weeks were spent at D0 and an additional 10 weeks were spent at D1. The Region was no experiencing a drought for 26 weeks.

Source: U.S. Drought Monitor

According to the U.S. Drought Monitor, the Charleston Region was in the D4 (Exceptional Drought) category for a number of weeks in early 2012 with a Palmer Drought Index of at least -5.0 (Extreme Drought). It is possible for severe and exceptional drought periods to return to the Charleston Region.

Drought Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of James Island	26-50%

Winter Weather

Location

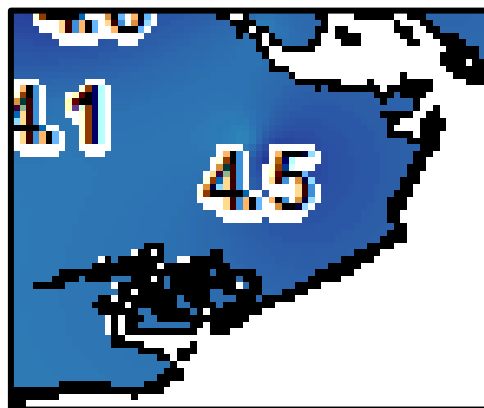
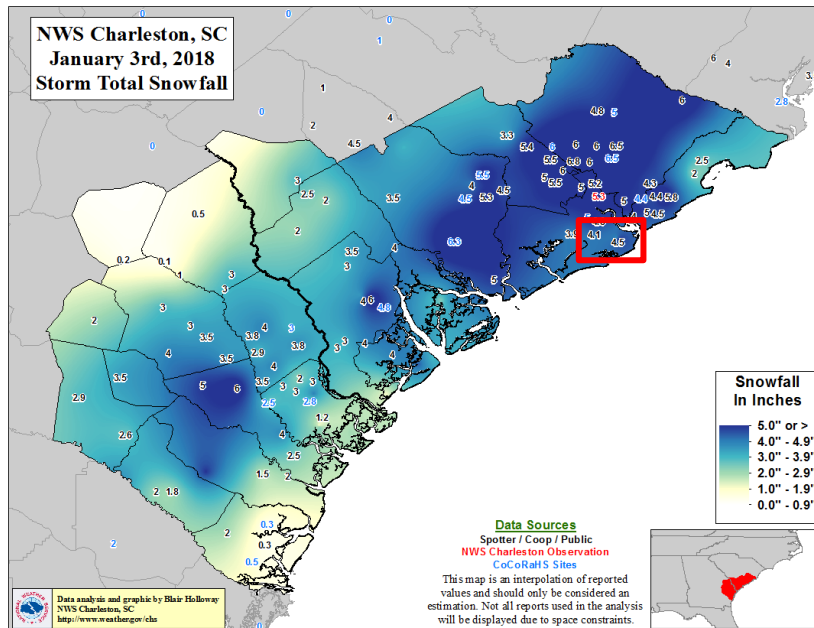
While the Region does not regularly encounter extreme winter storms, some aspects of winter weather occur in the Region annually. With the random nature of this hazard, all jurisdictions are subject to winter weather conditions.

Historical Occurrences

Winter Weather Events Through April 2019	
Total of 10 Events	Total
	Damage
	\$233,000

Source: NOAA Climate Data

A rare winter storm affected southeast South Carolina on January 3, 2018. The storm produced a variety of wintry precipitation, including snow, sleet and freezing rain. Charleston Airport (KCHS) measured 5.3 inches of snow, the 3rd greatest daily snowfall on record, just 0.1 inches shy of the 5.4 inches that fell during the 1973 storm (NWS, 2019).



Winter Weather Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of James Island	51-75%

5.7(b) - James Island Problem Assessment

5.7.1 – Hazard Vulnerability

The analysis for this section is identical to the analysis under “Hazard Vulnerability” for Unincorporated Charleston County.

5.7.2 – Vulnerable Buildings

The analysis for this section is identical to the analysis under “Vulnerable Buildings” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-7-9

Building Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
Jurisdiction	Dam Failure	Drought	Earthquakes	Flooding	Hazardous Material Incidents	Hurricanes	Sea Level Rise	Tornadoes	Terrorist Incidents	Tsunamis	Wildfires	Winter Weather
Town of James Island	5	5	2	2	4	1	2	1	3	3	4	2

5.7.3 – Infrastructure Vulnerability

The analysis for this section is identical to the analysis under “Infrastructure Vulnerability” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-7-11

Infrastructure Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
Town of James Island	5	5	3	2	5	1	1	4	3	4	5	4

Problem Statements and Vulnerability Based on Jurisdiction	
Jurisdiction	Vulnerability Assessment
Town of James Island	The Town has many rivers and creeks running through it or near it. It is also adjacent to the Charleston Harbor. This makes the Town vulnerable to hurricanes, flooding and sea level rise. Outdated storm drainage systems and having to work with multiple jurisdictions on the island make for an issue in coordination with standards. This coastal community is also vulnerable to tsunamis.

5.7.4 - Known Flood Damages

The analysis for this section is identical to the analysis under “Known Flood Damages” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Town of James Island Higher Regulatory Standards
2' freeboard
1/2 foot rise in floodway
All Inspectors are State certified
Five year cumulative of all permits is included when conducting a substantial review

5.7.5 - Past Flood Impacts

The analysis for this section is identical to the analysis under “Past Flood Impacts” for Unincorporated Charleston County.

5.7.6 - Emergency Warning Needs

The analysis for this section is identical to the analysis under “Emergency Warning Needs” for Unincorporated Charleston County.

5.7.7 - Critical Facilities

The analysis for this section is identical to the analysis under “Critical Facilities” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-7-13

Critical Facility Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
Town of James Island	5	5	3	4	5	2	3	2	2	4	5	3

A full list of the capabilities for Charleston County and plan participating partners can be seen in the “Critical Facilities” description in Section 5.1(b).

5.7.8 - Natural and Beneficial Functions of Floodplains

The analysis for this section is identical to the analysis under “Natural and Beneficial Functions of Floodplains” for Unincorporated Charleston County.

5.7.9 – Development and Population Trends

The analysis for this section is identical to the analysis under “Development and Population Trends” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-7-14

Estimated Population 2017-2018 in Charleston County SC		
Jurisdiction	Growth Rate 2010-2018	Projected 2018 Population
Town of James Island	7.60%	12,068

Source: U.S. Census Bureau, Population Division 2018

Additional summaries of the anticipated future development trends for the local governments within Charleston County, as provided by the local government entities participating in the Charleston Regional Hazard Mitigation Plan, are outlined in “Development and Population Trends” in Section 5.1(b).

5.7.10 – Economic Impact

The analysis for this section is identical to the analysis under “Economic Impact” for Unincorporated Charleston County.

5.7.11 – Resiliency to Hazards

The analysis for this section is identical to the analysis under “Resiliency to Hazards” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Attachment 5-7-D: Charleston Region Buildings Vulnerable to Flooding Due to Location in the Special Flood Hazard Area (SFHA) Only

Jurisdiction	Total Site-Built Structures	% of Total Site-Built Structures in the SFHA	Mobile Homes in SFHA*	Residential site-built structures in the SFHA		Commercial Structures in the SFHA		Total Structures in the SFHA (including site-built and mobile homes)	
				SFHA	A/AE Zone	V/VE Zone	A/AE Zone	V/VE Zone	A/AW Zone*
James Island	5,279	61	16	2,930	196	68	1	3,014	197

* Since most mobile homes in Charleston County are treated as vehicles for tax purposes, the determination of “A” or “V” zones for these homes using the Q-3 digital data was not able to be readily performed. All mobile homes in the SFHA are included in the A-zone total for this table, since most jurisdictions in Charleston County restrict mobile homes from the “V” flood zone areas.

Attachment 5-7-E: Charleston Region Buildings Vulnerable to Flooding Due to Year of Construction and Location in the Special Flood Hazard Area (SFHA)

Jurisdiction	Pre-1985 Site-Built Residential Buildings in SFHA	Pre-1985 Commercial Buildings in SFHA	Total Pre-1985 Site-Built Buildings in SFHA	% of All Site-Built Buildings In Jurisdiction Constructed Pre-1985 and in SFHA	Pre-1985 Mobile Homes in SFHA	Total Site-Built Buildings Pre-1985 & Mobile

						Homes in SFHA
James Island	2,431	34	2,465	59.1	7	2,472

Attachment 5-7-F: Charleston Region Average Valuation of Buildings and Mobile Homes

Jurisdiction	Avg. Site-Built Residential Building Value	Avg. Commercial Building Value	Avg. Mobile Home Value**	Estimated Total Pre-1985 Site-Built and Mobile Home Building Value	Estimated Pre-1985 Site-Built Building And Mobile Home Value in SFHA (mil.\$)
James Island(All)	\$174,535.41	\$242,997.24	\$14,996.43	\$668,447,109.00	
Pre-1985 only	\$160,404.20	\$154,449.35	\$2,512.50		\$400,181,408.00

** Valuation data reflected herein is for mobile homes, regardless of age.

Attachment 5-7-G: Charleston Region Average Valuation of Site-Built Buildings by Flood Zone

Jurisdiction	Total Value "A" Zones Site-Built Structures	Total Value "V" Zones Site-Built Structures(mil\$)	Total Value Site-Built Structures Not in the SFHA (mil\$)	Total Value of Site-Built Structures Not Flood-Zone Coded** (mil\$)
James Island	531,449,001	46,792,500	352,708,801	349,367,401

** Valuation data reflected herein is for mobile homes, regardless of age.

5.8(a) - Town of Kiawah Island

Hurricane

Location

Hurricanes and tropical storms threaten the entire Atlantic and Gulf coast of the United States, as well as the Pacific coast. Hurricanes that originate in the Gulf of Mexico can still impact the Charleston Region. With about 68% of the Charleston Region in the floodplain and some jurisdictions located 100% in the floodplain and with the community being a coastal community, the Region is vulnerable to hurricanes and tropical storms and their aftermaths. Since hurricane landing patterns are unpredictable until the storm has formed and is within a short time from landing, the Region can not presume that past strike history will continue into the future, and all areas within the Region are subject to these types of events.

Occurrences

Hurricane Events between August 11 1940 - April 30 2013			
Name	Category	Date	Damage Description
August 11th, 1940 (Name classification started after 1950)	2	August 11th, 1940	Estimated damage to the city was \$1 million. Sullivan's Island and the City of the Isle of Palms suffered minor damage.
Hurricane Hazel	4	October 15th, 1954	Folly Beach, Sullivan's Island, and the Isle of Palms suffered light property damage and slight beach erosion. The City of Charleston experienced no serious damage.
Hurricane Gracie	3	September 29th, 1959	The total damage inflicted by the storm was estimated at \$14 million. High water marks, which were reported near the Town of Edisto Beach, South Carolina, ranged from 7.3 to 11.9 feet.
Hurricane David	3	August 29th - September 7th, 1979	Flooding and minor damage in the City of Charleston.
Hurricane Hugo	4	September 19th, 1989	Tidal surges north of the city were recorded at 19.8 feet and 11.8 feet in the Peninsula City. The hurricane struck at high tide. Its recorded diameter was over 500 miles, Four (4) people were killed and scores injured. Estimated damage of \$7 billion for the total area.
Hurricane Bertha	2	July 12th, 1996	This hurricane came close but did not cause any significant damage. Some coastal areas experienced moderate beach erosion. Tourism estimated loss revenue of 20 million dollars.
Hurricane Fran	3	September 5th, 1996	The storm didn't directly hit the Charleston Region but remnants of this hurricane created power outages with economic losses estimated at 20 million dollars.
Hurricane Bonnie	3	August 26th, 1998	Remnants of this hurricane produced winds that knocked down several trees in the Town of Mount Pleasant as it headed for the North Carolina Coast.
Hurricane Floyd	2	September 15th, 1999	Sustained winds of 58 miles per hour were recorded in downtown Charleston with gusts up to 85 miles per hour. Generally 3-5 inches of rainfall occurred. An estimated \$10.5 million in damages occurred in the Charleston region.
Hurricane Irene	1	October 17th, 1999	This hurricane dropped 3 to 5 inches of rain created minor street flooding. Minor beach erosion. Trees knocked down and power outages in the area.
Tropical Storm Gordon		September 18th, 2000	Remnants of the storm dropped 6-10 inches of rain. Minor beach erosion occurred as a result of this storm.
Tropical Storm Claudette		July 14th, 2003	Two and a half inches of rain, a tree was downed, 11 traffic accidents.
Tropical Depression Seven		July 25th, 2003	Expected to receive as much as 6 inches of rain and wind gusts up to 35 mph from this storm.
Tropical Storm Henri		September 6th, 2003	Folly Beach, Sullivan's Island, and Isle of Palms experienced beach erosion from remnants of the storm, which was predicted to also bring up to 5 inches of rain to the Charleston area.
Hurricane Isabel	2	September 17th, 2003	This storm created 8 foot surf at Kiawah Island and had wind gusts of 40 mph offshore and 20 mph in downtown Charleston when it passed offshore. Coastal erosion was expected, as tides were 6 to 12 inches above normal.
Tropical Storm Alex		August 2nd, 2004	Minor beach erosion was reported on Folly Beach.
Tropical Storm Bonnie		August 12th, 2004	The remnants of this storm caused a tornado and several incidents of wind damage in the Awendaw area.
Hurricane Charley	1	August 14-15th, 2004	An estimated 4 inches of rain fell in 2 hours in the Northern part of Charleston County on August 14, 2004, flooding low lying areas and areas with poor drainage. Storm surge was estimated at 4-6 feet from Oyster Landing to the Cape Romain Wildlife Refuge in the northern portions of Charleston County. Minor property and tree damage occurred as a result of this storm. The storm caused an estimated damage of \$2 million in South Carolina.
Hurricane Gaston	1	August 29th, 2004	Sustained winds of 75 mph. The storm brought a 4 foot storm surge into Bull's Bay, which caused an estimated \$4.8 million in damages to homes, primarily in areas east of the Cooper River creating debris with an estimated clean-up cost of \$2.2 million county-wide, and left nearly all of the customers of South Carolina Electric and Gas without electrical power. Total estimated damages, per the National Weather Service, were \$7.6 million in Charleston County.

Tropical Storm Frances		September 6th, 2004	This storm created nearly 6 ft. surf. Dropped nearly 5 inches of rain, winds of 35 mph, minor damage and flooding.
Tropical Depression Jeanne		September 27th, 2004	Resulted in 40 ft. of beach erosion on the north end of Folly Beach. Maximum wind gusts in Charleston County from this storm were 41 mph in downtown Charleston and at the Charleston airport. Maximum wind gusts at Folly Beach were 38 mph. Non-tornadic damage was limited to a few trees falling on cars.
Tropical Storm Ophelia		September 13th, 2005	Loss of Life, Beach Erosion, minor damage.
Tropical Storm Tammy		October 5th, 2005	Significant Beach Erosion, flooding, minor damage.
Tropical Storm Alberto		June 13th, 2006	Remnants of the storm produced a tornado that touched down near Awendaw, knocking down trees. Street flooding occurred in Charleston and North Charleston as a result of this storm.
Tropical Storm Ernesto		August 31st, 2006	Mt. Pleasant received 6.65 inches of rainfall from this storm system. Street flooding occurred in the City of Charleston and 40 mph gusts.
Tropical Storm Barry		June 2nd, 2007	Remnants of the storm produced heavy rains, strong winds, rough surf, and 3 inches of rain. Loss of electricity to 13,900 customers of SCE&G and Berkeley Electric Cooperative, mostly in the Summerville area, which caused vessels to break their lines, and flood streets, particularly on the Charleston Peninsula. Wind gusts up to 60 mph were recorded.
Tropical Storm Hanna		September 5th, 2008	Resulting in strong wind and localized heavy rain.
Tropical Storm Irene		August 25th, 2011	The Charleston County Folly Beach Park received significant erosion-related damages as a result of this storm, including beach areas and structures.
Tropical Storm Lee		September 6th, 2011	Charleston County sustained scattered showers, thunderstorms, and winds up to 22 mph with a half-inch of rain in some areas.
Tropical Storm Beryl		May 27th, 2012	The region saw tropical storm forced winds, heavy rainfall, and fallen trees as result of the storm.
Tropical Storm Sandy		October 27th, 2012	The storm produced forced winds of 40 mph.

Hurricane Events between May 1, 2013 – January 31, 2019

Name	Category	Date	Damage Description
Tropical Storm Andrea		June 6, 2013	Heavy rainfall 3-7 inches
Tropical Storm Arthur		July 3, 2014	Tropical storm watch was posted for Santee River to Bogue Banks, NC. Wind gusts up to 42 mph (68 km/h) along coastal areas, resulting in scattered power outages
Tropical Storm Ana		May 7-8, 2015	Tropical storm warning from South Santee River to Surf City, NC. Produced a small storm surge along Charleston County coast.
Hurricane Joaquin	4	October 1-5, 2015	Did not make landfall in the US, but caused catastrophic flooding in South Carolina and intense flooding and power outages in Charleston County. South Carolina Governor Haley declared a State of Emergency.
Hurricane Matthew	1	October 7-8, 2016	Once a Category 5 hurricane before ripping through Haiti and eastern Cuba, Hurricane Matthew had downgraded to a Category 1 by the time it hit South Carolina. Even so, 830,000 South Carolinians lost power, 355,000 evacuated from their homes, and 4 lost their lives.
Hurricane Irma	1	9/11-9/12/2017	Once a Category 5 hurricane before ripping through the Caribbean, Hurricane Irma had downgraded to a Category 1, and eventually a tropical storm, by the time the system impacted South Carolina. Even so, over 100,000 South Carolinians lost power, 3 lost their lives, and Charleston recorded its third highest storm surge ever (10ft).
Hurricane Florence	1	9/14/2018	Once a Category 4 hurricane before making landfall north of Charleston County, this storm impacted Charleston County as a tropical depression. No lives were lost in Charleston County although thousands of residents lost power during the storm's peak.

Hurricane Michael	4	10/11/2018	Making landfall as a Category 4 hurricane in Florida's Bay County, this storm impacted Charleston County by bringing 50 mph winds which dismantled many trees and power lines plus a storm surge measured at 2.07 ft in Charleston Harbor. Charleston County saw no lost lives, although the storm directly caused 16 casualties and 43 indirectly, according to the NOAA.
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Hurricane Probability for each Jurisdiction	
Jurisdiction	Probability
Town of Kiawah Island	26-50%

Flood

Location

Flooding can occur throughout most of the Charleston Region since around 68% resides within a floodplain. Floodplains are designated by the frequency of the flood that is large enough to cover them. Flood frequencies are determined by plotting a graph of the size of all known floods for an area and calculating how often floods occur. The Federal Emergency Management Agency (FEMA) identifies floodplain areas by producing Flood Insurance Rate Maps (FIRM). These maps show all locations near major bodies of water, and show base flood elevations and floodplain boundaries like the 100-year floodplain boundaries. 100-year flood event is a 1% probability of occurring in any given year. The roughly 68% of the areas located in the floodplain are exposed to the threat of floods but that does not mean the other areas are not vulnerable to a flash flood or flooding events. Damaged infrastructure and roadways can limit mobility for citizens. All areas can experience flooding hazards.

Below is a list from each participant in the plan for areas of concern for flooding.

Flood Prone Areas of Charleston County	
<i>Jurisdictions Serviced by Charleston County</i>	<i>Area</i>
Town of Kiawah Island	Entire Island with special regard to land and property along the Kiawah River

Historical Occurrences

Severe Flooding Events Between Jan 1, 1950 – April 30, 2019	
Total: 1 Severe Event	Total: \$728,550

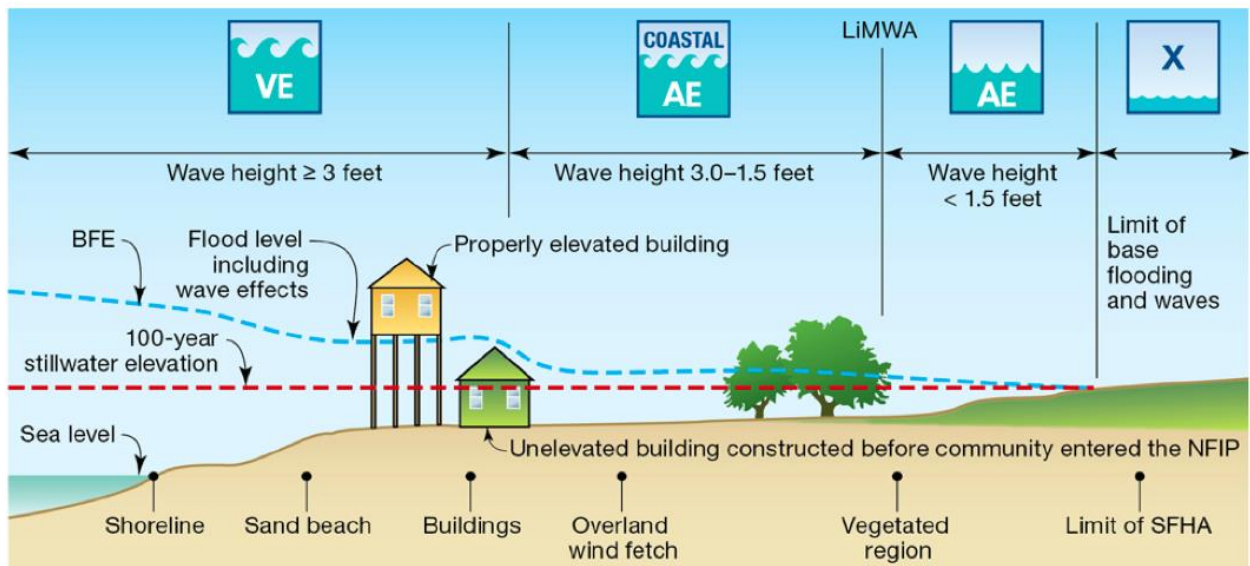
These flooding events were mainly the result from heavy rain or severe weather (thunderstorms, tropical storms, heavy rain) incidents that caused flooding in the Charleston Region. Charleston broke its record for number of annual-flood days last year. The previous record of 38 days, observed in 2015, was exceeded by 12 days for a total of 50 annual-flood days in 2016. Compared to 1995, trends in flooding during 2016 have increased by 130 percent on average.

Flooding Probability for each Jurisdiction	
Jurisdiction	Probability
Town of Kiawah Island	76-100%

Sea Level Rise

Location

Flooding and tidal flooding is a good indicator of what areas are most at risk for sea level rise and the stressors that accompany it: nuisance flooding, increased storm surge, loss of property. Land in the most susceptible flood zones (AE and VE) will be most affected as sea level continues to rise. Areas of the most susceptibility include Eastern Folly Beach and Morris Island, the tips of Sullivan’s Island, the northeastern coast of James Island near SC-30 and Harbor View Rd., all of Kiawah Island, especially laterally along the banks of the Kiawah River, all of Seabrook and Edisto’s coastline, eastern Isle of Palms and Caper’s Island, all of Awendaw’s coastline, and the northeastern coastline of Murphy Island and the coast of the Dunes West Golf and Resort Club. Below is an illustration of the definitions of the different flood zones:



Amount of Land Area of Charleston County Above Sea Level										
Elevation above spring high water (m)	0.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00
Area of Land (sq. km)	108.6	175.5	223	305.5	344.2	421.8	464.9	587.2	684.4	858.2
Percent of Total Land Cover	4.6%	7.4%	9.4%	12.9%	14.5%	17.8%	19.6%	24.8%	28.9%	36.2%

Occurrences

King tides, which is the above average high tide occurring when once a lunar cycle, are a good predictor of sea level rise. On average there were over twice as many observed tides than predicted tides. The depth averaged more than a foot deeper than expected. There were 28 more king tides than predicted in 2018 and the highest observed tide was over a foot and a half higher than the highest predicted tide. King tides give a community a glimpse into what it will be like to live with a higher sea level. Communities can expect more king tides in the future as sea level continues to rise.

Duration and Depth* of King Tides in Charleston Area from January 2014 – December 2019

Year	Predicted Number of Tides	Observed Number of Tides	Highest Predicted Tide (ft)	Highest Observed Tide (ft)
2014	28	46	7	7.6
2015	40	111	7.2	8.7
2016	49	82	7.2	7.9
2017	34	111	7	9.9
2018	44	72	6.9	8.8
Average	39	84.4	7.06	8.58
Total	195	422	35.3	42.9

*Depth is based off of the Charleston Harbor Tide Gauge

**Available data from 2014 onwards gathered through MyCoast.org backed by SC DHEC:
<https://mycoast.org/sc/king-tides>

Sea Level Rise/King Tide Probability for each Jurisdiction	
Jurisdiction	Probability
Town of Kiawah Island	76-100%

Rip Current

Location

The Charleston Region stretches nearly 100 miles along the Atlantic Ocean. The Region's beaches are prone to rip currents daily leaving citizens who enjoy the beaches vulnerable to this threat. This type of hazard does not cost damage to buildings or infrastructure but it continues to take lives of residents and visitors on an annual basis. Since majority of people in the Region will experience being around the water at some point, the whole Region can be affected.

Historical Occurrences

According to the National Oceanic and Atmospheric Administration (NOAA) and the National Climatic Data Center (NCDC), rip currents will be listed in Storm Data only when they cause a drowning(s), near-drowning(s), result in numerous rescues (i.e., 5 or more at one beach community), or damage watercraft. Events associated with other surf-related currents, such as long-shore or tidal currents, will not be included in Storm Data as Rip Current events. Rip currents can occur any time and any place along beaches or in other bodies of water.

Charleston County Severe Rip Tide Occurrences from January 1, 1950 – April 30th, 2019

Total: 3 Rip Current Events with Deaths and 3 Reported Injuries

Source: NOAA Storm Events Database

Rip Current Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of Kiawah Island	51-75%

Severe Storm

Location

A thunderstorm event is an atmospheric hazard, and has no geographic boundaries. They can occur in all regions of the United States however, thunderstorms are most common in the central and southern states because atmospheric conditions are more favorable for generating thunderstorms. Since thunderstorms are unpredictable, all jurisdictions are equally exposed to these hazards.

Historical Occurrences

Severe Storm Events (Thunderstorm Winds) 1956 – April 2019		
TOTAL: 3 Events	Average Wind Speed: 50	Total Damage: \$1,500

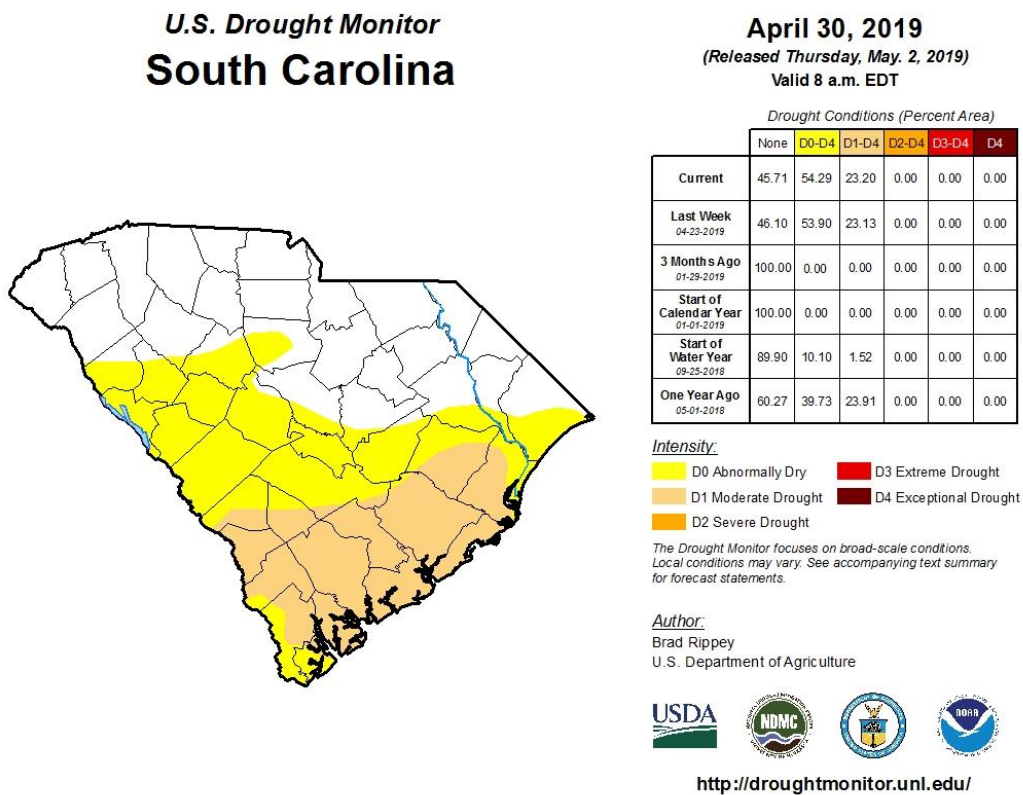
Source: NOAA Storm Events Database

Severe Storm Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of Kiawah Island	76-100%

Drought

Location

Droughts typically cover a large area and cannot be confined to any geographic boundary. For this purpose, the whole Charleston Region is vulnerable to the threat of a drought.



(An example of the extent of drought that the State experienced in late April 2019)

Historical Occurrences

Number of weeks of Drought Events between May 1, 2013 – April 30, 2019							
Year	Category						Description
	None	D0 Abnormally Dry	D1 Moderate Drought	D2 Severe Drought	D3 Extreme Drought	D4 Exceptional Drought	
1999-2000	35	17	2	0	0	0	
2000-2001	17	35	19	5	0	0	
2001-2002	4	48	38	32	19	0	
2002-2003	18	34	20	18	13	0	
2003-2004	46	6	0	0	0	0	
2004-2005	32	20	5	0	0	0	
2005-2006	47	5	0	0	0	0	
2006-2007	27	25	3	0	0	0	
2007-2008	0	53	35	12	0	0	
2008-2009	15	37	22	0	0	0	
2009-2010	38	14	2	0	0	0	
2010-2011	29	23	0	0	0	0	
2011-2012	0	53	50	46	39	3	
2012-2013	7	45	20	9	5	0	
2013-2014	32	20	0	0	0	0	The Region experienced 20 weeks in drought stage. 32 weeks of no drought stage were reported and 20 weeks of D0 drought from October to December.
2014-2015	37	15	0	0	0	0	The Region experienced only 15 weeks of D0 drought. During weeks when drought was experienced, only approximately 10-20 percent of the county was affected. 37 weeks of the year, the Region experienced no drought.
2015-2016	36	16	0	0	0	0	The Region experienced 16 weeks of D0 drought. During weeks when drought was experienced, only approximately 10-20 percent of the county was affected. 36 weeks of the year, the Region experienced no drought.
2016-2017	38	14	6	0	0	0	The Region experienced 20 weeks of drought stage. During these 20 weeks, the drought stage remained at D0 for 14 weeks and D1 for 6 weeks. 38 weeks of the year, the Region experienced no drought.
2017-2018	23	29	14	4	0	0	The Region experienced 29 weeks of drought stage D0 and 14 weeks of D1. In addition, 4 weeks were spent at D2; there were 23 weeks where the Region experienced no drought
2018-2019	26	26	10	0	0	0	The Region experienced 36 total drought weeks. 26 weeks were spent at D0 and an additional 10 weeks were spent at D1. The Region was no experiencing a drought for 26 weeks.

Source: U.S. Drought Monitor

According to the U.S. Drought Monitor, the Charleston Region was in the D4 (Exceptional Drought) category for a number of weeks in early 2012 with a Palmer Drought Index of at least -5.0 (Extreme Drought). It is possible for severe and exceptional drought periods to return to the Charleston Region.

Drought Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of Kiawah Island	26-50%

Winter Weather

Location

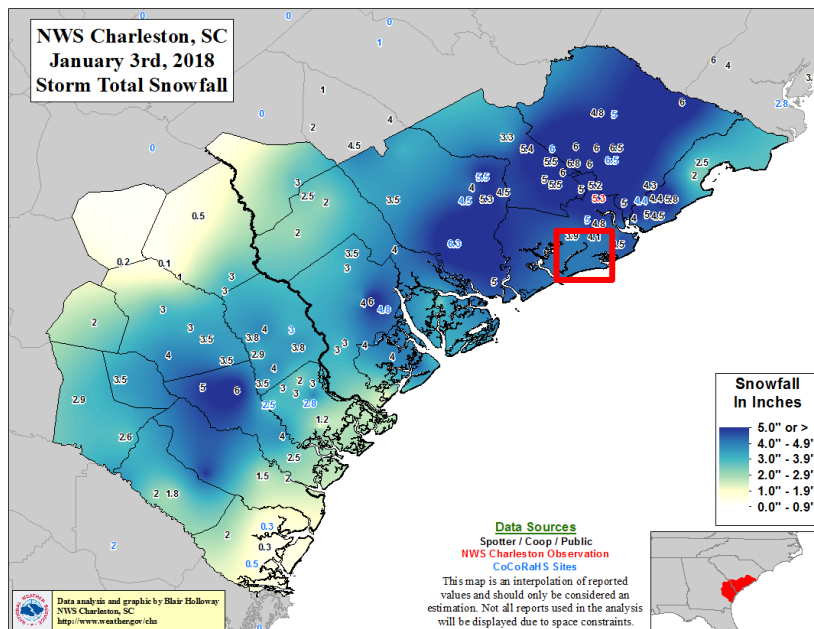
While the Region does not regularly encounter extreme winter storms, some aspects of winter weather occur in the Region annually. With the random nature of this hazard, all jurisdictions are subject to winter weather conditions.

Historical Occurrences

Winter Weather Events Through April 2019	
Total of 10 Events	Total
	Damage
	\$233,000

Source: NOAA Climate Data

A rare winter storm affected southeast South Carolina on January 3, 2018. The storm produced a variety of wintry precipitation, including snow, sleet and freezing rain. Charleston Airport (KCHS) measured 5.3 inches of snow, the 3rd greatest daily snowfall on record, just 0.1 inches shy of the 5.4 inches that fell during the 1973 storm (NWS, 2019).



Winter Weather Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of Kiawah Island	51-75%

5.8(b) – Kiawah Island Problem Assessment

5.8.1 – Hazard Vulnerability

The analysis for this section is identical to the analysis under “Hazard Vulnerability” for Unincorporated Charleston County.

5.8.2 – Vulnerable Buildings

The analysis for this section is identical to the analysis under “Vulnerable Buildings” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-8-9

Building Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
Jurisdiction	Dam Failure	Drought	Earthquakes	Flooding	Hazardous Material Incidents	Hurricanes	Sea Level Rise	Tornadoes	Terrorist Incidents	Tsunamis	Wildfires	Winter Weather
Town of Kiawah Island	4	4	1	1	4	1	1	2	2	1	5	2

5.8.3 – Infrastructure Vulnerability

The analysis for this section is identical to the analysis under “Infrastructure Vulnerability” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-8-11

Infrastructure Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
Town of Kiawah Island	2	5	1	1	5	1	1	4	1	1	5	1

Problem Statements and Vulnerability Based on Jurisdiction	
Jurisdiction	Vulnerability Assessment
Town of Kiawah Island	Being a coastal town, hurricanes, tornadoes, sea level rise and flooding are potentially major problems for Kiawah Island and are most vulnerable to these hazards. Kiawah has a large portion of the residents who do not live full time on the Island and use their homes as secondary homes. This poses a vulnerability to the buildings as these structures may not be prepped properly for a hurricane or repairs may not be started promptly. Again, having a lot of individuals out of state poses a vulnerability for hurricanes, tornadoes, sea level rise, and flooding. This coastal community is also vulnerable to tsunamis.

5.8.4 - Known Flood Damages

The analysis for this section is identical to the analysis under “Known Flood Damages” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-8-12

Loss Statistics for Charleston County as of 9/30/2018					
Jurisdiction	Total Losses	Closed Losses	Open Losses	CWOP Losses	Total Payments
KIAWAH ISLAND, TOWN OF	114	73	0	41	375,382.27
<i>FEMA Policy and Claims Statistics Database, 2019</i>					

Town of Kiawah Island Higher Regulatory Standards
1' freeboard
Five year cumulative of all permits is included when conducting a substantial review
Require BFE's to be included on all plans and FLCs for under construction
Do not allow recreational vehicles of any kind on the island
Require all buildings to be built landward of the reach of mean high tide
Do not allow any encroachments to be located less than 2-times the width or 20 feet for streams w/out established BFE's
Require infrastructure to be installed to minimize flood damage.

5.8.5 - Past Flood Impacts

The analysis for this section is identical to the analysis under “Past Flood Impacts” for Unincorporated Charleston County.

5.8.6 - Emergency Warning Needs

The analysis for this section is identical to the analysis under “Emergency Warning Needs” for Unincorporated Charleston County.

5.8.7 – Critical Facilities

The analysis for this section is identical to the analysis under “Critical Facilities” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-8-13

Critical Facility Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
Town of Kiawah Island	4	5	1	1	5	1	1	5	1	1	5	3

A full list of the capabilities for Charleston County and plan participating partners can be seen in the “Critical Facilities” description in Section 5.1(b).

5.8.8 – Natural and Beneficial Functions of Floodplains

The analysis for this section is identical to the analysis under “Natural and Beneficial Functions of Floodplains” for Unincorporated Charleston County.

5.8.9 – Development and Population Trends

The analysis for this section is identical to the analysis under “Development and Population Trends” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-8-14

Estimated Population 2017-2018 in Charleston County SC		
Jurisdiction	Growth Rate 2010-2018	Projected 2018 Population
Town of Kiawah Island	8.36%	1,762

Source: U.S. Census Bureau, Population Division 2018

Additional summaries of the anticipated future development trends for the local governments within Charleston County, as provided by the local government entities participating in the Charleston Regional Hazard Mitigation Plan, are outlined in “Development and Population Trends” in Section 5.1(b).

5.8.10 – Economic Impact

The analysis for this section is identical to the analysis under “Economic Impact” for Unincorporated Charleston County.

5.8.11 – Resiliency to Hazards

The analysis for this section is identical to the analysis under “Resiliency to Hazards” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Attachment 5-8-D: Charleston Region Buildings Vulnerable to Flooding Due to Location in the Special Flood Hazard Area (SFHA) Only

Jurisdiction	Total Site-Built Structures	% of Total Site-Built Structures in the SFHA	Mobile Homes in SFHA *	Residential site-built structures in the SFHA		Commercial Structures in the SFHA		Total Structures in the SFHA (including site-built and mobile homes)	
				A/AE Zone	V/VE Zone	A/AEZone	V/VEZone	A/AW Zone*	V/VEZone
Kiawah Island	3,813	97	0	3,565	70	55	5	3,620	75

* Since most mobile homes in Charleston County are treated as vehicles for tax purposes, the determination of “A” or “V” zones for these homes using the Q-3 digital data was not able to be readily performed. All mobile homes in the SFHA are included in the A-zone total for this table, since most jurisdictions in Charleston County restrict mobile homes from the “V” flood zone areas.

Attachment 5-8-E: Charleston Region Buildings Vulnerable to Flooding Due to Year of Construction and Location in the Special Flood Hazard Area (SFHA)

Jurisdiction	Pre-1985 Site-Built Residential Buildings in SFHA	Pre-1985 Commercial Buildings in SFHA	Total Pre-1985 Site-Built Buildings in SFHA	% of All Site-Built Buildings In Jurisdiction Constructed Pre-1985 and in SFHA	Pre-1985 Mobile Homes in SFHA	Total Site-Built Buildings Pre-1985 & Mobile Homes in SFHA
Kiawah Island	1,619	20	1,639	100	0	1,639

Attachment 5-8-F: Charleston Region Average Valuation of Buildings and Mobile Homes

Jurisdiction	Avg. Site-Built Residential Building Value	Avg. Commercial Building Value	Avg. Mobile Home Value**	Estimated Total Pre-1985 Site-Built and Mobile Home Building Value	Estimated Pre-1985 Site-Built Building And Mobile Home Value in SFHA (mil.\$)
Kiawah Island (All)	\$476,247.69	\$2,119,297.65	N/A	\$405,993,292.00	
Pre-1985 only	\$248,726.56	\$165,249.60	\$0.00		\$405,993,292.00

** Valuation data reflected herein is for mobile homes, regardless of age.

Attachment 5-8-G: Charleston Region Average Valuation of Site-Built Buildings by Flood Zone

Jurisdiction	Total Value “A” Zones Site-Built Structures	Total Value “V” Zones Site-Built Structures(mil\$)	Total Value Site-Built Structures Not in the SFHA (mil\$)	Total Value of Site-Built Structures Not Flood-Zone Coded** (mil\$)
Kiawah Island	1,725,374,200	89,830,000	0	0

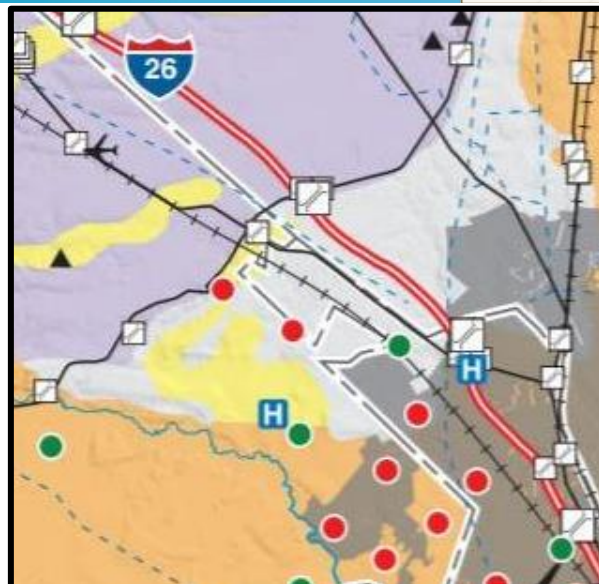
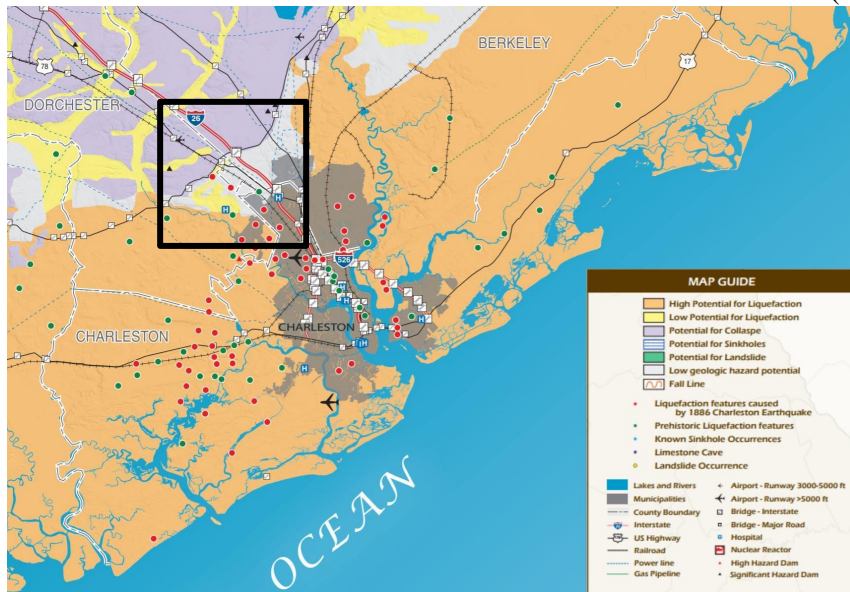
** Valuation data reflected herein is for mobile homes, regardless of age.

5.9(a) - Town of Lincolnville

Earthquake

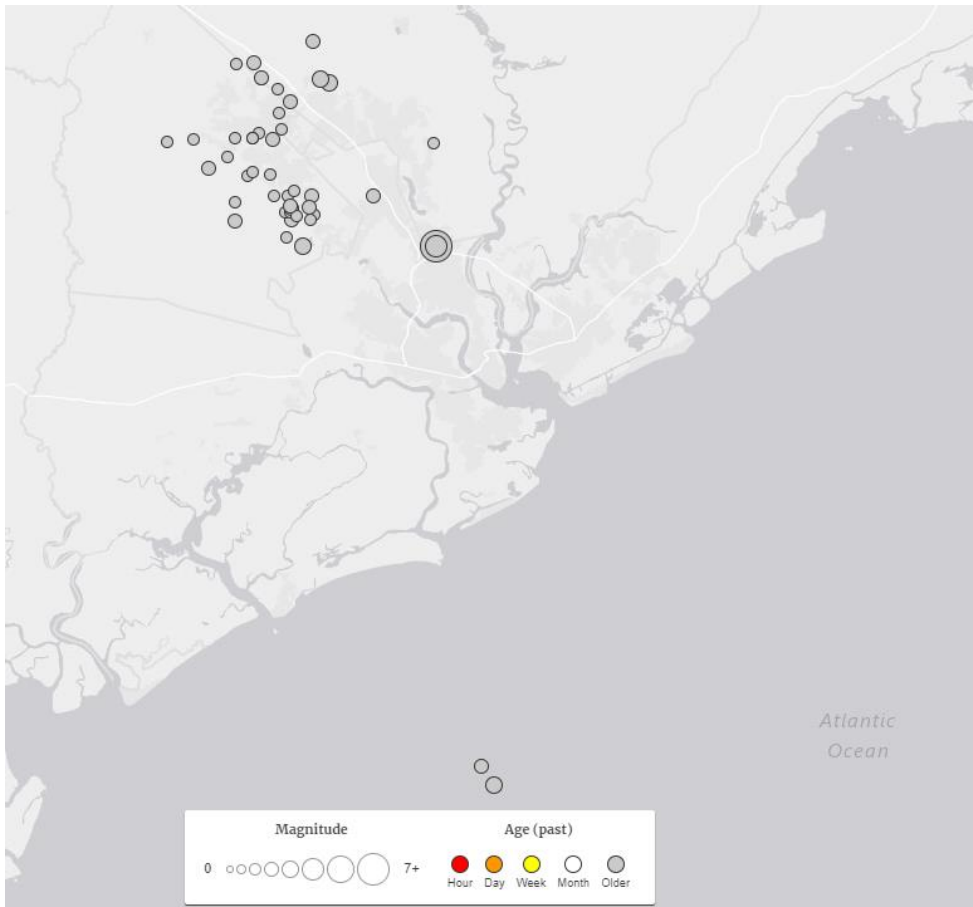
Location

Earthquakes are not an uncommon occurrence in South Carolina. The majority of earthquakes worldwide occur at plate boundaries when plates stick and then jump past each other. The cause of earthquakes in South Carolina is not so clear; the quakes are located within a plate rather than at a plate boundary. In South Carolina, approximately 70 percent of the earthquakes occur in the Coastal Plain and most are located around three areas west and north of Charleston: Ravenel-Adams Run-Hollywood, Middleton Place - Summerville, and Bowman. Geologically, Charleston lies in one of the most seismically active areas in the Eastern United States. This seismic cluster is known as the Middleton Place - Summerville Seismic Zone (MPSSZ).



Source: SC DNR Geologic Hazard of the South Carolina Coastal Plain 2012

Historical Occurrences



Time*	Depth	Magnitude	Location
1817-01-08T09:00:00.000Z		5	South Carolina
1886-09-01T02:51:00.000Z		7.03	South Carolina
1959-08-03T06:08:37.200Z	1	4.4	South Carolina
1974-11-22T05:25:55.500Z	18	4.7	South Carolina
1977-01-18T18:29:13.500Z	5	3	South Carolina
1977-12-15T07:15:55.000Z	9	2.5	South Carolina
1977-12-15T19:16:43.100Z	9	3	South Carolina
1978-09-07T22:53:22.300Z	11	2.7	South Carolina
1979-12-07T05:43:35.000Z	15	2.9	South Carolina
1980-09-01T05:44:42.300Z	6	2.7	South Carolina
1981-03-19T04:33:55.720Z	0.1	2.5	South Carolina

Time*	Depth	Magnitude	Location
1982-03-01T03:33:13.560Z	6.7	3	South Carolina
1983-11-06T09:02:19.820Z	9.6	3.3	South Carolina
1986-09-17T09:33:49.460Z	7.7	2.6	South Carolina
1988-01-23T01:57:16.390Z	7.4	3.3	South Carolina
1989-01-02T16:35:16.270Z	4.9	2.6	South Carolina
1990-02-07T07:41:39.920Z	9.3	2.7	South Carolina
1990-05-11T18:23:33.950Z	6.1	2.6	South Carolina
1990-11-13T15:22:13.010Z	3.4	3.2	South Carolina
1992-08-21T16:31:55.160Z	10	4.1	South Carolina
1995-04-17T13:45:57.800Z	10	3.9	South Carolina
1999-03-29T14:49:36.510Z	5	2.9	South Carolina
2002-11-08T13:29:03.190Z	3.9	3.5	South Carolina
2002-11-11T23:39:29.720Z	2.4	4	South Carolina
2003-02-28T07:02:36.500Z	4.3	2.6	7km SW of Ladson, South Carolina
2003-03-02T17:18:26.500Z	6.5	2.9	7km SW of Ladson, South Carolina
2003-05-05T10:53:49.900Z	11.4	3.1	4km NNW of Summerville, South Carolina
2003-06-12T23:33:17.200Z	10.4	2.6	5km WSW of Centerville, South Carolina
2003-07-19T14:22:21.300Z	5.7	2.5	7km SSW of Ladson, South Carolina
2003-10-14T10:45:38.600Z	7.2	2.5	5km S of Centerville, South Carolina
2003-12-22T23:50:26.000Z	5.6	3	8km SSW of Ladson, South Carolina
2004-05-01T04:16:28.300Z	10.7	2.7	3km ENE of Goose Creek, South Carolina
2004-07-20T09:13:14.400Z	10.3	3.1	7km WSW of Centerville, South Carolina

Time*	Depth	Magnitude	Location
2004-08-18T03:43:42.400Z	7.7	2.5	0km NE of Summerville, South Carolina
2004-11-25T22:58:45.900Z	12.9	2.7	4km NNW of Summerville, South Carolina
2005-11-19T20:02:20.000Z	5	2.6	South Carolina
2008-12-16T12:42:17.520Z	15.39	3.6	5km N of Sangaree, South Carolina
2009-01-29T21:11:27.200Z	6.45	2.5	2km SW of Summerville, South Carolina
2009-05-06T17:07:17.090Z	2.02	2.5	2km N of Summerville, South Carolina
2009-08-29T10:37:13.700Z	4.93	3.2	2km NE of Summerville, South Carolina
2010-05-12T09:03:36.760Z	1.26	2.8	6km SSW of Ladson, South Carolina
2011-10-15T07:02:32.820Z	8.05	2.5	4km WSW of Summerville, South Carolina
2011-12-21T21:38:57.670Z	12.33	2.6	7km SW of Centerville, South Carolina
2012-01-04T07:56:03.800Z	4.94	2.6	3km SSW of Centerville, South Carolina
2012-07-31T04:53:09.290Z	8.21	2.8	5km S of Centerville, South Carolina
2013-09-19T19:14:11.170Z	11.44	2.5	8km WSW of Summerville, South Carolina
2014-03-19T22:38:03.330Z	6.91	3	0km S of Centerville, South Carolina

**Sourced from USGS Latest Earthquakes 1800-to-date*

The most significant historical earthquakes in Charleston was the 1886 Charleston earthquake. The August 31, 1886 earthquake, with an estimated magnitude of 7.3 struck the Summerville/Charleston area and is the largest historical earthquake to have occurred in the eastern United States and the most destructive, killing 60 people and causing \$5 to \$6 million dollars (1886 dollars) worth of damage. The Charleston Region lies within the meizoseismal area (area of maximum damage) of the 1886 earthquake, but the effects of the 1886 earthquake were felt throughout the eastern United States. The 1886 earthquake had more than 300 aftershocks that occurred for 35 years after the initial earthquake (South Carolina Seismic Network, 1996, July). The 7.3 magnitude earthquake that occurred in 1886 killed 100 people and destroyed or damaged most of the buildings in Charleston and Summerville. The seismic history of the 1886 quake indicates that it erupts on the average every 500 years. But moderate quakes can and do occur here, and not so rarely. Two 3.6 temblors and one 3.2 temblor have rattled Summerville between 2008 and 2013. Also in 2002, a 4.4 magnitude quake erupted in the ocean off Kiawah Island. Summerville had two 4.1 quakes in the 1990s. They did not do much more than rattle nerves. But a 5 magnitude quake would be 10 times stronger, and some 800 of them occur across the globe every year. Moderate quakes are a great concern to

emergency managers. Currently, though, the County has not experienced an earthquake exceeding a 2.5 magnitude since March 2014.

Earthquake Probability for each Jurisdiction	
Jurisdiction	Probability
Town of Lincolnton	76-100%

Wildfire

Location

Wildfire is a potentially serious threat in the Charleston Region, particularly in areas with a high density of vegetation and areas within or surrounding the Francis Marion National Forest. Areas where there is an urban-wild land interface like (St. John’s Fire District) are also at risk. Even urban areas within the Region pose the threat of wildfires, since they are defined as uncontrolled fires, which most fires are. For the purpose of this plan, all areas, buildings and facilities are considered to be equally exposed.

Historical Occurrences

The table below shows the amount of fires and acres buried each fiscal year from 2012 to 2019.

Wildfire Events from 2013-2019							
Year	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019
Fires	19	15	9	6	23	6	Unknown
Acres	656.6	37.5	349.9	134.8	249.2	30.2	Unknown

Source: South Carolina Forestry Commission

Below is a table summarizing fire incidents from 2013 to 2019 recorded by the Consolidated 9-1-1 system.

Fire Incidents from May 1, 2013 – April 30, 2019							
As Reported by Charleston County Consolidated 9-1-1							
Category	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	
Outside Fires	893	542	632	999	657	573	
Trail/Rail Fires	3	1	2	1	3	0	
Marine Fires	13	5	11	11	21	7	
Vehicle Fire	102	90	111	111	112	124	
Total	1011	638	756	1122	793	704	11,366

Wildfire Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of Lincolnton	0-25%

Severe Storm

Location

A thunderstorm event is an atmospheric hazard, and has no geographic boundaries. They can occur in all regions of the United States however, thunderstorms are most common in the central and southern states because atmospheric conditions are more favorable for generating thunderstorms. Since thunderstorms are unpredictable, all jurisdictions are equally exposed to these hazards.

Historical Occurrences

Severe Storm Events (Thunderstorm Winds) 1956 – April 2019

TOTAL: 6 Events

**Average
Wind
Speed:
50.3**

**Total
Damage:
\$6,250**

Source: NOAA Storm Events Database

Severe Storm (Hail) Incidents in Charleston County 1957 – April 2019

Total: 2 Events

**AVERAGE
SIZE: .875**

**TOTAL
DAMAGE:
\$ 0**

Source: NOAA Storm Events Database

Severe Storm Probability for Each Jurisdiction

Jurisdiction	Probability
Town of Lincolnton	76-100%

Drought

Location

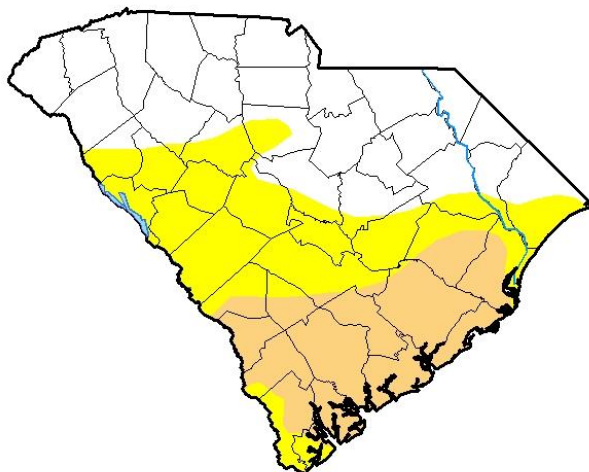
Droughts typically cover a large area and cannot be confined to any geographic boundary. For this purpose, the whole Charleston Region is vulnerable to the threat of a drought.

**U.S. Drought Monitor
South Carolina**

April 30, 2019

(Released Thursday, May 2, 2019)

Valid 8 a.m. EDT



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	45.71	54.29	23.20	0.00	0.00	0.00
Last Week <i>04-23-2019</i>	46.10	53.90	23.13	0.00	0.00	0.00
3 Months Ago <i>01-29-2019</i>	100.00	0.00	0.00	0.00	0.00	0.00
Start of Calendar Year <i>01-01-2019</i>	100.00	0.00	0.00	0.00	0.00	0.00
Start of Water Year <i>09-25-2018</i>	89.90	10.10	1.52	0.00	0.00	0.00
One Year Ago <i>05-01-2018</i>	60.27	39.73	23.91	0.00	0.00	0.00

Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:

Brad Rippey
U.S. Department of Agriculture



<http://droughtmonitor.unl.edu/>

(An example of the extent of drought that the State experienced in late April 2019)

Historical Occurrences

Year	Number of weeks of Drought Events between May 1, 2013 – April 30, 2019						Description
	Category						
	None	D0 Abnormally Dry	D1 Moderate Drought	D2 Severe Drought	D3 Extreme Drought	D4 Exceptional Drought	
1999-2000	35	17	2	0	0	0	

2000-2001	17	35	19	5	0	0	
2001-2002	4	48	38	32	19	0	
2002-2003	18	34	20	18	13	0	
2003-2004	46	6	0	0	0	0	
2004-2005	32	20	5	0	0	0	
2005-2006	47	5	0	0	0	0	
2006-2007	27	25	3	0	0	0	
2007-2008	0	53	35	12	0	0	
2008-2009	15	37	22	0	0	0	
2009-2010	38	14	2	0	0	0	
2010-2011	29	23	0	0	0	0	
2011-2012	0	53	50	46	39	3	
2012-2013	7	45	20	9	5	0	
2013-2014	32	20	0	0	0	0	The Region experienced 20 weeks in drought stage. 32 weeks of no drought stage were reported and 20 weeks of D0 drought from October to December.
2014-2015	37	15	0	0	0	0	The Region experienced only 15 weeks of D0 drought. During weeks when drought was experienced, only approximately 10-20 percent of the county was affected. 37 weeks of the year, the Region experienced no drought.
2015-2016	36	16	0	0	0	0	The Region experienced 16 weeks of D0 drought. During weeks when drought was experienced, only approximately 10-20 percent of the county was affected. 36 weeks of the year, the Region experienced no drought.
2016-2017	38	14	6	0	0	0	The Region experienced 20 weeks of drought stage. During these 20 weeks, the drought stage remained at D0 for 14 weeks and D1 for 6 weeks. 38 weeks of the year, the Region experienced no drought.
2017-2018	23	29	14	4	0	0	The Region experienced 29 weeks of drought stage D0 and 14 weeks of D1. In addition, 4 weeks were spent at D2; there were 23 weeks where the Region experienced no drought
2018-2019	26	26	10	0	0	0	The Region experienced 36 total drought weeks. 26 weeks were spent at D0 and an additional 10 weeks were spent at D1. The Region was no experiencing a drought for 26 weeks.

Source: U.S. Drought Monitor

According to the U.S. Drought Monitor, the Charleston Region was in the D4 (Exceptional Drought) category for a number of weeks in early 2012 with a Palmer Drought Index of at least -5.0 (Extreme Drought). It is possible for severe and exceptional drought periods to return to the Charleston Region.

Drought Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of Lincolnville	26-50%

Winter Weather

Location

While the Region does not regularly encounter extreme winter storms, some aspects of winter weather occur in the Region annually. With the random nature of this hazard, all jurisdictions are subject to winter weather conditions.

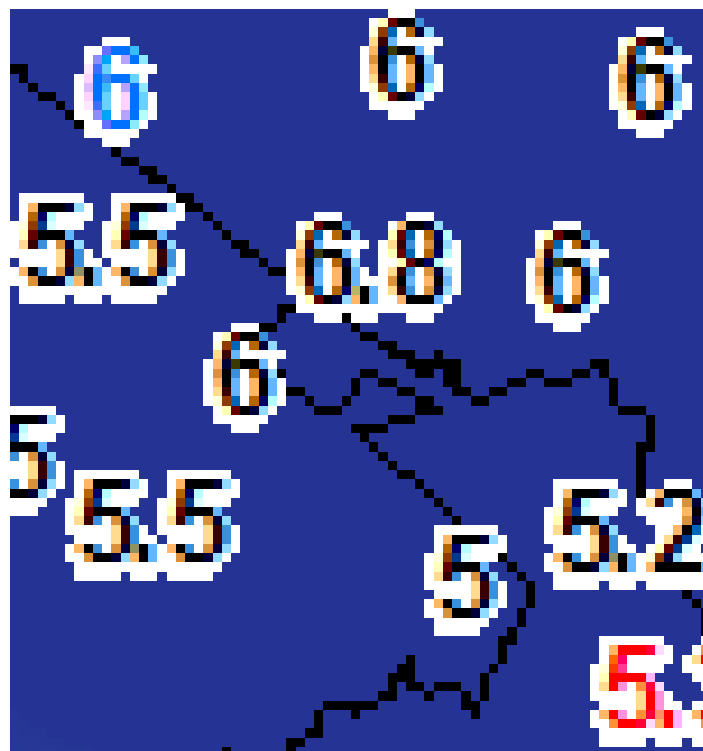
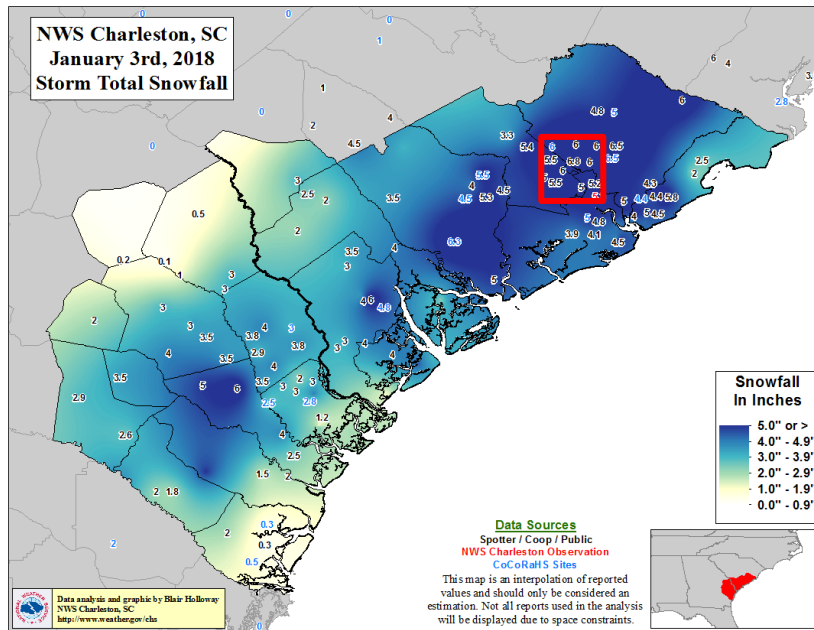
Historical Occurrences

Winter Weather Events Through April 2019

Total of 10 Events	Total
	Damage
	\$ 233,000

Source: NOAA Climate Data

A rare winter storm affected southeast South Carolina on January 3, 2018. The storm produced a variety of wintry precipitation, including snow, sleet and freezing rain. Charleston Airport (KCHS) measured 5.3 inches of snow, the 3rd greatest daily snowfall on record, just 0.1 inches shy of the 5.4 inches that fell during the 1973 storm (NWS, 2019).



Winter Weather Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of Lincolnville	51-75%

5.9(b) - Lincolnville Problem Assessment

5.9.1 - Hazard Vulnerability

The analysis for this section is identical to the analysis under “Hazard Vulnerability” for Unincorporated Charleston County.

5.9.2 - Vulnerable Buildings

The analysis for this section is identical to the analysis under “Vulnerable Buildings” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-9-9

Building Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
Jurisdiction	Dam Failure	Drought	Earthquakes	Flooding	Hazardous Material Incidents	Hurricanes	Sea Level Rise	Tornadoes	Terrorist Incidents	Tsunamis	Wildfires	Winter Weather
Town of Lincolnville	5	3	4	4	4	3	3	3	4	5	3	3

The Town of Lincolnville is serviced by Charleston County and therefore reflect their survey responses.

5.9.3 - Infrastructure Vulnerability

The analysis for this section is identical to the analysis under “Infrastructure Vulnerability” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-9-11

Infrastructure Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
Town of Lincolnville	5	4	1	1	2	1	2	2	2	2	3	3

The Town of Lincolnville is serviced by Charleston County and therefore reflect their survey responses.

Problem Statements and Vulnerability Based on Jurisdiction	
Jurisdiction	Vulnerability Assessment
Town of Lincolnville	This is a small town in Charleston County neighboring North Charleston and Summerville, and it has a high number of mobile homes. This makes it most vulnerable to hurricanes and tornadoes. No buildings are built in the flood zone and the jurisdiction is at minimal risk for any other hazards as there are no major intersections within the town.

5.9.4 – Known Flood Damages

The analysis for this section is identical to the analysis under “Known Flood Damages” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Town of Lincolville Higher Regulatory Standards
2' freeboard
1/2 foot rise in floodway
Five year cumulative of all permits is included when conducting a substantial review

5.9.5 – Past Flood Impacts

The analysis for this section is identical to the analysis under “Past Flood Impacts” for Unincorporated Charleston County.

5.9.6 – Emergency Warning Needs

The analysis for this section is identical to the analysis under “Emergency Warning Needs” for Unincorporated Charleston County.

5.9.7 – Critical Facilities

The analysis for this section is identical to the analysis under “Critical Facilities” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-9-13

Critical Facility Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
Town of Lincolville	5	3	2	2	3	2	3	3	2	3	3	1

The Town of Lincolville is serviced by Charleston County and therefore reflect their survey responses.

A full list of the capabilities for Charleston County and plan participating partners can be seen in the “Critical Facilities” description in Section 5.1(b).

5.9.8 – Natural and Beneficial Functions of Floodplains

The analysis for this section is identical to the analysis under “Natural and Beneficial Functions of Floodplains” for Unincorporated Charleston County.

5.9.9 – Development and Population Trends

The analysis for this section is identical to the analysis under “Development and Population Trends” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-9-14

Estimated Population 2017-2018 in Charleston County SC		
Jurisdiction	Growth Rate 2010-2018	Projected 2018 Population
Town of Lincolnton	115.18%	2,451

Source: U.S. Census Bureau, Population Division 2018

Additional summaries of the anticipated future development trends for the local governments within Charleston County, as provided by the local government entities participating in the Charleston Regional Hazard Mitigation Plan, are outlined in “Development and Population Trends” in Section 5.1(b).

5.9.10 – Economic Impact

The analysis for this section is identical to the analysis under “Economic Impact” for Unincorporated Charleston County.

5.9.11 – Resiliency to Hazards

The analysis for this section is identical to the analysis under “Resiliency to Hazards” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Attachment 5-9-D: Charleston Region Buildings Vulnerable to Flooding Due to Location in the Special Flood Hazard Area (SFHA) Only

Jurisdiction	Total Site-Built Structures	% of Total Site-Built Structures in the SFHA	Mobile Homes in SFHA*	Residential site-built structures in the SFHA		Commercial Structures in the SFHA		Total Structures in the SFHA (including site-built and mobile homes)	
				SFHA	A/AE Zone	V/VE Zone	A/AE Zone	V/VE Zone	A/AW Zone*
Lincolnton	324	58	62	164	0	23	0	249	0

* Since most mobile homes in Charleston County are treated as vehicles for tax purposes, the determination of “A” or “V” zones for these homes using the Q-3 digital data was not able to be readily performed. All mobile homes in the SFHA are included in the A-zone total for this table, since most jurisdictions in Charleston County restrict mobile homes from the “V” flood zone areas.

Attachment 5-9-E: Charleston Region Buildings Vulnerable to Flooding Due to Year of Construction and Location in the Special Flood Hazard Area (SFHA)

Jurisdiction	Pre-1985 Site-Built Residential Buildings in SFHA	Pre-1985 Commercial Buildings in SFHA	Total Pre-1985 Site-Built Buildings in SFHA	% of All Site-Built Buildings In Jurisdiction Constructed Pre-1985 and in SFHA	Pre-1985 Mobile Homes in SFHA	Total Site-Built Buildings Pre-1985 & Mobile Homes in SFHA
Lincolntonville	91	6	97	62.99	23	120

Attachment 5-9-F: Charleston Region Average Valuation of Buildings and Mobile Homes

Jurisdiction	Avg. Site-Built Residential Building Value	Avg. Commercial Building Value	Avg. Mobile Home Value**	Estimated Total Pre-1985 Site-Built and Mobile Home Building Value	Estimated Pre-1985 Site-Built Building And Mobile Home Value in SFHA (mil.\$)
Lincolntonville (<i>All</i>)	\$86,631.79	\$721,729.27	\$8,572.22	\$11,883,000.00	
Pre-1985 only	\$78,923.45	\$37,812.50	\$2,008.82		\$7,747,700.00

** Valuation data reflected herein is for mobile homes, regardless of age.

Attachment 5-9-G: Charleston Region Average Valuation of Site-Built Buildings by Flood Zone

Jurisdiction	Total Value "A" Zones Site-Built Structures	Total Value "V" Zones Site-Built Structures(mil\$)	Total Value Site-Built Structures Not in the SFHA (mil\$)	Total Value of Site-Built Structures Not Flood-Zone Coded** (mil\$)
Lincolntonville	19,000,600	0	34,906,700	32,811,500

** Valuation data reflected herein is for mobile homes, regardless of age.

5.10(a) – Town of McClellanville

Flood

Location

Flooding can occur throughout most of the Charleston Region since around 68% resides within a floodplain. Floodplains are designated by the frequency of the flood that is large enough to cover them. Flood frequencies are determined by plotting a graph of the size of all known floods for an area and calculating how often floods occur. The Federal Emergency Management Agency (FEMA) identifies floodplain areas by producing Flood Insurance Rate Maps (FIRM). These maps show all locations near major bodies of water, and show base flood elevations and floodplain boundaries like the 100-year floodplain boundaries. 100-year flood event is a 1% probability of occurring in any given year. The roughly 68% of the areas located in the floodplain are exposed to the threat of floods but that does not mean the other areas are not vulnerable to a flash flood or flooding events. Damaged infrastructure and roadways can limit mobility for citizens. All areas can experience flooding hazards.

Below is a list from each participant in the plan for areas of concern for flooding.

Flood Prone Areas of Charleston County	
<i>Jurisdictions Serviced by Charleston County</i>	<i>Area</i>
Town of McClellanville	Properties that are adjacent to Jeremy Creek, which runs through town and several drainage ditches that overflow during heavy rain and flooding events

Historical Occurrences

Flooding Events Between Jan 1, 1950 – April 30, 2019	
Total: 2 Events	Total: \$0

These flooding events were mainly the result from heavy rain or severe weather (thunderstorms, tropical storms, heavy rain) incidents that caused flooding in the Charleston Region. Charleston broke its record for number of annual-flood days last year. The previous record of 38 days, observed in 2015, was exceeded by 12 days for a total of 50 annual-flood days in 2016. Compared to 1995, trends in flooding during 2016 have increased by 130 percent on average.

Flooding Probability for each Jurisdiction	
Jurisdiction	Probability
Town of McClellanville	76-100%

Hazardous Materials

Historical Occurrences

The Charleston Regional Hazard Mitigation Plan began collecting Hazardous Material incident data from the Charleston County Consolidated 9-1-1 system in 2012. Below is a table summarizing hazardous material incidents from 2013-2019.

Hazardous Materials Incidents from May 1, 2013 to April 30, 2019							
As Reported by Charleston County Consolidated 9-1-1							
Category	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	
Hazmat	37	51	18	24	22	15	
Fuel Spill	104	111	102	85	74	67	
Gas Leak/Gas Odor (Natural and LP Gases)	278	201	360	397	395	363	
Total	419	363	480	506	491	445	2704

Hazmat Probability for each Jurisdiction	
Jurisdiction	Probability
Town of McClellanville	51-75%

Wildfire

Location

Wildfire is a potentially serious threat in the Charleston Region, particularly in areas with a high density of vegetation and areas within or surrounding the Francis Marion National Forest. Areas where there is an urban-wild land interface like (St. John’s Fire District) are also at risk. Even urban areas within the Region pose the threat of wildfires, since they are defined as uncontrolled fires, which most fires are. For the purpose of this plan, all areas, buildings and facilities are considered to be equally exposed.

Historical Occurrences

The table below shows the amount of fires and acres buried each fiscal year from 2012 to 2019.

Wildfire Events from 2013-2019							
Year	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019
Fires	19	15	9	6	23	6	Unknown
Acres	656.6	37.5	349.9	134.8	249.2	30.2	Unknown

Source: South Carolina Forestry Commission

Below is a table summarizing fire incidents from 2013 to 2019 recorded by the Consolidated 9-1-1 system.

Fire Incidents from May 1, 2013 – April 30, 2019							
As Reported by Charleston County Consolidated 9-1-1							
Category	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	
Outside Fires	893	542	632	999	657	573	
Trail/Rail Fires	3	1	2	1	3	0	
Marine Fires	13	5	11	11	21	7	
Vehicle Fire	102	90	111	111	112	124	
Total	1011	638	756	1122	793	704	11,366

Wildfire Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of McClellanville	26-50%

Dam Failure

Location

Dam failures are extremely rare events. Santee Cooper, a state-owned utility, operates both the Santee Dam and the Pinopolis Dam System, a failure of which could affect areas within Charleston County. A catastrophic failure at either of these dams would create flooding within the Charleston County area, and would be a significant event. The most likely root cause of such a failure would be an earthquake of a larger magnitude than 7.6 on the Richter scale or perhaps an act of terrorism. While dam failure is unlikely, it is possible that the Charleston County area could experience dam-related flooding.

Historical Occurrences

There have been no recorded historical incidents regarding the Santee Cooper Dam and Pinopolis Dam, which are the only two dams that would impact the Charleston Region during a failure.

Dam Failure Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of McClellanville	51-75%

Severe Storm

Location

A thunderstorm event is an atmospheric hazard, and has no geographic boundaries. They can occur in all regions of the United States however, thunderstorms are most common in the central and southern states because atmospheric conditions are more favorable for generating thunderstorms. Since thunderstorms are unpredictable, all jurisdictions are equally exposed to these hazards.

Historical Occurrences

Severe Storm Events (Thunderstorm Winds) 1956 – April 2019		
TOTAL: 2 Events	Average Wind Speed: 50	Total Damage: \$0

Source: NOAA Storm Events Database

Severe Storm (Hail) Incidents in Charleston County 1957 – April 2019		
Total: 5 Events	AVERAGE SIZE: 1.076	TOTAL DAMAGE: \$0

Source: NOAA Storm Events Database

Severe Storm Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of McClellanville	76-100%

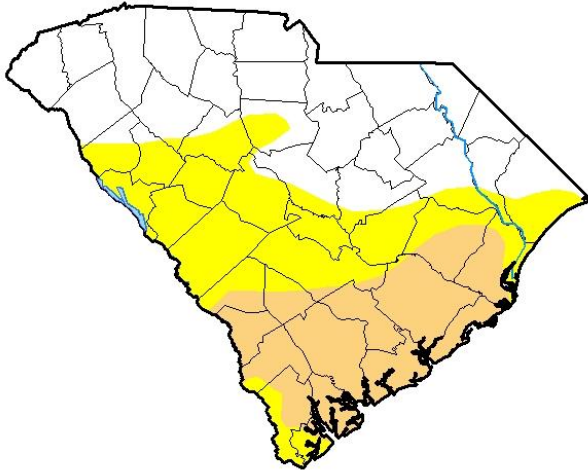
Drought

Location

Droughts typically cover a large area and cannot be confined to any geographic boundary. For this purpose, the whole Charleston Region is vulnerable to the threat of a drought.

U.S. Drought Monitor South Carolina

April 30, 2019
(Released Thursday, May 2, 2019)
Valid 8 a.m. EDT



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	45.71	54.29	23.20	0.00	0.00	0.00
Last Week 04-23-2019	46.10	53.90	23.13	0.00	0.00	0.00
3 Months Ago 01-29-2019	100.00	0.00	0.00	0.00	0.00	0.00
Start of Calendar Year 01-01-2019	100.00	0.00	0.00	0.00	0.00	0.00
Start of Water Year 09-25-2018	89.90	10.10	1.52	0.00	0.00	0.00
One Year Ago 05-01-2018	60.27	39.73	23.91	0.00	0.00	0.00

Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:

Brad Rippey
U.S. Department of Agriculture



<http://droughtmonitor.unl.edu/>

(An example of the extent of drought that the State experienced in late April 2019)

Historical Occurrences

Year	Number of weeks of Drought Events between May 1, 2013 – April 30, 2019						Description
	None	D0 Abnormally Dry	D1 Moderate Drought	D2 Severe Drought	D3 Extreme Drought	D4 Exceptional Drought	
1999-2000	35	17	2	0	0	0	
2000-2001	17	35	19	5	0	0	
2001-2002	4	48	38	32	19	0	
2002-2003	18	34	20	18	13	0	
2003-2004	46	6	0	0	0	0	
2004-2005	32	20	5	0	0	0	
2005-2006	47	5	0	0	0	0	
2006-2007	27	25	3	0	0	0	
2007-2008	0	53	35	12	0	0	
2008-2009	15	37	22	0	0	0	
2009-2010	38	14	2	0	0	0	
2010-2011	29	23	0	0	0	0	
2011-2012	0	53	50	46	39	3	
2012-2013	7	45	20	9	5	0	
2013-2014	32	20	0	0	0	0	The Region experienced 20 weeks in drought stage. 32 weeks of no drought stage were reported and 20 weeks of D0 drought from October to December.
2014-2015	37	15	0	0	0	0	The Region experienced only 15 weeks of D0 drought. During weeks when drought was experienced, only approximately 10-20 percent of the county was affected. 37 weeks of the year, the Region experienced no drought.
2015-2016	36	16	0	0	0	0	The Region experienced 16 weeks of D0 drought. During weeks when drought was experienced, only approximately 10-20 percent of the county was

							affected. 36 weeks of the year, the Region experienced no drought.
2016-2017	38	14	6	0	0	0	The Region experienced 20 weeks of drought stage. During these 20 weeks, the drought stage remained at D0 for 14 weeks and D1 for 6 weeks. 38 weeks of the year, the Region experienced no drought.
2017-2018	23	29	14	4	0	0	The Region experienced 29 weeks of drought stage D0 and 14 weeks of D1. In addition, 4 weeks were spent at D2; there were 23 weeks where the Region experienced no drought
2018-2019	26	26	10	0	0	0	The Region experienced 36 total drought weeks. 26 weeks were spent at D0 and an additional 10 weeks were spent at D1. The Region was no experiencing a drought for 26 weeks.

Source: U.S. Drought Monitor

According to the U.S. Drought Monitor, the Charleston Region was in the D4 (Exceptional Drought) category for a number of weeks in early 2012 with a Palmer Drought Index of at least -5.0 (Extreme Drought). It is possible for severe and exceptional drought periods to return to the Charleston Region.

Probability

Since droughts typically cover a large area and aren't confined to any geographic boundary, the chance that the Region will experience some stage of drought is 100% any given year. Over the past six years, the Region has experienced D2 (Severe Drought), D3 (Extreme Drought), and D4 (Exceptional Drought) only 4 weeks. The probability of the Region being in a severe or worst drought is 14% any given year, and the probability of drought is equal across all jurisdictions. The vulnerability and impact of the hazard is discussed later in the Plan.

Drought Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of McClellanville	26-50%

Winter Weather

Location

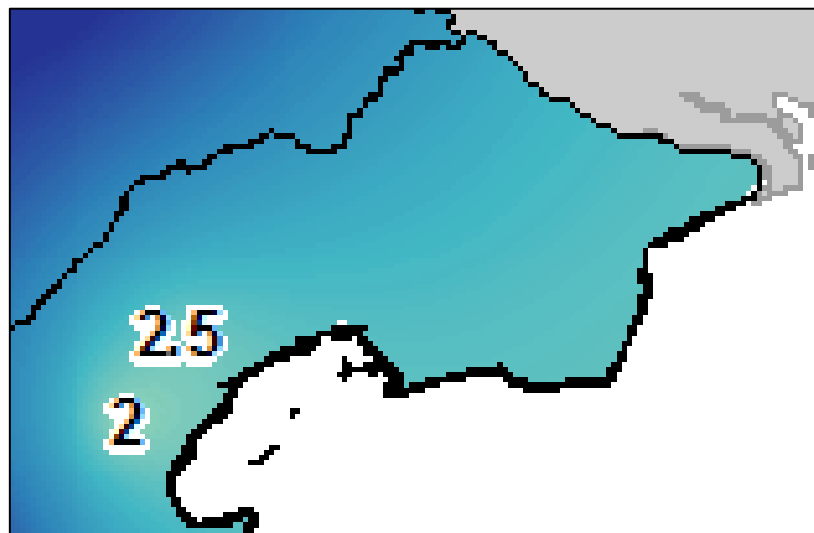
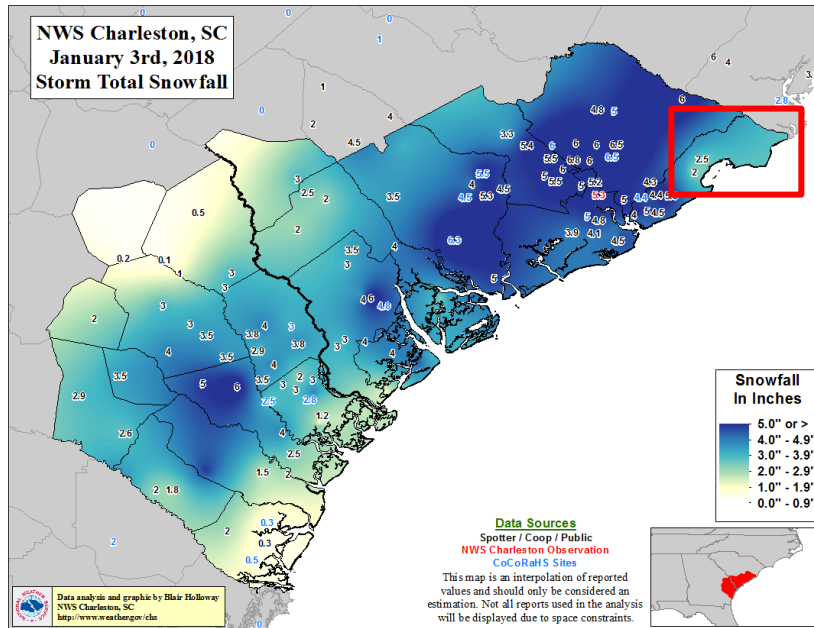
While the Region does not regularly encounter extreme winter storms, some aspects of winter weather occur in the Region annually. With the random nature of this hazard, all jurisdictions are subject to winter weather conditions.

Historical Occurrences

Winter Weather Events Through April 2019	
Total of 10 Events	
	\$ 23,000

Source: NOAA Climate Data

A rare winter storm affected southeast South Carolina on January 3, 2018. The storm produced a variety of wintry precipitation, including snow, sleet and freezing rain. Charleston Airport (KCHS) measured 5.3 inches of snow, the 3rd greatest daily snowfall on record, just 0.1 inches shy of the 5.4 inches that fell during the 1973 storm (NWS, 2019).



Winter Weather Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of McClellanville	3

5.10(b) – McClellanville Problem Assessment

5.10.1 – Hazard Vulnerability

The analysis for this section is identical to the analysis under “Hazard Vulnerability” for Unincorporated Charleston County.

5.10.2 – Vulnerable Buildings

The analysis for this section is identical to the analysis under “Vulnerable Buildings” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-9

Building Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
Jurisdiction	Dam Failure	Drought	Earthquakes	Flooding	Hazardous Material Incidents	Hurricanes	Sea Level Rise	Tornadoes	Terrorist Incidents	Tsunamis	Wildfires	Winter Weather
Town of McClellanville	5	5	2	1	5	1	3	1	2	3	2	2

5.10.3 – Infrastructure Vulnerability

The analysis for this section is identical to the analysis under “Infrastructure Vulnerability” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5.10-11

Infrastructure Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
Town of McClellanville	5	3	2	1	3	1	2	3	2	3	3	4

Problem Statements and Vulnerability Based on Jurisdiction	
Jurisdiction	Vulnerability Assessment
Town of McClellanville	The main waterway, Jeremy Creek, which flows through McClellanville makes the Town vulnerable to flooding and hurricanes. Hurricane Hugo made landfall in the Cape Romain Bulls Bay area. McClellanville, in Hugo’s northeast quadrant, felt the strongest effects. Hurricane Matthew, a category two hurricane, made landfall in McClellanville in 2016. The town is also vulnerable to dam failure and wildfire with the proximity to the major dams in the Lowcountry and Francis Marion National Forest.

5.10.4 – Known Flood Damages

The analysis for this section is identical to the analysis under “Known Flood Damages” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-10-12

Loss Statistics for Charleston County as of 9/30/2018					
Jurisdiction	Total Losses	Closed Losses	Open Losses	CWOP Losses	Total Payments
MCCLELLANVILLE, TOWN OF	67	58	0	9	2,144,786.64
<i>FEMA Policy and Claims Statistics Database, 2019</i>					

Town of McClellanville Higher Regulatory Standards
1' freeboard
1/2 foot rise in floodway
Five year cumulative of all permits is included when conducting a substantial review

5.10.5 – Past Flood Impacts

The analysis for this section is identical to the analysis under “Past Flood Impacts” for Unincorporated Charleston County.

5.10.6 – Emergency Warning Needs

The analysis for this section is identical to the analysis under “Emergency Warning Needs” for Unincorporated Charleston County.

5.10.7 – Critical Facilities

The analysis for this section is identical to the analysis under “Critical Facilities” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-10-13

Critical Facility Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
Town of McCellanville	5	5	3	3	5	2	2	3	2	5	2	2

A full list of the capabilities for Charleston County and plan participating partners can be seen in the “Critical Facilities” description in Section 5.1(b).

5.10.8 – Natural and Beneficial Functions of Floodplains

The analysis for this section is identical to the analysis under “Natural and Beneficial Functions of Floodplains” for Unincorporated Charleston County.

5.10.9 – Development and Population Trends

The analysis for this section is identical to the analysis under “Development and Population Trends” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-10-14

Estimated Population 2017-2018 in Charleston County SC		
Jurisdiction	Growth Rate 2010-2018	Projected 2018 Population
Town of McClellanville	8.61%	542

Source: U.S. Census Bureau, Population Division 2018

Additional summaries of the anticipated future development trends for the local governments within Charleston County, as provided by the local government entities participating in the Charleston Regional Hazard Mitigation Plan, are outlined in “Development and Population Trends” in Section 5.1(b).

5.10.10 – Economic Impact

The analysis for this section is identical to the analysis under “Economic Impact” for Unincorporated Charleston County.

5.10.11 – Resiliency to Hazards

The analysis for this section is identical to the analysis under “Resiliency to Hazards” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Attachment 5-10-C: Repetitive Loss Areas within the Charleston Region

Repetitive Loss Areas				
Street	City, State	Zip Code	Jurisdiction	PSD / FD
Morrison Dive	McClellanville, SC	29458	McClellanville	
Pinckney Street	McClellanville, SC	29458	McClellanville	
Highway 17 N.	McClellanville, SC	29458	McClellanville	

Attachment 5-10-D: Charleston Region Buildings Vulnerable to Flooding Due to Location in the Special Flood Hazard Area (SFHA) Only

Jurisdiction	Total Site-Built Structures	% of Total Site-Built Structures in the SFHA	Mobile Homes in SFHA *	Residential site-built structures in the SFHA		Commercial Structures in the SFHA		Total Structures in the SFHA (including site-built and mobile homes)	
				A/AE Zone	V/VE Zone	A/AE Zone	V/VE Zone	A/AW Zone*	V/VE Zone
McClellanville	410	96	1	314	22	55	1	370	23

* Since most mobile homes in Charleston County are treated as vehicles for tax purposes, the determination of “A” or “V” zones for these homes using the Q-3 digital data was not able to be readily performed. All mobile homes in the SFHA are included in the A-zone total for this table, since most jurisdictions in Charleston County restrict mobile homes from the “V” flood zone areas.

Attachment 5-10-E: Charleston Region Buildings Vulnerable to Flooding Due to Year of Construction and Location in the Special Flood Hazard Area (SFHA)

Jurisdiction	Pre-1985 Site-Built Residential Buildings in SFHA	Pre-1985 Commercial Buildings in SFHA	Total Pre-1985 Site-Built Buildings in SFHA	% of All Site-Built Buildings In Jurisdiction Constructed Pre-1985 and in SFHA	Pre-1985 Mobile Homes in SFHA	Total Site-Built Buildings Pre-1985 & Mobile Homes in SFHA
McClellanville	162	22	184	97.87	0	184

Attachment 5-10-F: Charleston Region Average Valuation of Buildings and Mobile Homes

Jurisdiction	Avg. Site-Built Residential Building Value	Avg. Commercial Building Value	Avg. Mobile Home Value**	Estimated Total Pre-1985 Site-Built and Mobile Home Building Value	Estimated Pre-1985 Site-Built Building And Mobile Home Value in SFHA (mil.\$)
McClellanville (All)	\$221,634.77	\$131,045.64	\$15,600.00	\$29,521,200.00	
Pre-1985 only	\$168,192.73	\$80,427.27			\$29,130,200.00

** Valuation data reflected herein is for mobile homes, regardless of age.

Attachment 5-10-G: Charleston Region Average Valuation of Site-Built Buildings by Flood Zone

Jurisdiction	Total Value “A” Zones Site-Built Structures	Total Value “V” Zones Site-Built Structures(mil\$)	Total Value Site-Built Structures Not in the SFHA (mil\$)	Total Value of Site-Built Structures Not Flood-Zone Coded** (mil\$)
McClellanville	72,179,393	9,266,800	3,457,000	785,600

** Valuation data reflected herein is for mobile homes, regardless of age.

5.11(a) – Town of Meggett

Flood

Location

Flooding can occur throughout most of the Charleston Region since around 68% resides within a floodplain. Floodplains are designated by the frequency of the flood that is large enough to cover them. Flood frequencies are determined by plotting a graph of the size of all known floods for an area and calculating how often floods occur. The Federal Emergency Management Agency (FEMA) identifies floodplain areas by producing Flood Insurance Rate Maps (FIRM). These maps show all locations near major bodies of water, and show base flood elevations and floodplain boundaries like the 100-year floodplain boundaries. 100-year flood event is a 1% probability of occurring in any given year. The roughly 68% of the areas located in the floodplain are exposed to the threat of floods but that does not mean the other areas are not vulnerable to a flash flood or flooding events. Damaged infrastructure and roadways can limit mobility for citizens. All areas can experience flooding hazards.

Below is a list from each participant in the plan for areas of concern for flooding.

Flood Prone Areas of Charleston County	
<i>Jurisdictions Serviced by Charleston County</i>	<i>Area</i>
Town of Meggett	Quigley Road and Ethel Post Office Road
	Quigley Road (roughly 1000 feet from Ethel Post Office intersection)
	Highway 165 between Meggett Bridge (Ethel Post Office) and Metal Trades
	Coastline Road
	Ethel Post Office near Petersfield Neighborhood (across from L.E.A.R.N. facility)
	Lowcountry Leadership Charter School – flooding and heavy rains have cause wastewater backups over the last 6 years.

Historical Occurrences

Flooding Events Between Jan 1, 1950 – April 30, 2019	
Total: 1 Event	Total Damage: \$728,550

**NOAA Storm Events Database*

These flooding events were mainly the result from heavy rain or severe weather (thunderstorms, tropical storms, heavy rain) incidents that caused flooding in the Charleston Region. Charleston broke its record for number of annual-flood days last year. The previous record of 38 days, observed in 2015, was exceeded by 12 days for a total of 50 annual-flood days in 2016. Compared to 1995, trends in flooding during 2016 have increased by 130 percent on average.

Flooding Probability for each Jurisdiction	
Jurisdiction	Probability

Wildfire

Location

Wildfire is a potentially serious threat in the Charleston Region, particularly in areas with a high density of vegetation and areas within or surrounding the Francis Marion National Forest. Areas where there is an urban-wild land interface like (St. John's Fire District) are also at risk. Even urban areas within the Region pose the threat of wildfires, since they are defined as uncontrolled fires, which most fires are. For the purpose of this plan, all areas, buildings and facilities are considered to be equally exposed.

Historical Occurrences

The table below shows the amount of fires and acres buried each fiscal year from 2012 to 2019.

Wildfire Events from 2013-2019							
Year	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019
Fires	19	15	9	6	23	6	Unknown
Acres	656.6	37.5	349.9	134.8	249.2	30.2	Unknown

Source: South Carolina Forestry Commission

Below is a table summarizing fire incidents from 2013 to 2019 recorded by the Consolidated 9-1-1 system.

Fire Incidents from May 1, 2013 – April 30, 2010							
As Reported by Charleston County Consolidated 9-1-1							
Category	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	
Outside Fires	893	542	632	999	657	573	
Trail/Rail Fires	3	1	2	1	3	0	
Marine Fires	13	5	11	11	21	7	
Vehicle Fire	102	90	111	111	112	124	
Total	1011	638	756	1122	793	704	11,366

Wildfire Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of Meggett	26-50%

Severe Storm

Location

A thunderstorm event is an atmospheric hazard, and has no geographic boundaries. They can occur in all regions of the United States however, thunderstorms are most common in the central and southern states because atmospheric conditions are more favorable for generating thunderstorms. Since thunderstorms are unpredictable, all jurisdictions are equally exposed to these hazards.

Historical Occurrences

Severe Storm Events (Thunderstorm Winds) 1956 – April 2019		
TOTAL: 9 Events	Average	Total
	Wind	Damage:
	Speed:	\$11,000
	50.56	

Source: NOAA Storm Events Database

Severe Storm (Hail) Incidents in Charleston County 1957 – April 2019		
Total: 2 Events	AVERAGE	TOTAL
	SIZE:	DAMAG
	0.875	E: \$ -

Source: NOAA Storm Events Database

Severe Storm Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of Meggett	76-100%

Drought

Location

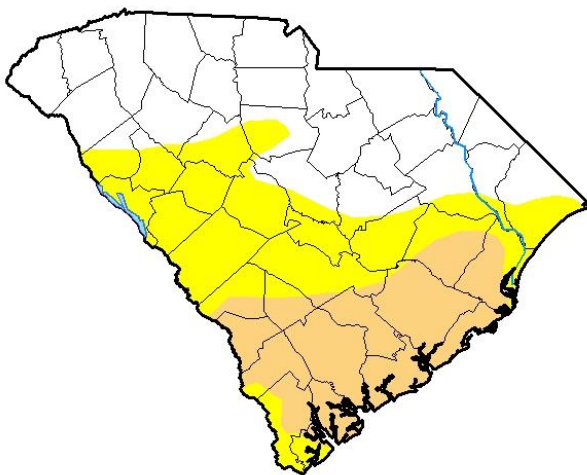
Droughts typically cover a large area and cannot be confined to any geographic boundary. For this purpose, the whole Charleston Region is vulnerable to the threat of a drought.

U.S. Drought Monitor South Carolina

April 30, 2019

(Released Thursday, May 2, 2019)

Valid 8 a.m. EDT



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	45.71	54.29	23.20	0.00	0.00	0.00
Last Week <small>04-23-2019</small>	46.10	53.90	23.13	0.00	0.00	0.00
3 Months Ago <small>01-29-2019</small>	100.00	0.00	0.00	0.00	0.00	0.00
Start of Calendar Year <small>01-01-2019</small>	100.00	0.00	0.00	0.00	0.00	0.00
Start of Water Year <small>09-25-2018</small>	89.90	10.10	1.52	0.00	0.00	0.00
One Year Ago <small>05-01-2018</small>	60.27	39.73	23.91	0.00	0.00	0.00

Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:

Brad Rippey
U.S. Department of Agriculture



<http://droughtmonitor.unl.edu/>

(An example of the extent of drought that the State experienced in late April 2019)

Historical Occurrences

Year	Number of weeks of Drought Events between May 1, 2013 – April 30, 2019						Description
	Category						
	None	D0 Abnormally Dry	D1 Moderate Drought	D2 Severe Drought	D3 Extreme Drought	D4 Exceptional Drought	
1999-2000	35	17	2	0	0	0	
2000-2001	17	35	19	5	0	0	
2001-2002	4	48	38	32	19	0	

2002-2003	18	34	20	18	13	0	
2003-2004	46	6	0	0	0	0	
2004-2005	32	20	5	0	0	0	
2005-2006	47	5	0	0	0	0	
2006-2007	27	25	3	0	0	0	
2007-2008	0	53	35	12	0	0	
2008-2009	15	37	22	0	0	0	
2009-2010	38	14	2	0	0	0	
2010-2011	29	23	0	0	0	0	
2011-2012	0	53	50	46	39	3	
2012-2013	7	45	20	9	5	0	
2013-2014	32	20	0	0	0	0	The Region experienced 20 weeks in drought stage. 32 weeks of no drought stage were reported and 20 weeks of D0 drought from October to December.
2014-2015	37	15	0	0	0	0	The Region experienced only 15 weeks of D0 drought. During weeks when drought was experienced, only approximately 10-20 percent of the county was affected. 37 weeks of the year, the Region experienced no drought.
2015-2016	36	16	0	0	0	0	The Region experienced 16 weeks of D0 drought. During weeks when drought was experienced, only approximately 10-20 percent of the county was affected. 36 weeks of the year, the Region experienced no drought.
2016-2017	38	14	6	0	0	0	The Region experienced 20 weeks of drought stage. During these 20 weeks, the drought stage remained at D0 for 14 weeks and D1 for 6 weeks. 38 weeks of the year, the Region experienced no drought.
2017-2018	23	29	14	4	0	0	The Region experienced 29 weeks of drought stage D0 and 14 weeks of D1. In addition, 4 weeks were spent at D2; there were 23 weeks where the Region experienced no drought
2018-2019	26	26	10	0	0	0	The Region experienced 36 total drought weeks. 26 weeks were spent at D0 and an additional 10 weeks were spent at D1. The Region was no experiencing a drought for 26 weeks.

Source: U.S. Drought Monitor

According to the U.S. Drought Monitor, the Charleston Region was in the D4 (Exceptional Drought) category for a number of weeks in early 2012 with a Palmer Drought Index of at least -5.0 (Extreme Drought). It is possible for severe and exceptional drought periods to return to the Charleston Region.

Drought Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of Meggett	26-50%

Winter Weather

Location

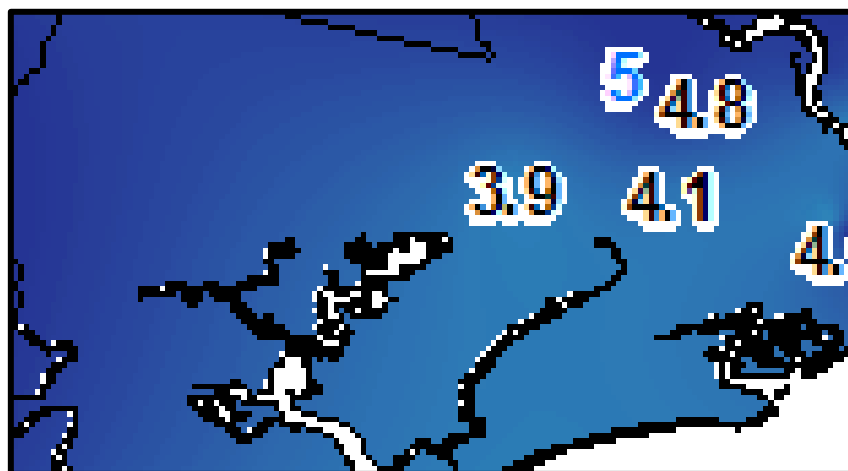
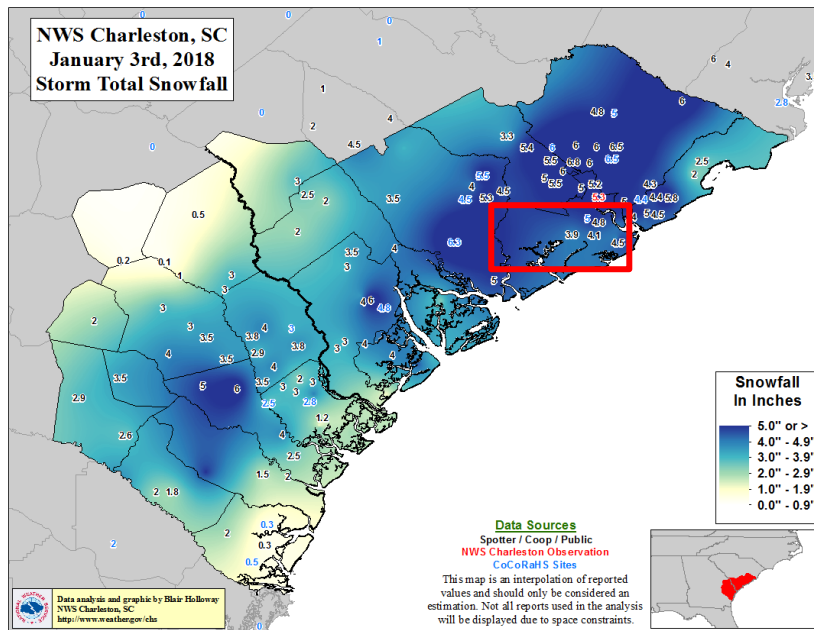
While the Region does not regularly encounter extreme winter storms, some aspects of winter weather occur in the Region annually. With the random nature of this hazard, all jurisdictions are subject to winter weather conditions.

Historical Occurrences

Winter Weather Events Through April 2019	
Total of 10 Events	
	\$ 23,000

Source: NOAA Climate Data

A rare winter storm affected southeast South Carolina on January 3, 2018. The storm produced a variety of wintry precipitation, including snow, sleet and freezing rain. Charleston Airport (KCHS) measured 5.3 inches of snow, the 3rd greatest daily snowfall on record, just 0.1 inches shy of the 5.4 inches that fell during the 1973 storm (NWS, 2019).



Winter Weather Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of Meggett	51-75%

5.11(b) - Meggett Problem Assessment

5.11.1 - Hazard Vulnerability

The analysis for this section is identical to the analysis under “Hazard Vulnerability” for Unincorporated Charleston County.

5.11.2 - Vulnerable Buildings

The analysis for this section is identical to the analysis under “Vulnerable Buildings” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-11-9

Building Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
Jurisdiction	Dam Failure	Drought	Earthquakes	Flooding	Hazardous Material Incidents	Hurricanes	Sea Level Rise	Tornadoes	Terrorist Incidents	Tsunamis	Wildfires	Winter Weather
Town of Meggett	5	1	1	3	1	1	3	1	1	3	3	3

5.11.3 - Infrastructure Vulnerability

The analysis for this section is identical to the analysis under “Infrastructure Vulnerability” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-11-11

Infrastructure Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
Town of Meggett	5	5	1	1	5	1	1	5	1	3	5	3

Problem Statements and Vulnerability Based on Jurisdiction	
Jurisdiction	Vulnerability Assessment
Town of Meggett	The Town has a lot of waterfront property on the Wadmalaw River. This is also a rural community. It is vulnerable to flooding and hurricanes as there are low lying areas. Meggett also have a couple repetitive loss areas within its community. More individuals are starting to develop this part of Charleston County as the cities become more populated.

5.11.4 - Known Flood Damages

The analysis for this section is identical to the analysis under “Known Flood Damages” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-11-12

Loss Statistics for Charleston County as of 9/30/2018					
Jurisdiction	Total Losses	Closed Losses	Open Losses	CWOP Losses	Total Payments

MEGGETT, TOWN OF	31	16	0	15	314,126.70
FEMA Policy and Claims Statistics Database, 2019					

Town of Meggett Higher Regulatory Standards
2' freeboard
1/2 foot rise in floodway
Five year cumulative of all permits is included when conducting a substantial review

5.11.5 - Past Flood Impacts

The analysis for this section is identical to the analysis under “Past Flood Impacts” for Unincorporated Charleston County.

5.11.6 - Emergency Warning Needs

The analysis for this section is identical to the analysis under “Emergency Warning Needs” for Unincorporated Charleston County.

5.11.7 - Critical Facilities

The analysis for this section is identical to the analysis under “Critical Facilities” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-11-13

Critical Facility Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
Town of Meggett	5	5	1	1	5	1	1	5	1	3	5	3

A full list of the capabilities for Charleston County and plan participating partners can be seen in the “Critical Facilities” description in Section 5.1(b).

5.11.8 - Natural and Beneficial Functions of Floodplains

The analysis for this section is identical to the analysis under “Natural and Beneficial Functions of Floodplains” for Unincorporated Charleston County.

5.11.9 - Development and Population Trends

The analysis for this section is identical to the analysis under “Development and Population Trends” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-11-14

Estimated Population 2017-2018 in Charleston County SC		
Jurisdiction	Growth Rate 2010-2018	Projected 2018 Population
Town of Meggett	5.46%	1,293

Source: U.S. Census Bureau, Population Division 2018

Additional summaries of the anticipated future development trends for the local governments within Charleston County, as provided by the local government entities participating in the Charleston Regional Hazard Mitigation Plan, are outlined in “Development and Population Trends” in Section 5.1(b).

5.11.10 – Economic Impact

The analysis for this section is identical to the analysis under “Economic Impact” for Unincorporated Charleston County.

5.11.11 – Resiliency to Hazards

The analysis for this section is identical to the analysis under “Resiliency to Hazards” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Attachment 5-11-D: Charleston Region Buildings Vulnerable to Flooding Due to Location in the Special Flood Hazard Area (SFHA) Only

Jurisdiction	Total Site-Built Structures	% of Total Site-Built Structures in the SFHA	Mobile Homes in SFHA*	Residential site-built structures in the SFHA		Commercial Structures in the SFHA		Total Structures in the SFHA (including site-built and mobile homes)	
				SFHA	A/AE Zone	V/VE Zone	A/AEZone	V/VEZone	A/AW Zone*
Meggett	759	81	47	575	2	33	1	655	3

* Since most mobile homes in Charleston County are treated as vehicles for tax purposes, the determination of “A” or “V” zones for these homes using the Q-3 digital data was not able to be readily performed. All mobile homes in the SFHA are included in the A-zone total for this table, since most jurisdictions in Charleston County restrict mobile homes from the “V” flood zone areas.

Attachment 5-11-E: Charleston Region Buildings Vulnerable to Flooding Due to Year of Construction and Location in the Special Flood Hazard Area (SFHA)

Jurisdiction	Pre-1985 Site-Built Residential Buildings in SFHA	Pre-1985 Commercial Buildings in SFHA	Total Pre-1985 Site-Built Buildings in SFHA	% of All Site-Built Buildings In Jurisdiction Constructed Pre-1985 and in SFHA	Pre-1985 Mobile Homes in SFHA	Total Site-Built Buildings Pre-1985 & Mobile Homes in SFHA
Meggett	204	17	221	88.76	15	236

Attachment 5-11-F: Charleston Region Average Valuation of Buildings and Mobile Homes

Jurisdiction	Avg. Site-Built Residential Building Value	Avg. Commercial Building Value	Avg. Mobile Home Value**	Estimated Total Pre-1985 Site-Built and Mobile Home Building Value	Estimated Pre-1985 Site-Built Building And Mobile Home Value in SFHA (mil.\$)
Meggett (<i>All</i>)	\$199,913.87	\$171,083.78	\$11,643.55	\$35,631,100.00	
Pre-1985 only	\$148,579.13	\$78,261.11	\$3,280.00		\$33,203,700.00

** Valuation data reflected herein is for mobile homes, regardless of age.

Attachment 5-11-G: Charleston Region Average Valuation of Site-Built Buildings by Flood Zone

Jurisdiction	Total Value "A" Zones Site-Built Structures	Total Value "V" Zones Site-Built Structures(mil\$)	Total Value Site-Built Structures Not in the SFHA (mil\$)	Total Value of Site-Built Structures Not Flood-Zone Coded** (mil\$)
Meggett	123,989,300	345,400	26,133,300	15,844,200

** Valuation data reflected herein is for mobile homes, regardless of age.

5.12(a) – Town of Mt. Pleasant

Flood

The Town of Mt Pleasant commonly experiences flooding in the following areas:

ROADS/ AREAS KNOWN TO FLOOD with Heavy Rain/ Extended Rain/ Tides:	Emergency Division/ Area	Issue
William Street – at Royall Ave	1	low area - tidal flooding
William Street Extension	1	low area - tidal flooding
Bank Street at Royall Ave	1	low area - pump station capacity
Coleman Boulevard	1	capacity - upgraded 2019
Church Street by Mill Street	1	low area - tidal flooding
Behind Friend Street/ Queen Street/ Pitt St.	1	low area - upgraded 2015
Freeman Street	1	low area no drains
Erkman St & Kincade Street	1	capacity issue
Ferry Street	1	low area - pump station capacity
William Street	1	low area - tidal flooding
Atlantic Street Belleview to Pocahontas	1	low are no drains
Fox Pond Drive	1	debris prone
Privateer Drive - cul de sac	1	tidal
Barquentine Dr. - cul de sac	1	tidal
Whilden at Morrison	1	low area - pump station capacity
Bank and Carr Street	1	low area - pump station capacity
Allen & Matoaka Streets	1	limited drains/ ditches
Deer & Short Streets	1	no drains
Middle Street	1	low area - tidal flooding
Magwood Lane/ Haddrell Street	1	low area - tidal flooding
Simmons Street/ Mill Street	1	low area - tidal flooding
pit/ Royall/ center/ William street	1	flooding in rear yards - tidal/ low area
Rose Lane	1	no drains
Bennett Street between Venning/ Morrison	1	limited drains - low area
Pitt Street Business	1	limited drains/ capacity
Rivers Street at Whilden	1	limited drains/ maintenance/ capacity
Coleman Boulevard at Moultrie Middle School	1	** Upgraded drainage 2019
Vincent Drive at Pearl – Brookgreen	1	limited drains - low area
Pearl Street - Brookgreen	1	limited drains - low area
Bose Court - Brookgreen	1	limited drains - low area
Elizabeth Circle – Shemwood I	1	limited drains - low area
Bluebird Drive – Moss Park	1	limited drains/ capacity

ROADS/ AREAS KNOWN TO FLOOD with Heavy Rain/ Extended Rain/ Tides:	Emergency Division/ Area	Issue
Oakleaf Apartments – at rear ditch	1	capacity/ debris prone
Old Georgetown Road	1	capacity
Decoy Court – Mallard Lakes	2	capacity/ debris prone
Merganser Court – Mallard Lakes	2	capacity/ debris prone
Old Colony Road - Heritage	2	capacity/ debris prone
Meadowcroft Lane - Heritage	2	capacity/ debris prone
Lakeview Drive – The Groves	1	limited drains
Japonica Drive – The Groves	1	limited drains
Bayview Drive – Bayview Acres	1	limited drains
Quince Street – Bayview Acres	1	limited drains
Cumming Circle – Cooper Estates	1	limited drains
Williamson Drive – Baytree Town homes	1	limited drains
Ralston Court - Baytree Town homes	1	limited drains
Baytree Court - Baytree Town homes	1	limited drains
Pine Hollow Drive – Pine Hollow	1	limited drains
Kirk Court/ Creekside Subdivision Tennis Center	1	limited drains - private
Large Ditch at Sandpiper Convalescent Home/ Hunters Trace Town homes	1	clogging of debris
Hobcaw Drive – Hobcaw Point – rear yard	1	limited drains
Oldwannus Drive – Parish Place	1	clogging - limited drains
O’Sullivan Drive – Parish Place	1	clogging - limited drains
Anna Knapp Boulevard – by Publix	1	clogging - limited drains
Mathis Ferry Road	1	clogging - capacity
Various Roads – Remley’s Point	1	tidal - limited drains/ capacity
Belle Hall Parkway @ Longpoint	2	grading issue
Hook Lane	2	capacity of rear system overflows to street
Hidden Boulevard	2	clogging/ tidal
Chimney Bluff Road – Past Bridge	2	clogging/ debris
Davant Circle - Longpoint	2	clogging/ debris
Arundel Place – Longpoint	2	clogging/ debris
Rice Hope Drive – Longpoint	2	clogging/ debris
Longpoint Road at Marsh Crossings	2	tidal
Wando Park Boulevard – multiple locations	2	clogging debris at I-526
Hidden Bridge Drive –Coopers Landing	2	capacity/ elevation issues?
Lauda Drive – Wando East	2	capacity
Nantahala Boulevard – Wando East	2	capacity

ROADS/ AREAS KNOWN TO FLOOD with Heavy Rain/ Extended Rain/ Tides:	Emergency Division/ Area	Issue
Law Lane at Indigo Cut – Snee Farm	2	capacity - under construction for 10 year storm
Planters Curve – Snee Farm	2	capacity - under construction for 10 year storm
Colonial Drive – Snee Farm	2	capacity
Deleisseline Blvd. Snee Farm	2	capacity
Chersonese Round – Snee Farm	2	capacity
Governors Road – Snee Farm	2	capacity
Astor Court – Snee Farm Gardens	2	capacity
Longpoint Road	2	clogging/ capacity
Beaumont Townhomes area	2	capacity
Snee Farm Gardens	2	capacity
Longpoint Road at Hwy 17	2	capacity/ clogging
Hamlin Road at Laing School	3	capacity - some improvements installed
Rifle Range Road between Six Mile Road and Hamlin Road	3	capacity/ debris prone
Highway 41 causeways	3	tidal surge
Dunes West Entrance (Private)	3	capacity/ tidal
Various Roads – Dunes West (Private)	3	capacity/ tidal

Road/ Area of Concern	Area	Emergency Division/ Zone	Impact	Water in curb/ inlets - tide level	Tidal Inundation
2nd Avenue	Remley's Point	1	Road flooding		8' tide
3rd Avenue	Remley's Point	1	Road flooding		8' tide
5th Avenue	Remley's Point	1	Road flooding		8' tide
6th Avenue	Remley's Point	1	Road flooding		8' tide
Harbor Point Drive	Harbor Point S/D	1	Road flooding		8' tide
Church Street	Old Village	1	Road flooding		8' tide
Shem Creek Marine/ Restaurants/ Ronnie Boals Area	Old Village	1	Road flooding	7.30'	8' tide
Haddrell Street	Old Village	1	Road flooding	7.30'	8' tide
Simmons Street Boat Landing	Old Village	1	Road flooding		8' tide
Mill Street	Old Village	1	Road flooding		8' tide

William Street/ Royall Avenue to Center Street	Old Village	1	Road flooding		8' tide
William Street Extension	Old Village	1	Road flooding		8' tide
Oakhaven	Oakhaven	2	Road flooding		8' tide
Longpoint Road Causeway/ Bridge		2	Road flooding	7.59'	8' tide
Darrell Creek Trail at Commonwealth	Commonwealth	3	Road flooding/ Yard Flooding		8' tide
Park West	Various neighborhoods	3	Back flooding on detention ponds at creeks		8' tide
Dunes West	Dunes West	3	Road flooding/ Yard Flooding		9' tide
Highway 41	Causeways	3	Road flooding		9' tide
Bowman Road	Shem Creek Bridge	1	Road flooding		9' tide
Shemwood/ Brookgreen	Shemwood I	1	Road flooding/ Yard Flooding		9' tide
Home Farm	Home Farm	1	Road flooding/ Yard Flooding		9' tide
Rivertowne Area	Rivertowne/ RTCC	3	Road flooding/ Yard Flooding		9' tide
Seafood Road	Gasdenville (County/ SCDOT)	3	Road Flooding		8' tide

*** Tidal surge flooding only - no rain event impacts considered in this listing.**

Hurricane

Location

Hurricanes and tropical storms threaten the entire Atlantic and Gulf coast of the United States, as well as the Pacific coast. Hurricanes that originate in the Gulf of Mexico can still impact the Charleston Region. With about 68% of the Charleston Region in the floodplain and some jurisdictions located 100% in the floodplain and with the community being a coastal community, the Region is vulnerable to hurricanes and tropical storms and their aftermaths. Since hurricane landing patterns are unpredictable until the storm has formed and is within a short time from landing, the Region can not presume that past strike history will continue into the future, and all areas within the Region are subject to these types of events.

Occurrences

Hurricane Events between August 11 1940 - April 30 2013			
Name	Category	Date	Damage Description
August 11th, 1940 (Name classification started after 1950)	2	August 11th, 1940	Estimated damage to the city was \$1 million. Sullivan's Island and the City of the Isle of Palms suffered minor damage.
Hurricane Hazel	4	October 15th, 1954	Folly Beach, Sullivan's Island, and the Isle of Palms suffered light property damage and slight beach erosion. The City of Charleston experienced no serious damage.
Hurricane Gracie	3	September 29th, 1959	The total damage inflicted by the storm was estimated at \$14 million. High water marks, which were reported near the Town of Edisto Beach, South Carolina, ranged from 7.3 to 11.9 feet.
Hurricane David	3	August 29th - September 7th, 1979	Flooding and minor damage in the City of Charleston.
Hurricane Hugo	4	September 19th, 1989	Tidal surges north of the city were recorded at 19.8 feet and 11.8 feet in the Peninsula City. The hurricane struck at high tide. Its recorded diameter was over 500 miles, Four (4) people were killed and scores injured. Estimated damage of \$7 billion for the total area.
Hurricane Bertha	2	July 12th, 1996	This hurricane came close but did not cause any significant damage. Some coastal areas experienced moderate beach erosion. Tourism estimated loss revenue of 20 million dollars.
Hurricane Fran	3	September 5th, 1996	The storm didn't directly hit the Charleston Region but remnants of this hurricane created power outages with economic losses estimated at 20 million dollars.
Hurricane Bonnie	3	August 26th, 1998	Remnants of this hurricane produced winds that knocked down several trees in the Town of Mount Pleasant as it headed for the North Carolina Coast.
Hurricane Floyd	2	September 15th, 1999	Sustained winds of 58 miles per hour were recorded in downtown Charleston with gusts up to 85 miles per hour. Generally 3-5 inches of rainfall occurred. An estimated \$10.5 million in damages occurred in the Charleston region.
Hurricane Irene	1	October 17th, 1999	This hurricane dropped 3 to 5 inches of rain created minor street flooding. Minor beach erosion. Trees knocked down and power outages in the area.
Tropical Storm Gordon		September 18th, 2000	Remnants of the storm dropped 6-10 inches of rain. Minor beach erosion occurred as a result of this storm.
Tropical Storm Claudette		July 14th, 2003	Two and a half inches of rain, a tree was downed, 11 traffic accidents.
Tropical Depression Seven		July 25th, 2003	Expected to receive as much as 6 inches of rain and wind gusts up to 35 mph from this storm.
Tropical Storm Henri		September 6th, 2003	Folly Beach, Sullivan's Island, and Isle of Palms experienced beach erosion from remnants of the storm, which was predicted to also bring up to 5 inches of rain to the Charleston area.
Hurricane Isabel	2	September 17th, 2003	This storm created 8 foot surf at Kiawah Island and had wind gusts of 40 mph offshore and 20 mph in downtown Charleston when it passed offshore. Coastal erosion was expected, as tides were 6 to 12 inches above normal.
Tropical Storm Alex		August 2nd, 2004	Minor beach erosion was reported on Folly Beach.
Tropical Storm Bonnie		August 12th, 2004	The remnants of this storm caused a tornado and several incidents of wind damage in the Awendaw area.
Hurricane Charley	1	August 14-15th, 2004	An estimated 4 inches of rain fell in 2 hours in the Northern part of Charleston County on August 14, 2004, flooding low lying areas and areas with poor drainage. Storm surge was estimated at 4-6 feet from Oyster Landing to the Cape Romain Wildlife Refuge in the northern portions of Charleston County. Minor property and tree damage occurred as a result of this storm. The storm caused an estimated damage of \$2 million in South Carolina.
Hurricane Gaston	1	August 29th, 2004	Sustained winds of 75 mph. The storm brought a 4 foot storm surge into Bull's Bay, which caused an estimated \$4.8 million in damages to homes, primarily in areas east of the Cooper River creating debris with an estimated clean-up cost of \$2.2 million county-wide, and left nearly all of the customers of South Carolina Electric and Gas without electrical power. Total estimated damages, per the National Weather Service, were \$7.6 million in Charleston County.

Tropical Storm Frances		September 6th, 2004	This storm created nearly 6 ft. surf. Dropped nearly 5 inches of rain, winds of 35 mph, minor damage and flooding.
Tropical Depression Jeanne		September 27th, 2004	Resulted in 40 ft. of beach erosion on the north end of Folly Beach. Maximum wind gusts in Charleston County from this storm were 41 mph in downtown Charleston and at the Charleston airport. Maximum wind gusts at Folly Beach were 38 mph. Non-tornadic damage was limited to a few trees falling on cars.
Tropical Storm Ophelia		September 13th, 2005	Loss of Life, Beach Erosion, minor damage.
Tropical Storm Tammy		October 5th, 2005	Significant Beach Erosion, flooding, minor damage.
Tropical Storm Alberto		June 13th, 2006	Remnants of the storm produced a tornado that touched down near Awendaw, knocking down trees. Street flooding occurred in Charleston and North Charleston as a result of this storm.
Tropical Storm Ernesto		August 31st, 2006	Mt. Pleasant received 6.65 inches of rainfall from this storm system. Street flooding occurred in the City of Charleston and 40 mph gusts.
Tropical Storm Barry		June 2nd, 2007	Remnants of the storm produced heavy rains, strong winds, rough surf, and 3 inches of rain. Loss of electricity to 13,900 customers of SCE&G and Berkeley Electric Cooperative, mostly in the Summerville area, which caused vessels to break their lines, and flood streets, particularly on the Charleston Peninsula. Wind gusts up to 60 mph were recorded.
Tropical Storm Hanna		September 5th, 2008	Resulting in strong wind and localized heavy rain.
Tropical Storm Irene		August 25th, 2011	The Charleston County Folly Beach Park received significant erosion-related damages as a result of this storm, including beach areas and structures.
Tropical Storm Lee		September 6th, 2011	Charleston County sustained scattered showers, thunderstorms, and winds up to 22 mph with a half-inch of rain in some areas.
Tropical Storm Beryl		May 27th, 2012	The region saw tropical storm forced winds, heavy rainfall, and fallen trees as result of the storm.
Tropical Storm Sandy		October 27th, 2012	The storm produced forced winds of 40 mph.

Hurricane Events between May 1, 2013 – January 31, 2019

Name	Category	Date	Damage Description
Tropical Storm Andrea		June 6, 2013	Heavy rainfall 3-7 inches
Tropical Storm Arthur		July 3, 2014	Tropical storm watch was posted for Santee River to Bogue Banks, NC. Wind gusts up to 42 mph (68 km/h) along coastal areas, resulting in scattered power outages
Tropical Storm Ana		May 7-8, 2015	Tropical storm warning from South Santee River to Surf City, NC. Produced a small storm surge along Charleston County coast.
Hurricane Joaquin	4	October 1-5, 2015	Did not make landfall in the US, but caused catastrophic flooding in South Carolina and intense flooding and power outages in Charleston County. South Carolina Governor Haley declared a State of Emergency.
Hurricane Matthew	1	October 7-8, 2016	Once a Category 5 hurricane before ripping through Haiti and eastern Cuba, Hurricane Matthew had downgraded to a Category 1 by the time it hit South Carolina. Even so, 830,000 South Carolinians lost power, 355,000 evacuated from their homes, and 4 lost their lives.
Hurricane Irma	1	9/11-9/12/2017	Once a Category 5 hurricane before ripping through the Caribbean, Hurricane Irma had downgraded to a Category 1, and eventually a tropical storm, by the time the system impacted South Carolina. Even so, over 100,000 South Carolinians lost power, 3 lost their lives, and Charleston recorded its third highest storm surge ever (10ft).

Hurricane Florence	1	9/14/2018	Once a Category 4 hurricane before making landfall north of Charleston County, this storm impacted Charleston County as a tropical depression. No lives were lost in Charleston County although thousands of residents lost power during the storm's peak.
Hurricane Michael	4	10/11/2018	Making landfall as a Category 4 hurricane in Florida's Bay County, this storm impacted Charleston County by bringing 50 mph winds which dismantled many trees and power lines plus a storm surge measured at 2.07 ft in Charleston Harbor. Charleston County saw no lost lives, although the storm directly caused 16 casualties and 43 indirectly, according to the NOAA.

Hurricane Probability for each Jurisdiction	
Jurisdiction	Probability
Town of Mt. Pleasant	26-50%

Hazardous Materials

Location

The Charleston Region is a rapidly growing international port with many industries and growing businesses. The Charleston Region also has a United States Air Force Base and several other smaller military establishments, which handle various types and quantities of hazardous materials. Hazardous materials are a continuous potential hazard due to the large amount of transportation of these materials occurring in and around the Region.

Historical Occurrences

The Charleston Regional Hazard Mitigation Plan began collecting Hazardous Material incident data from the Charleston County Consolidated 9-1-1 system in 2012. Below is a table summarizing hazardous material incidents from 2013-2019.

Hazardous Materials Incidents from May 1, 2013 to April 30, 2019							
As Reported by Charleston County Consolidated 9-1-1							
Category	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	
Hazmat	37	51	18	24	22	15	
Fuel Spill	104	111	102	85	74	67	
Gas Leak/Gas Odor (Natural and LP Gases)	278	201	360	397	395	363	
Total	419	363	480	506	491	445	2704

Hazardous Material Incident Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of Mt. Pleasant	76-100%

Terrorism

Location

The Charleston Region is always at risk of being targeted for a terrorist attack due to the Charleston Port. With Charleston being a major metropolitan area, it is subjected to possible terrorist attacks. With attacks ranging from size and destruction, the whole Region could experience the effects of a terrorist attack.

Historical Occurrences

The Charleston Region hasn't experienced any major terrorist threats or attacks. Isolated incidents like bomb threats, suspicious packages are reported each year. In January 2008, nine out of ten public safety dispatch operations in Charleston County finalized an Intergovernmental Agreement to consolidate dispatch operations. The City of Folly Beach still maintains their own Dispatch Center but have 9-1-1 calls transferred to them.

Suspicious Packages and Bomb Threat							
From May 1, 2013 – April, 30 2019							
As reported by Charleston County Consolidated 9-1-1 Center							
Category	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	
Bomb Threat	21	2	5	12	17	24	
Bomb Threat (Suspected Caller)	2	0	0	1	1	0	
Ordinance/Explosive Found	8	5	8	14	12	10	
Suspicious Package	66	110	111	95	131	81	
Suspicious Package with Leakage Residue	1	1	4	2	6	1	
Total	98	118	128	124	167	116	751

Terrorism Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of Mt. Pleasant	26-50%

Wildfire

Location

Wildfire is a potentially serious threat in the Charleston Region, particularly in areas with a high density of vegetation and areas within or surrounding the Francis Marion National Forest. Areas where there is an urban-wild land interface like (St. John's Fire District) are also at risk. Even urban areas within the Region pose the threat of wildfires, since they are defined as uncontrolled fires, which most fires are. For the purpose of this plan, all areas, buildings and facilities are considered to be equally exposed.

Historical Occurrences

The table below shows the amount of fires and acres buried each fiscal year from 2013 to 2019.

Wildfire Events from 2013-2019							
Year	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019
Fires	19	15	9	6	23	6	Unknown
Acres	656.6	37.5	349.9	134.8	249.2	30.2	Unknown

Source: South Carolina Forestry Commission

Below is a table summarizing fire incidents from 2012-2019 recorded by the Consolidated 9-1-1 system.

Fire Incidents from May 1, 2013 – April 30, 2019							
As Reported by Charleston County Consolidated 9-1-1							
Category	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	
Outside Fires	893	542	632	999	657	573	
Trail/Rail Fires	3	1	2	1	3	0	
Marine Fires	13	5	11	11	21	7	
Vehicle Fire	102	90	111	111	112	124	
Total	1011	638	756	1122	793	704	11,366

Wildfire Averages for Charleston County				
Averages	5 Year	10 Year	15 Year	20 Year
Fires	12	19	63	50
Acres	159.1	469.0	618.3	527.3

Source: South Carolina Forestry Commission

Wildfire Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of Mt. Pleasant	2

Severe Storm

Location

A thunderstorm event is an atmospheric hazard, and has no geographic boundaries. They can occur in all regions of the United States however, thunderstorms are most common in the central and southern states because atmospheric conditions are more favorable for generating thunderstorms. Since thunderstorms are unpredictable, all jurisdictions are equally exposed to these hazards.

Historical Occurrences

Severe Storm Events (Thunderstorm Winds) 1956 – April 2019		
TOTAL: 4 Events	Average Wind Speed:	Total Damage:
	55.5	\$ -

Source: NOAA Storm Events Database

Severe Storm (Hail) Incidents in Charleston County 1957 – April 2019		
Total: 9 Events	AVERAGE SIZE:	TOTAL Damage:
	1.01	\$ -

Source: NOAA Storm Events Database

Severe Storm (Lightning) Incidents in Charleston County 1998 – April 2019	
Total: 2 Events	Total:
	\$500,000

Source: NOAA Storm Events Database

Severe Storm Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of Mt. Pleasant	4

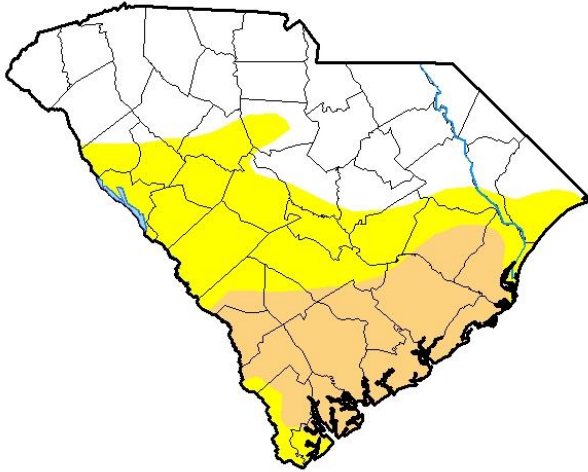
Drought

Location

Droughts typically cover a large area and cannot be confined to any geographic boundary. For this purpose, the whole Charleston Region is vulnerable to the threat of a drought.

U.S. Drought Monitor South Carolina

April 30, 2019
(Released Thursday, May 2, 2019)
Valid 8 a.m. EDT



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	45.71	54.29	23.20	0.00	0.00	0.00
Last Week 04-23-2019	46.10	53.90	23.13	0.00	0.00	0.00
3 Months Ago 01-29-2019	100.00	0.00	0.00	0.00	0.00	0.00
Start of Calendar Year 01-01-2019	100.00	0.00	0.00	0.00	0.00	0.00
Start of Water Year 09-25-2018	89.90	10.10	1.52	0.00	0.00	0.00
One Year Ago 05-01-2018	60.27	39.73	23.91	0.00	0.00	0.00

Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:

Brad Rippey
U.S. Department of Agriculture



<http://droughtmonitor.unl.edu/>

(An example of the extent of drought that the State experienced in late April 2019)

Historical Occurrences

Year	Number of weeks of Drought Events between May 1, 2013 – April 30, 2019						Description
	None	D0 Abnormally Dry	D1 Moderate Drought	D2 Severe Drought	D3 Extreme Drought	D4 Exceptional Drought	
1999-2000	35	17	2	0	0	0	
2000-2001	17	35	19	5	0	0	
2001-2002	4	48	38	32	19	0	
2002-2003	18	34	20	18	13	0	
2003-2004	46	6	0	0	0	0	
2004-2005	32	20	5	0	0	0	
2005-2006	47	5	0	0	0	0	
2006-2007	27	25	3	0	0	0	
2007-2008	0	53	35	12	0	0	
2008-2009	15	37	22	0	0	0	
2009-2010	38	14	2	0	0	0	
2010-2011	29	23	0	0	0	0	
2011-2012	0	53	50	46	39	3	
2012-2013	7	45	20	9	5	0	
2013-2014	32	20	0	0	0	0	The Region experienced 20 weeks in drought stage. 32 weeks of no drought stage were reported and 20 weeks of D0 drought from October to December.

2014-2015	37	15	0	0	0	0	The Region experienced only 15 weeks of D0 drought. During weeks when drought was experienced, only approximately 10-20 percent of the county was affected. 37 weeks of the year, the Region experienced no drought.
2015-2016	36	16	0	0	0	0	The Region experienced 16 weeks of D0 drought. During weeks when drought was experienced, only approximately 10-20 percent of the county was affected. 36 weeks of the year, the Region experienced no drought.
2016-2017	38	14	6	0	0	0	The Region experienced 20 weeks of drought stage. During these 20 weeks, the drought stage remained at D0 for 14 weeks and D1 for 6 weeks. 38 weeks of the year, the Region experienced no drought.
2017-2018	23	29	14	4	0	0	The Region experienced 29 weeks of drought stage D0 and 14 weeks of D1. In addition, 4 weeks were spent at D2; there were 23 weeks where the Region experienced no drought
2018-2019	26	26	10	0	0	0	The Region experienced 36 total drought weeks. 26 weeks were spent at D0 and an additional 10 weeks were spent at D1. The Region was no experiencing a drought for 26 weeks.

Source: U.S. Drought Monitor

According to the U.S. Drought Monitor, the Charleston Region was in the D4 (Exceptional Drought) category for a number of weeks in early 2012 with a Palmer Drought Index of at least -5.0 (Extreme Drought). It is possible for severe and exceptional drought periods to return to the Charleston Region.

Drought Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of Mt. Pleasant	26-50%

Winter Weather

Location

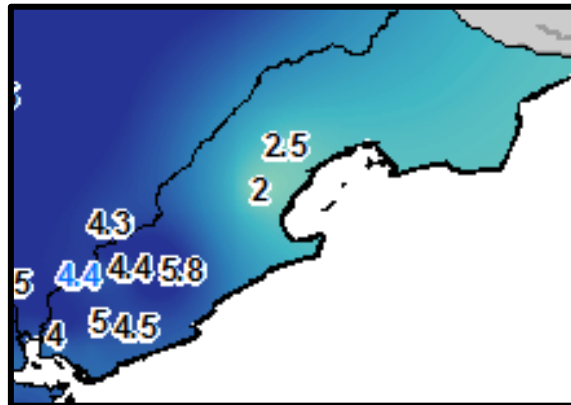
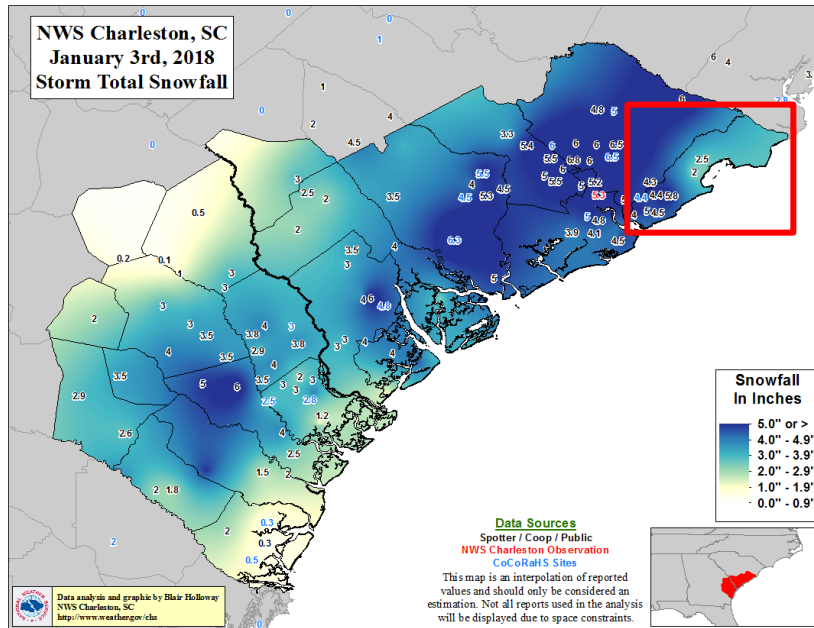
While the Region does not regularly encounter extreme winter storms, some aspects of winter weather occur in the Region annually. With the random nature of this hazard, all jurisdictions are subject to winter weather conditions.

Historical Occurrences

Winter Weather Events Through April 2019	
Total of 10 Events	Total
	Damage
	\$233,00
	0

Source: NOAA Climate Data

A rare winter storm affected southeast South Carolina on January 3, 2018. The storm produced a variety of wintry precipitation, including snow, sleet and freezing rain. Charleston Airport (KCHS) measured 5.3 inches of snow, the 3rd greatest daily snowfall on record, just 0.1 inches shy of the 5.4 inches that fell during the 1973 storm (NWS, 2019).



Winter Weather Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of Mt. Pleasant	51-75%

5.12(b) - Mt. Pleasant Problem Assessment

5.12.1 - Hazard Vulnerability

The analysis for this section is identical to the analysis under “Hazard Vulnerability” for Unincorporated Charleston County. Jurisdiction-specific insights are listed below:

Impacts for all Hazards for Town of Mount Pleasant	
Hazard	Impact

Hurricane	The potential for Tropical Weather is of great concern for the Town of Mount Pleasant. Storm track and intensity are very unpredictable until near landfall. The severity of impact will vary according to the tropical system's composition to include size, surge, intensity, speed, and geographic location of landfall with regard to Mount Pleasant. The Town can expect, at a minimum, interruption of key and critical infrastructure due to high wind impacts and flooding of roads, structures, utilities, etc. Tropical systems come with a risk of tornado impact especially as the system interacts with land.
Flooding	Approximately 60% of the Town of Mount Pleasant is located in a Special Flood Hazard Area. Flood impact occurs as a consequence of many types of flood hazard to include storm surge, heavy rain events, undersized (or no) drainage systems, and extreme high tides. Flood hazard impact often is exacerbated by overlapping event types such as a heavy rain event during extreme high tide. Anticipated impacts of flooding are largely dependent upon the extent and duration of the event. At a minimum, severe flooding will interrupt transportation and threaten critical utilities (such as wastewater treatment). First responder rescues are likely to be needed for citizens trapped in vehicles or isolated in structures surrounded by high and flowing water. Following extended flood events public health may be of great concern as waters become contaminated.
Sea Level Rise	Some impact from Sea Level Rise is felt now, and is anticipated to increase in severity in coming decades. Currently, the primary consequence seen is an increase of minor flooding for portions of major transportation roadways as well as low lying community roads and yards. Long term impacts are still being assessed. Focus should be given to infrastructure such as drainage and wastewater systems. Particularly, how they are designed or upfitted to withstand SLR impact and adequately discharge without mechanical assistance. Very long term concern includes more frequent and severe impacts to roads, properties, and structures.
Earthquake	The Charleston area is one of the greatest areas of earthquake risk in in the state. The last significant earthquake that impacted the area occurred in 1886 which killed 60 people and caused significant structural damage in the City of Charleston. If the same 7.3 magnitude earthquake were to occur today, there would be potentially catastrophic impacts to include significant loss of life, structures destroyed, subsequent fires, severe interruption of critical facilities and infrastructure; as well as cascading impact on the economy.
Tornado	Tornadoes occur with very little warning and carry impacts varying according to the intensity, duration, and path. Tornado risk is typically associated with severe weather brought in by low pressure systems. Hurricanes also produce tornadoes in rain bands as it comes ashore. Potential impact includes loss of life, building and infrastructure damage, interruption of transportation and other utilities.
Hazardous Materials	Hazardous Material incidents have the potential to impact the Town of Mount Pleasant in the case of a port incident, intentional attack, or spill, leak, or explosion during transport or storage. Materials in various forms can cause loss of life, injury, long-term health problems, damage to property.
Terrorism	Impacts resulting from an intentional, acts of violence will range from minimal to extreme loss of life, injuries, destruction of property and economic loss. Much of the impact will vary according to severity and classification of the attack.

Wildfire	There are portions of the Town of Mount Pleasant that are susceptible to wildfire; mostly restricted to less densely populated areas. Impacts associated with wildfire include interrupted transportation, air quality, potential loss of life, loss of structure, and property damage.
Tsunamis	The impact of tsunamis is considered minimal and may be expected to occur with earthquake events. Vulnerability to tsunami impacts in the Town of Mount Pleasant would include disruption to transportation routes, structures, and utilities located in the lower lying areas along Charleston Harbor and the intracoastal waterway.
Dam Failure	The Town of Mount Pleasant is minimally vulnerable to the impact of Dam Failure. The greatest risk is associated with smaller dams within the town, which would likely result in minor flooding and damage to roadways and utilities. There are larger dams within the region, but are considered to have a lower risk of impact to Mount Pleasant.
Rip Currents	The Town of Mount Pleasant is a waterfront community, but with no beach areas. The vulnerability to Rip Currents is minimal. There are several larger rivers, including Charleston Harbor, that have strong currents that can pose a safety risk for boaters and swimmers.
Severe Storm	Severe weather occurs throughout the year and may be associated with frontal boundaries, low pressure systems, or hot summer days with "pop up thunderstorms". Severe thunderstorms typically produce large amounts of lightning, hail, high winds, heavy rain, and potentially tornadoes. Impact varies according to intensity of the storm and may include risk of injury or loss of life, destruction of property, and flash flooding.
Drought	The impact of drought is minimal on the Town of Mount Pleasant. Regionally, the historical droughts typically experienced were D1 (moderate drought). Vulnerable populations and utilities would include farmers/ agriculture, properties with drinking wells, and municipal water sources. Drinking water in Mount Pleasant is provided by a separate utility. Water is sourced from a deep aquifer and from inland sources. The inland water sources are the most vulnerable during droughts.
Winter Weather	Severe winter weather can negatively impact many components of the entire region when it occurs. Transportation infrastructure, economy and critical utilities are the primary areas of concern. Vulnerable populations may be at greater risk due to lack of access to heat. Injuries, loss of life, and property damage can occur due to falling trees and tree limbs and slippery road surfaces.
Other	The Town of Mount Pleasant is located in a coastal region where access to the jurisdiction requires the use of bridges. Bridges are also used for access and interconnectivity within the community. During any regional emergency, it is possible for the Town or portions of the Town to be isolated for a period of time. The vulnerability for the Town and its citizens may be lead to delayed emergency or recovery services from outside resources or from Town responders.

5.12.2 – Vulnerable Buildings

The analysis for this section is identical to the analysis under “Vulnerable Buildings” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-12-9

Building Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
Jurisdiction	Dam Failure	Drought	Earthquakes	Flooding	Hazardous Material Incidents	Hurricanes	Sea Level Rise	Tornadoes	Terrorist Incidents	Tsunamis	Wildfires	Winter Weather
Town of Mt. Pleasant	4	4	1	2	3	1	3	2	3	2	2	3

5.12.3 - Infrastructure Vulnerability

The analysis for this section is identical to the analysis under “Infrastructure Vulnerability” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-12-11

Infrastructure Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TsunamiS	WILDFIRES	WINTER WEATHER
Town of Mt. Pleasant	4	4	1	2	3	1	3	2	3	4	3	1

Additionally, the following road flood maintenance projects help decrease infrastructure vulnerability to hazards:

Road	Segments	Emergency Division/ Area	Owner	Maintenance Issue	Needs
Mathis Ferry Road	Entire length	1	SCDOT	roadside ditches/ culverts are heavy debris prone	Pipes/ ditches need annual cleaning
Long Point Road	Whipple Road to Hwy 17	2	SCDOT	roadside ditches/ culverts are heavy debris prone	Pipes/ ditches need annual cleaning
Wando Park Blvd - Maintenance related (Town/ SCDOT) – work in progress	Entire lengths/ outfalls to I-526	2	TOMP/ SCDOT	Road drains to I-526, 526 needs cleaning/ maintenance to allow flow	Pipes/ ditches need annual cleaning

Rifle Range Road (6-Mile to Hamlin) – Lack of infrastructure/ maintenance / age (SCDOT)	Entire length (roadside ditches)	3 & 4	SCDOT	Roadside ditches have silted in / debris prone	Pipes/ ditches need annual cleaning
Belle Hall Parkway at Longpoint Road	at intersection	2	TOMP/ SCDOT	road shoulder is high - prevents water from flowing into ditch/ inlet	shoulder needs grading/ lowering
Drainage Canal Hot Spots	As identified for Drainage maintenance program - internal checklist		various	known debris choke points in canal systems at culverts	check/ clear after events
Flap Gates/ Tide Gates	As identified for Drainage maintenance program - internal checklist			tidal gates to keep flood waters out	can be debris compromised
* other flood prone areas of concern may be listed in the Regional Hazard Mitigation Plan - Attachment 6C for Town of Mount Pleasant's Drainage Improvement Projects					

Problem Statements and Vulnerability Based on Jurisdiction	
Jurisdiction	Vulnerability Assessment
Town of Mount Pleasant	The Town is accessed by the Ravenel Bridge, Interstate 526 and Hwy 17 from Georgetown. Two of the three access points are via bridges. An earthquake could cause catastrophic damage to the Town if it became inaccessible. The Town is also susceptible to flooding, mostly in the Historic District, with outdated storm drainage infrastructure and low lying areas. The Town is also developing very quickly with a new influx of businesses and residents unfamiliar with the hazards associated with the Town. Buildings are also built close together which could be detrimental if an earthquake occurred or hurricane made landfall. The Town of Mt. Pleasant is also bordered by water with the Wando River, the Charleston Harbor, Hobcaw Creek and Shem Creek. It has some protection from hurricanes with the barrier islands of Sullivan's Island, Dewees Island and Isle of Palms.

5.12.4 - Known Flood Damages

The analysis for this section is identical to the analysis under “Known Flood Damages” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-12-12

Loss Statistics for Charleston County as of 9/30/2018					
Jurisdiction	Total Losses	Closed Losses	Open Losses	CWOP Losses	Total Payments
MOUNT PLEASANT, TOWN OF	1,546	992	1	553	15,788,749.43
FEMA Policy and Claims Statistics Database, 2019					

Item	Standard
Freeboard	1 foot freeboard
Cumulative substantial improvement	10 Year Cumulative Substantial Improvement
Protection of Critical Facilities	Critical Facilities Allowed only in Zone X (unshaded)
Enclosure limits below elevated buildings in SFHAs	Enclosure limits of 200 SF below elevated buildings in SFHAs
Nonconversion Agreements	Nonconversion Agreements required for Elevated Residential Buildings
Critical Line	Critical Line setback and buffer requirements
Open space requirements for new residential developments	Open space requirements for new residential developments 20% to 30%
New Impervious Surface Overlay District	New Impervious Surface Overlay District - 40% impervious Surface Limit
	New Single Family Residential Stormwater Management & Tree Preservation Program

5.12.5 – Past Flood Impacts

The analysis for this section is identical to the analysis under “Past Flood Impacts” for Unincorporated Charleston County.

Flood Areas- Capacity Concerns

Area/ Subdivision	Age of infrastructure (plat dates)	Type of infrastructure	History/ reports of flooding issues	Has re- development of properties	Road ownership	Jurisdiction	Watershed/ Priority	SLR Vulnerability	Prior Improvement Projects?	In Hazard Plan	CIP/ CMP STATUS
*Hobcaw Point	1950-1980s	Ditches, pipes, private ponds	Home Yard road	Yes	Town SCDOT	Town	Hobcaw Creek (303d)	2 feet +	No	Yes	CMP FY 17/18 study area
*Groves	1960s	Ditches Pipes	Road Yard	Yes	Town	Town	Shem Creek Charleston Harbor	No	Yes Cliffwood/ Japonica (SW)	Yes	CMP FY 18/19 Study area
Greenhill	1958	Ditches Pipes	Yard	Yes	SCDOT	Town	Hobcaw (303d)	4 feet +	Yes CDBG	Yes	TBD
Brookgreen	1948	Pipes/ ditches Lake	Home Road Yard	Yes	SCDOT	Town	Shem Creek (303d)	1 foot +	Yes Phases 1-3 of 4 SW	Yes	TBD
Shemwood I/ Armsway	1942+	Pipes Ditches Lake	Home Road Yard	Yes	SCDOT	Town	Shem Creek (303d)	1 foot +	No	yes	TBD
Cooper Estates/ Millwood Baytree	1965	Pipes Ditches	Road Yard	Yes	SCDOT Town	Town	Shem Creek (303d)	2 feet +	Yes Asset Mgt. (BT) SW	Yes (BT)	TBD

		Lake Cooper	Home (BT)								
Isaac German Watershed (six mile to Chas National & Hamlin/ Boston Grill)	1800+	Ditches	Road		SCDOT	Town	Isaac German	2 feet +	Road upgrades		
		Pipes	Yard	Yes	Town	County	Intra Coastal	Lower ends	New Developments upstream	Yes	TBD
		Wetlands	Home?		Private						
Six Mile areas (Gulf Estates, Palmetto Fort, etc.)	1957-	Ditches	Road		SCDOT	Town	Intra Coastal	2 feet +			
		Pipes	Yard	Yes	Town	County	Isaac German	Lower end	No	Yes (gulf)	TBD
		Six Mile Canal									
Remley's Point	1879	Ditches	Yard				Charleston Harbor		Yes		In SEA
		Pipes	Road	Yes	Town	Town	Molasses Creek	1 foot +	CDBG	No	Grant Study area?
Bayview Acres	1951	Ditches	Road		SCDOT		Shem Creek				
		Pipes	Yard	Yes	Town	Town	(303d)	1 foot +	No	No	TBD
		Wetland									
Hickory Shadows	1970	Pipes	Road				Shem Creek	1 foot +	Yes		
		Canal	Yard	Yes	Town	Town	(303d)	(low ends)	Asset Mgt.	No	TBD
Rosemead	1975	Pipes	Road	TBD	Town	Town	Shem Creek	1 foot +	Yes		
		Canal					(303d)	(road)	Asset Mgt	No	TBD
Wakendaw	1969+	Pipes	Yards	TBD]			Hobcaw	2 feet +	Yes		
		Lakes		Upstream Development	Town	Town	(303d)	(Low Edge)	Asset Mgt	No	TBD

Old Village Old Mount Pleasant	In Process										
Snee Farm	In Process										
Future Consideration of consider areas as they are for inclusion into the matrix (or to coordinate with Charleston County) – includes areas within the Town’s Planning Boundaries;											
Four Mile	1950-/ +	Ditches Pipes	Road Yards	TBD Adjacent Development	Town County SCDOT	Town County	Intra Coastal Snee Farm/ Boone Hall (TMDL)	NO	No	No	TBD
Ten Mile Copahee	1960-/ +	Ditches Canals Wetlands	Yards	TBD Adjacent Development	SCDOT County	Town County	Intra Coastal	2 feet +	No	no	TBD
Phillips	1977-	Ditches Canals	Yards	TBD Adjacent Development	SCDOT County	Town County	Horlbeck Creek (TMDL)	2 feet +	No	no	TBD
Guerin’s Bridge	1950+	Ditches Canals	TBD	TBD	SCDOT County Town	Town County	Wando River (TMDL)	1 foot +	No	no	TBD
Snowden	1966	Ditches Canals	Yards (Longpoint Road)	Yes	SCDOT County	County Town	Foster Creek	2 feet +	TBD		TBD

			TBD		Town						
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5.12.6 – Emergency Warning Needs

The analysis for this section is identical to the analysis under “Emergency Warning Needs” for Unincorporated Charleston County.

5.12.7 – Critical Facilities

The analysis for this section is identical to the analysis under “Critical Facilities” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Facility	Emergency Division/ Area	Owner	Type	Use During	Use post event
Waterworks Treatment Plant – Waterworks Blvd. (Center Street)	1	MPW	Water/Wastewater	Utility services	utility services
Town Hall – Houston Northcutt/ Ann Edwards Lane	1	Town	EOC	EOC	Offices
Speights Field	1	Town	Municipal	Staging	Staging/ debris
SCE&G Substation - @ town hall	1	Utility	Power	Power	Power
Police Substation- Ed. Park	1	Town	Municipal building	None	Offices
Patriots Point Recreation Complex	1	Town	Municipal Facility	Staging	Staging/ housing/ debris
Mt. Pleasant Academy – Center Street	1	County	School	None	Staging/ housing
Moultrie Middle School – Coleman Boulevard	1	County	School	Emergency housing	Staging/ housing
G.M. Darby Building – King Street	1	Town	Municipal building	None	Offices
First Baptist School – McCants Street	1	Private	School	None	Staging/ housing
Fire Station #1 – McCants Street	1	Town	Fire/ EMS Response	Emergency services	Emergency services
Channel 4 News – Frontage Road	1	Private	Communications	Telecommunications	Telecommunications
Channel 2 News – Coleman Boulevard	1	Private	Communications	Telecommunications	Telecommunications
Center Street - Duffy Fields	1	Town	Municipal Facility	Staging	Staging/ housing/ Debris
Boys and Girls Club – Whilden Street	1	Town	Municipal building	None	Community services/ outreach
Bell South Facility – Ben Sawyer Boulevard	1	Utility	Communications	Telecommunications	Telecommunications
Alhambra Hall – Middle Street	1	Town	Municipal building	None	Staging/ housing

Memorial Waterfront Park	1	Town	Municipal Facility	none	staging/ housing/ debris
Whipple Road Tennis Center	2	Town	Municipal Facility	none	staging/ housing/ debris
Whipple Road Park & ballfields	2	Town	Municipal Facility	none	staging/ debris
Waterworks Station – off Mathis Ferry Road	2	MPW	Water/ Wastewater	Water supply	water supply
Wando Port Terminal/ SPA Headquarters	2	State	State	None	None
Wando Park Water Tower	2	MPW	Water/ Wastewater	Water supply	water supply
SCE&G transmission station	2	Utility	Utility	power	Power/ staging
SCE&G Transmission Lines (Whipple Road)	2	Utility	Utility	Power	power
SCE&G Substation – In Snowden	2	Utility	Utility	Power	power
Remley's Point Community Center	2	Town	Municipal Facility	None	Community outreach
Palmetto Islands County Park	2	County	Park	none	staging/ housing/ debris
National Guard Armory	2	National Guard	Resource	food services	staging/ housing
MPW – Rifle Range Road Plant	2	MPW	Water/ Wastewater	Utility services	utility services
Lucy Beckham High School (under Construction)	2	County	School	Emergency Housing	Staging/ housing
Jones Center	2	Town	Municipal Building	Emergency Housing?	Staging/ housing/ debris
James B. Edwards School	2	County	School	Emergency Housing	Staging/ housing
Hamlin Park	2	Town/ County	Park	none	staging/ debris
Greenhill Community Center	2	Town	Municipal Building	Staging	Community Outreach
Fire Station #2	2	Town	Fire/ EMS Response	Emergency services	Emergency services
Fire Station #3	2	Town	Fire/ EMS Response	Emergency services	Emergency services
Fire Station #7	2	Town	Fire/ EMS Response	Emergency Services	Emergency services
East Cooper Montessori School – Rifle Range Road	2	County	School	None	Staging/ housing
East Cooper Hospital	2	Private	Medical	Medical	Medical
Belle Hall Elementary	2	County	School	none	staging/ housing
Fire Station #4	2	Town	Fire/ EMS Response	Emergency services	Emergency services
Wando High School	3	County	School	Emergency housing	Staging/ housing

Public Services Facility – Sweetgrass Basket Parkway	3	Town	Municipal operations/ Fleet	Fleet/ Resource Staging / Fueling	Debris Management/ Operations
Police Fire Training Facility	3	Town	Municipal Facility	Staging	Staging/ housing
Park West Schools	3	County	School	Emergency housing	Staging/ housing
Park West Recreation	3	Town	Municipal Facility	None	Staging/ housing
MPW Water Tower/ Facility (Hwy 41)	3	MPW	Water/ Wastewater	Water supply	water supply
MPW water Tower/ Facility (Hwy 17N - Chas National)	3	MPW	Water/ Wastewater	Water supply	water supply
MPW North Operations Center	3	MPW	Water/ Wastewater	Staging	Staging
Lieben Road Facility	3	Town	Municipal building	Staging	Staging/ Debris/ Ops
Fire Stations #5	3	Town	Fire/ EMS Response	Emergency services	Emergency services
Fire Station #6	3	Town	Fire/ EMS Response	Emergency services	Emergency services
Whitehall Terrace Community Center	3	Town	Municipal Building	None	Community services/ outreach
Active Park - Carolina Park	3	Town	Municipal Facility	none	Staging/ debris
Roper Hospital	3	Private	Medical	Medical	Medical

Table 5-12-13

Critical Facility Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
Town of Mt. Pleasant	5	3	1	3	3	1	3	1	3	4	3	3

A full list of the capabilities for Charleston County and plan participating partners can be seen in the “Critical Facilities” description in Section 5.1(b).

5.12.8 - Natural and Beneficial Functions of Floodplains

The analysis for this section is identical to the analysis under “Natural and Beneficial Functions of Floodplains” for Unincorporated Charleston County.

5.12.9 - Development and Population Trends

The analysis for this section is identical to the analysis under “Development and Population Trends” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-12-14

Estimated Population 2017-2018 in Charleston County SC		
Jurisdiction	Growth Rate 2010-2017	Projected 2017 Population
Town of Mt. Pleasant	21.72%	86,668

Source: U.S. Census Bureau, Population Division 2018

Additional summaries of the anticipated future development trends for the local governments within Charleston County, as provided by the local government entities participating in the Charleston Regional Hazard Mitigation Plan, are outlined in “Development and Population Trends” in Section 5.1(b).

5.12.10 – Economic Impact

The analysis for this section is identical to the analysis under “Economic Impact” for Unincorporated Charleston County.

5.12.11 – Resiliency to Hazards

The analysis for this section is identical to the analysis under “Resiliency to Hazards” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Town of Mount Pleasant Capacity - Plan/ Code/ Study/ Regulations
Town of Mount Pleasant Strategic Plan; Theme 5 Incident Management
Town of Mount Pleasant Emergency Operations Plan
Resolution 18121 Adopting Emergency Operations Plan
South Carolina State Wide Mutual Aid
Stormwater Management Program/ Plan
Drainage System Maintenance SOPs
Asset Management Program/ Plan for drainage systems
Drainage Canal Maintenance Program
Capital Improvements Program/ Plan
Comprehensive Maintenance Program/ Plan
Old Village Drainage Study
Snee Farm Preliminary Engineering Report - Drainage Study
Hobcaw Point Drainage Study
Hazard Mitigation Plan (Charleston Region) - Attachment 6C drainage projects
Bridge Inspection Program
Water Quality Monitoring Plans
Civil Emergencies Code of Ordinances (Chapter 41)
Waters and Sewers Code of Ordinances (Chapter 51)
Stormwater Management Program Code of Ordinances (Chapter 52)
Building Regulations Code of Ordinances (Chapter 150)
Flood Damage Prevention Ordinance (Chapter 152)
Stormwater Management and Water Quality Regulations Code of Ordinances (Chapter 153)
Land Development Code of Ordinances (Chapter 155)

Zoning Code of Ordinances (Chapter 156)
2015 International Building Code with SC modifications
Higher Regulatory Standards (CRS Section - 430) - *see separate document
Departmental Specific Operating Procedures for Emergency and Disaster Response/ Recovery
NFIP & CRS Participation

Attachment 5-12-C: Repetitive Loss Areas within the Charleston Region

Repetitive Loss Areas				
Street	City, State	Zip Code	Jurisdiction	PSD / FD
DeLeisseline Boulevard	Mt. Pleasant, SC	29464	Mt. Pleasant	
E. Shipyard Road	Mt. Pleasant, SC	29464	Mt. Pleasant	
Ferry Street	Mt. Pleasant, SC	29464	Mt. Pleasant	
Hibben Street	Mt. Pleasant, SC	29464	Mt. Pleasant	
Hidden Bridge Drive	Mt. Pleasant, SC	29464	Mt. Pleasant	
Highway 17 By-Pass	Mt. Pleasant, SC	29464	Mt. Pleasant	
Kincaid Drive	Mt. Pleasant, SC	29464	Mt. Pleasant	
Kirk Court	Mt. Pleasant, SC	29464	Mt. Pleasant	
Live Oak Drive	Mt. Pleasant, SC	29464	Mt. Pleasant	
Magwood Lane	Mt. Pleasant, SC	29464	Mt. Pleasant	
Middle Street	Mt. Pleasant, SC	29464	Mt. Pleasant	
Montclair Drive	Mt. Pleasant, SC	29464	Mt. Pleasant	
Nantahala Boulevard	Mt. Pleasant, SC	29464	Mt. Pleasant	
Pearl Street	Mt. Pleasant, SC	29464	Mt. Pleasant	
Ralston Court	Mt. Pleasant, SC	29464	Mt. Pleasant	
Royall Avenue	Mt. Pleasant, SC	29464	Mt. Pleasant	
Sehoy Drive	Mt. Pleasant, SC	29464	Mt. Pleasant	
Shadow Drive	Mt. Pleasant, SC	29464	Mt. Pleasant	
Whilden Street	Mt. Pleasant, SC	29464	Mt. Pleasant	
William Street	Mt. Pleasant, SC	29464	Mt. Pleasant	

Attachment 5-12-D: Charleston Region Buildings Vulnerable to Flooding Due to Location in the Special Flood Hazard Area (SFHA) Only

Jurisdiction	Total Site-Built Structures	% of Total Site-Built Structures in the SFHA	Mobile Homes in SFHA*	Residential site-built structures in the SFHA		Commercial Structures in the SFHA		Total Structures in the SFHA (including site-built and mobile homes)	
				A/AE Zone	V/VE Zone	A/AE Zone	V/VE Zone	A/AW Zone*	V/VE Zone
			SFHA						

Town of Mt P	35,264	49	12	14,984	1,303	732	226	15,728	1,529
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* Since most mobile homes in Charleston County are treated as vehicles for tax purposes, the determination of “A” or “V” zones for these homes using the Q-3 digital data was not able to be readily performed. All mobile homes in the SFHA are included in the A-zone total for this table, since most jurisdictions in Charleston County restrict mobile homes from the “V” flood zone areas.

Attachment 5-12-E: Charleston Region Buildings Vulnerable to Flooding Due to Year of Construction and Location in the Special Flood Hazard Area (SFHA)

Jurisdiction	Pre-1985 Site-Built Residential Buildings in SFHA	Pre-1985 Commercial Buildings in SFHA	Total Pre-1985 Site-Built Buildings in SFHA	% of All Site-Built Buildings In Jurisdiction Constructed Pre-1985 and in SFHA	Pre-1985 Mobile Homes in SFHA	Total Site-Built Buildings Pre-1985 & Mobile Homes in SFHA
Town of Mt P	2,326	257	2,583	33.47	3	2,586

Attachment 5-12-F: Charleston Region Average Valuation of Buildings and Mobile Homes

Jurisdiction	Avg. Site-Built Residential Building Value	Avg. Commercial Building Value	Avg. Mobile Home Value**	Estimated Total Pre-1985 Site-Built and Mobile Home Building Value	Estimated Pre-1985 Site-Built Building And Mobile Home Value in SFHA (mil.\$)
Mt. Pleasant (All)	\$251,259.03	\$752,003.21	\$9,962.07	\$1,402,235,202.00	
Pre-1985 only	\$173,523.37	\$263,903.85	\$2,304.17		\$536,007,245.00

** Valuation data reflected herein is for mobile homes, regardless of age.

Attachment 5-12-G: Charleston Region Average Valuation of Site-Built Buildings by Flood Zone

Jurisdiction	Total Value “A” Zones Site-Built Structures	Total Value “V” Zones Site-Built Structures(mil\$)	Total Value Site-Built Structures Not in the SFHA (mil\$)	Total Value of Site-Built Structures Not Flood-Zone Coded** (mil\$)
Town of Mt P	5,044,095,826	555,892,200	4,586,456,356	3,748,937,556

** Valuation data reflected herein is for mobile homes, regardless of age.

5.13(a) - City of North Charleston

Flood

Location

Flooding can occur throughout most of the Charleston Region since around 68% resides within a floodplain. Floodplains are designated by the frequency of the flood that is large enough to cover them. Flood frequencies are determined by plotting a graph of the size of all known floods for an area and calculating how often floods occur. The Federal Emergency Management Agency (FEMA) identifies floodplain areas by producing Flood Insurance Rate Maps (FIRM). These maps show all locations near major bodies of water, and show base flood elevations and floodplain boundaries like the 100-year floodplain boundaries. 100-year flood event is a 1% probability of occurring in any given year. The roughly 68% of the areas located in the floodplain are exposed to the threat of floods but that does not mean the other areas are not vulnerable to a flash flood or flooding events. Damaged infrastructure and roadways can limit mobility for citizens. All areas can experience flooding hazards.

Below is a list from each participant in the plan for areas of concern for flooding.

Flood Prone Areas of Charleston County	
<i>Jurisdiction Not Serviced by Charleston County</i>	<i>Area</i>
City of North Charleston	Spruill Avenue (southern end)
	Azalea Drive
	Filbin Creek
	Ashley Phosphate and Palmetto Commerce Parkway
	Ashley River and Cooper River Waterfront subdivisions

Historical Occurrences

Flooding Events Between Jan 1, 1950 – April 30, 2019	
Total: 8 Events	Total: \$413,500

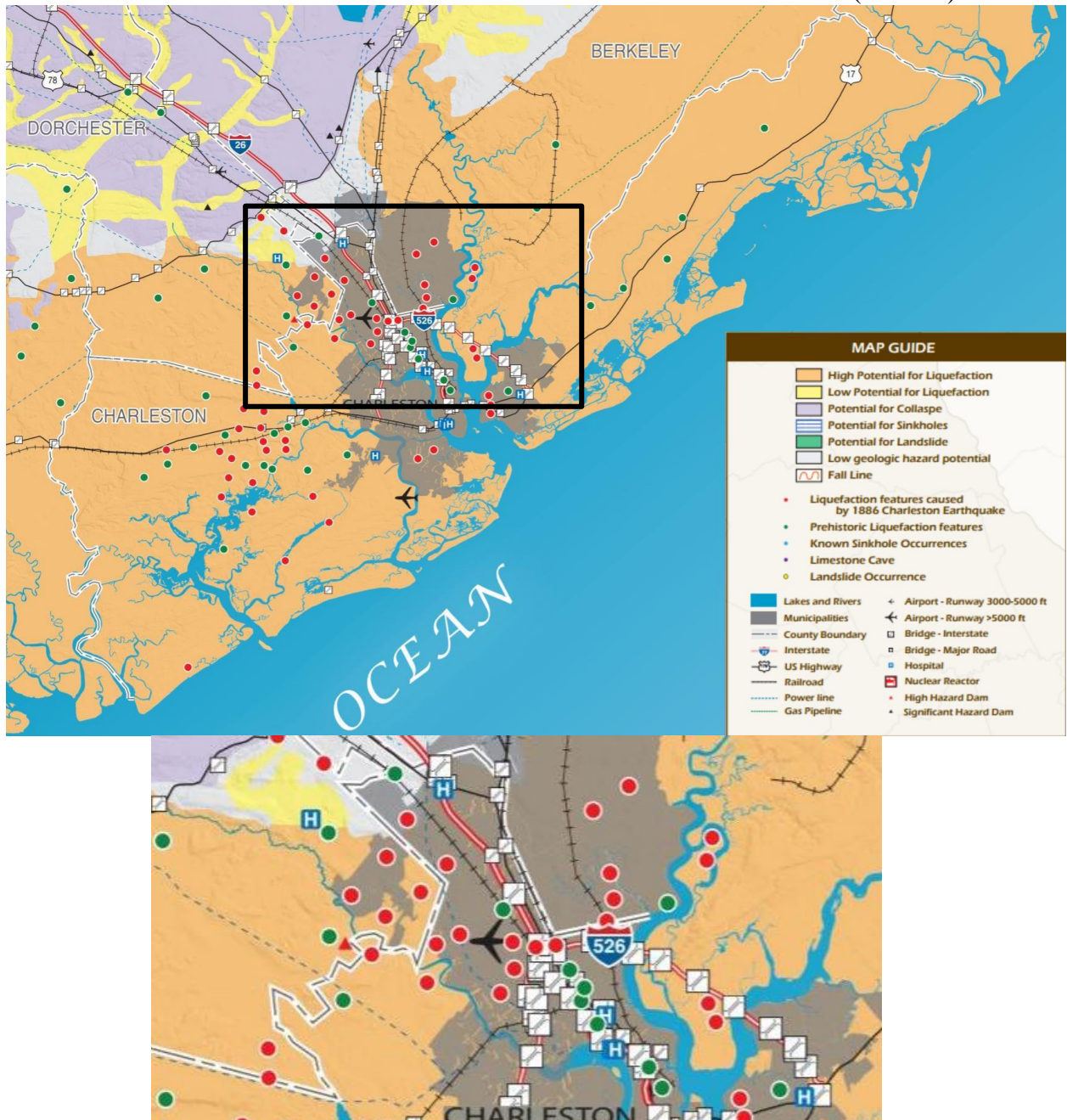
These flooding events were mainly the result from heavy rain or severe weather (thunderstorms, tropical storms, heavy rain) incidents that caused flooding in the Charleston Region. Charleston broke its record for number of annual-flood days last year. The previous record of 38 days, observed in 2015, was exceeded by 12 days for a total of 50 annual-flood days in 2016. Compared to 1995, trends in flooding during 2016 have increased by 130 percent on average.

Flooding Probability for each Jurisdiction	
Jurisdiction	Probability
City of North Charleston	51-75%

Earthquake

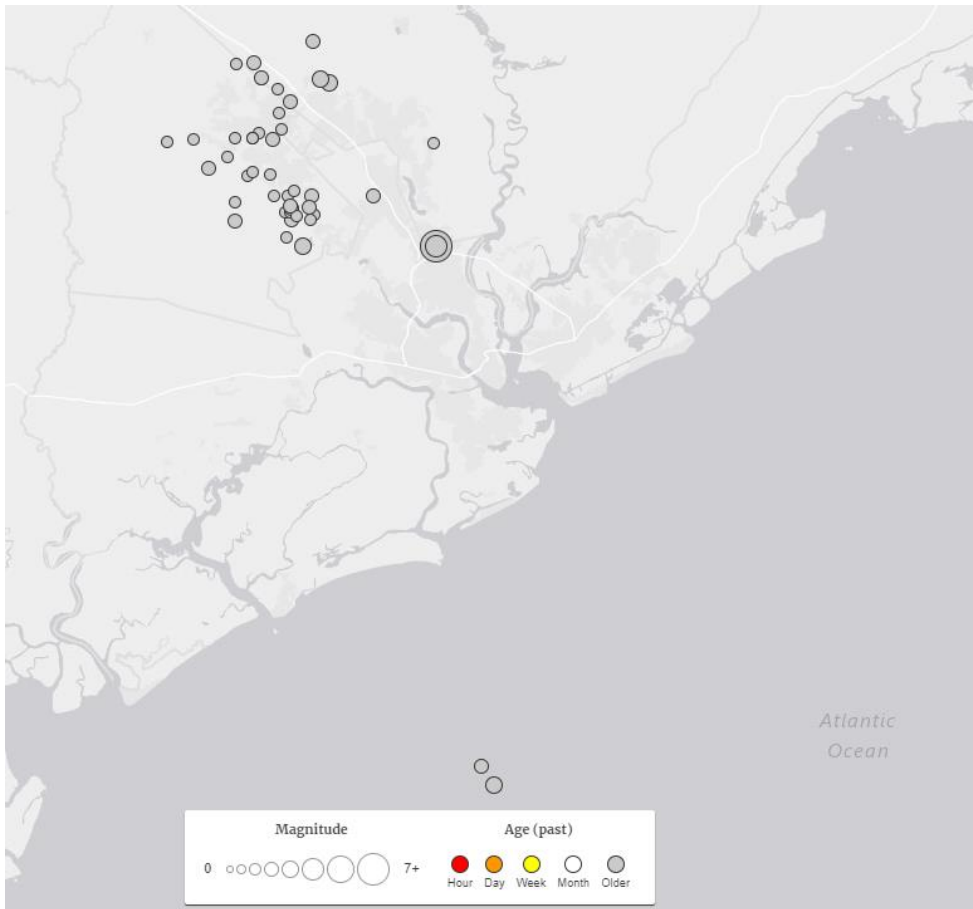
Location

Earthquakes are not an uncommon occurrence in South Carolina. The majority of earthquakes worldwide occur at plate boundaries when plates stick and then jump past each other. The cause of earthquakes in South Carolina is not so clear; the quakes are located within a plate rather than at a plate boundary. In South Carolina, approximately 70 percent of the earthquakes occur in the Coastal Plain and most are located around three areas west and north of Charleston: Ravenel-Adams Run-Hollywood, Middleton Place - Summerville, and Bowman. Geologically, Charleston lies in one of the most seismically active areas in the Eastern United States. This seismic cluster is known as the Middleton Place - Summerville Seismic Zone (MPSSZ).



Source: SC DNR Geologic Hazard of the South Carolina Coastal Plain 2012

Historical Occurrences



Source: USGS Latest Earthquakes 1800-to-date

Time*	Depth	Magnitude	Location
1817-01-08T09:00:00.000Z		5	South Carolina
1886-09-01T02:51:00.000Z		7.03	South Carolina
1959-08-03T06:08:37.200Z	1	4.4	South Carolina
1974-11-22T05:25:55.500Z	18	4.7	South Carolina
1977-01-18T18:29:13.500Z	5	3	South Carolina
1977-12-15T07:15:55.000Z	9	2.5	South Carolina
1977-12-15T19:16:43.100Z	9	3	South Carolina
1978-09-07T22:53:22.300Z	11	2.7	South Carolina
1979-12-07T05:43:35.000Z	15	2.9	South Carolina
1980-09-01T05:44:42.300Z	6	2.7	South Carolina
1981-03-19T04:33:55.720Z	0.1	2.5	South Carolina

Time*	Depth	Magnitude	Location
1982-03-01T03:33:13.560Z	6.7	3	South Carolina
1983-11-06T09:02:19.820Z	9.6	3.3	South Carolina
1986-09-17T09:33:49.460Z	7.7	2.6	South Carolina
1988-01-23T01:57:16.390Z	7.4	3.3	South Carolina
1989-01-02T16:35:16.270Z	4.9	2.6	South Carolina
1990-02-07T07:41:39.920Z	9.3	2.7	South Carolina
1990-05-11T18:23:33.950Z	6.1	2.6	South Carolina
1990-11-13T15:22:13.010Z	3.4	3.2	South Carolina
1992-08-21T16:31:55.160Z	10	4.1	South Carolina
1995-04-17T13:45:57.800Z	10	3.9	South Carolina
1999-03-29T14:49:36.510Z	5	2.9	South Carolina
2002-11-08T13:29:03.190Z	3.9	3.5	South Carolina
2002-11-11T23:39:29.720Z	2.4	4	South Carolina
2003-02-28T07:02:36.500Z	4.3	2.6	7km SW of Ladson, South Carolina
2003-03-02T17:18:26.500Z	6.5	2.9	7km SW of Ladson, South Carolina
2003-05-05T10:53:49.900Z	11.4	3.1	4km NNW of Summerville, South Carolina
2003-06-12T23:33:17.200Z	10.4	2.6	5km WSW of Centerville, South Carolina
2003-07-19T14:22:21.300Z	5.7	2.5	7km SSW of Ladson, South Carolina
2003-10-14T10:45:38.600Z	7.2	2.5	5km S of Centerville, South Carolina
2003-12-22T23:50:26.000Z	5.6	3	8km SSW of Ladson, South Carolina
2004-05-01T04:16:28.300Z	10.7	2.7	3km ENE of Goose Creek, South Carolina
2004-07-20T09:13:14.400Z	10.3	3.1	7km WSW of Centerville, South Carolina

Time*	Depth	Magnitude	Location
2004-08-18T03:43:42.400Z	7.7	2.5	0km NE of Summerville, South Carolina
2004-11-25T22:58:45.900Z	12.9	2.7	4km NNW of Summerville, South Carolina
2005-11-19T20:02:20.000Z	5	2.6	South Carolina
2008-12-16T12:42:17.520Z	15.39	3.6	5km N of Sangaree, South Carolina
2009-01-29T21:11:27.200Z	6.45	2.5	2km SW of Summerville, South Carolina
2009-05-06T17:07:17.090Z	2.02	2.5	2km N of Summerville, South Carolina
2009-08-29T10:37:13.700Z	4.93	3.2	2km NE of Summerville, South Carolina
2010-05-12T09:03:36.760Z	1.26	2.8	6km SSW of Ladson, South Carolina
2011-10-15T07:02:32.820Z	8.05	2.5	4km WSW of Summerville, South Carolina
2011-12-21T21:38:57.670Z	12.33	2.6	7km SW of Centerville, South Carolina
2012-01-04T07:56:03.800Z	4.94	2.6	3km SSW of Centerville, South Carolina
2012-07-31T04:53:09.290Z	8.21	2.8	5km S of Centerville, South Carolina
2013-09-19T19:14:11.170Z	11.44	2.5	8km WSW of Summerville, South Carolina
2014-03-19T22:38:03.330Z	6.91	3	0km S of Centerville, South Carolina

**Sourced from USGS Latest Earthquakes 1800-to-date*

The most significant historical earthquakes in Charleston was the 1886 Charleston earthquake. The August 31, 1886 earthquake, with an estimated magnitude of 7.3 struck the Summerville/Charleston area and is the largest historical earthquake to have occurred in the eastern United States and the most destructive, killing 60 people and causing \$5 to \$6 million dollars (1886 dollars) worth of damage. The Charleston Region lies within the meizoseismal area (area of maximum damage) of the 1886 earthquake, but the effects of the 1886 earthquake were felt throughout the eastern United States. The 1886 earthquake had more than 300 aftershocks that occurred for 35 years after the initial earthquake (South Carolina Seismic Network, 1996, July). The 7.3 magnitude earthquake that occurred in 1886 killed 100 people and destroyed or damaged most of the buildings in Charleston and Summerville. The seismic history of the 1886 quake indicates that it erupts on the average every 500 years. But moderate quakes can and do occur here, and not so rarely. Two 3.6 temblors and one 3.2 temblor have rattled Summerville between 2008 and 2013. Also in 2002, a 4.4 magnitude quake erupted in the ocean off Kiawah Island. Summerville had two 4.1 quakes in the 1990s. They did not do much more than rattle nerves. But a 5 magnitude quake would be 10 times stronger, and some 800 of them occur across the globe every year. Moderate quakes are a great concern to

emergency managers. Currently, though, the County has not experienced an earthquake exceeding a 2.5 magnitude since March 2014.

Earthquake Probability for each Jurisdiction	
Jurisdiction	Probability
City of North Charleston	76-100%

Hazardous Materials

Location

The Charleston Region is a rapidly growing international port with many industries and growing businesses. The Charleston Region also has a United States Air Force Base and several other smaller military establishments, which handle various types and quantities of hazardous materials. Hazardous materials are a continuous potential hazard due to the large amount of transportation of these materials occurring in and around the Region.

Historical Occurrences

The Charleston Regional Hazard Mitigation Plan began collecting Hazardous Material incident data from the Charleston County Consolidated 9-1-1 system in 2012. Below is a table summarizing hazardous material incidents from 2013-2019.

Hazardous Materials Incidents from May 1, 2013 to April 30, 2019							
As Reported by Charleston County Consolidated 9-1-1							
Category	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	
Hazmat	37	51	18	24	22	15	
Fuel Spill	104	111	102	85	74	67	
Gas Leak/Gas Odor (Natural and LP Gases)	278	201	360	397	395	363	
Total	419	363	480	506	491	445	2704

Hazardous Material Incident Probability for Each Jurisdiction	
Jurisdiction	Probability
City of North Charleston	76-100%

Dam Failure

Location

Dam failures are extremely rare events. Santee Cooper, a state-owned utility, operates both the Santee Dam and the Pinopolis Dam System, a failure of which could affect areas within Charleston County. A catastrophic failure at either of these dams would create flooding within the Charleston County area, and would be a significant event. The most likely root cause of such a failure would be an earthquake of a larger magnitude than 7.6 on the Richter scale or perhaps an act of terrorism. While dam failure is unlikely, it is possible that the Charleston County area could experience dam-related flooding.

Historical Occurrences

There have been no recorded historical incidents regarding the Santee Cooper Dam and Pinopolis Dam, which are the only two dams that would impact the Charleston Region during a failure.

Probability

There is no evidence to suggest there is any substantial risk for a dam failure. Only two jurisdictions that could be directly at risk should dam failure occur, City of North Charleston and the Town of McClellanville. Either of these jurisdictions would have a 100% probability of flood inundation if either of the two area dams were to fail in each given location. The vulnerability and impact of the hazard is discussed later in the Plan.

Dam Failure Probability for Each Jurisdiction	
Jurisdiction	Probability
Coty of North Charleston	51-75%

Severe Storm

Location

A thunderstorm event is an atmospheric hazard, and has no geographic boundaries. They can occur in all regions of the United States however, thunderstorms are most common in the central and southern states because atmospheric conditions are more favorable for generating thunderstorms. Since thunderstorms are unpredictable, all jurisdictions are equally exposed to these hazards.

Historical Occurrences

Severe Storm Events (Thunderstorm Winds) 1956 – April 2019		
TOTAL: 21 Events	Average Speed:	Total Damage:
	53.3	\$130,000

Source: NOAA Storm Events Database

Severe Storm (Hail) Incidents in Charleston County 1957 – April 2019		
Total: 14 Events	AVERAGE SIZE: .97	TOTAL DAMAG E: \$ -

Source: NOAA Storm Events Database

Severe Storm (Lightning) Incidents in Charleston County 1998 – April 2019	
Total: 3 Events	Total: \$

Source: NOAA Storm Events Database

Severe Storm Probability for Each Jurisdiction	
Jurisdiction	Probability
City of North Charleston	76-100%

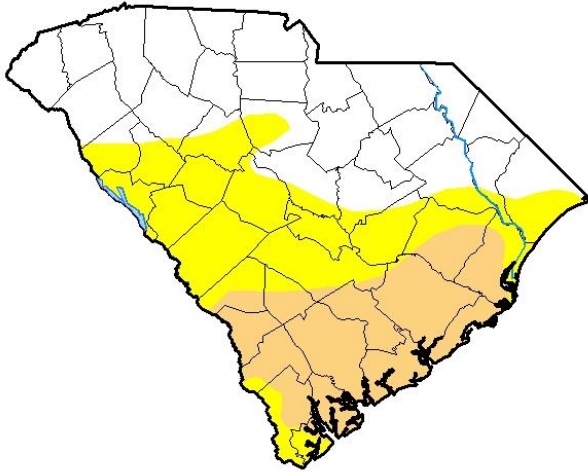
Drought

Location

Droughts typically cover a large area and cannot be confined to any geographic boundary. For this purpose, the whole Charleston Region is vulnerable to the threat of a drought.

U.S. Drought Monitor South Carolina

April 30, 2019
(Released Thursday, May 2, 2019)
Valid 8 a.m. EDT



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	45.71	54.29	23.20	0.00	0.00	0.00
Last Week 04-23-2019	46.10	53.90	23.13	0.00	0.00	0.00
3 Months Ago 01-29-2019	100.00	0.00	0.00	0.00	0.00	0.00
Start of Calendar Year 01-01-2019	100.00	0.00	0.00	0.00	0.00	0.00
Start of Water Year 09-25-2018	89.90	10.10	1.52	0.00	0.00	0.00
One Year Ago 05-01-2018	60.27	39.73	23.91	0.00	0.00	0.00

Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:

Brad Rippey
U.S. Department of Agriculture



<http://droughtmonitor.unl.edu/>

(An example of the extent of drought that the State experienced in late April 2019)

Historical Occurrences

Year	Number of weeks of Drought Events between May 1, 2013 – April 30, 2019						Description
	None	D0 Abnormally Dry	D1 Moderate Drought	D2 Severe Drought	D3 Extreme Drought	D4 Exceptional Drought	
1999-2000	35	17	2	0	0	0	
2000-2001	17	35	19	5	0	0	
2001-2002	4	48	38	32	19	0	
2002-2003	18	34	20	18	13	0	
2003-2004	46	6	0	0	0	0	
2004-2005	32	20	5	0	0	0	
2005-2006	47	5	0	0	0	0	
2006-2007	27	25	3	0	0	0	
2007-2008	0	53	35	12	0	0	
2008-2009	15	37	22	0	0	0	
2009-2010	38	14	2	0	0	0	
2010-2011	29	23	0	0	0	0	
2011-2012	0	53	50	46	39	3	
2012-2013	7	45	20	9	5	0	
2013-2014	32	20	0	0	0	0	The Region experienced 20 weeks in drought stage. 32 weeks of no drought stage were reported and 20 weeks of D0 drought from October to December.
2014-2015	37	15	0	0	0	0	The Region experienced only 15 weeks of D0 drought. During weeks when drought was experienced, only approximately 10-20 percent of the county was

							affected. 37 weeks of the year, the Region experienced no drought.
2015-2016	36	16	0	0	0	0	The Region experienced 16 weeks of D0 drought. During weeks when drought was experienced, only approximately 10-20 percent of the county was affected. 36 weeks of the year, the Region experienced no drought.
2016-2017	38	14	6	0	0	0	The Region experienced 20 weeks of drought stage. During these 20 weeks, the drought stage remained at D0 for 14 weeks and D1 for 6 weeks. 38 weeks of the year, the Region experienced no drought.
2017-2018	23	29	14	4	0	0	The Region experienced 29 weeks of drought stage D0 and 14 weeks of D1. In addition, 4 weeks were spent at D2; there were 23 weeks where the Region experienced no drought.
2018-2019	26	26	10	0	0	0	The Region experienced 36 total drought weeks. 26 weeks were spent at D0 and an additional 10 weeks were spent at D1. The Region was no experiencing a drought for 26 weeks.

Source: U.S. Drought Monitor

According to the U.S. Drought Monitor, the Charleston Region was in the D4 (Exceptional Drought) category for a number of weeks in early 2012 with a Palmer Drought Index of at least -5.0 (Extreme Drought). It is possible for severe and exceptional drought periods to return to the Charleston Region.

Drought Probability for Each Jurisdiction	
Jurisdiction	Probability
City of North Charleston	26-50%

Winter Weather

Location

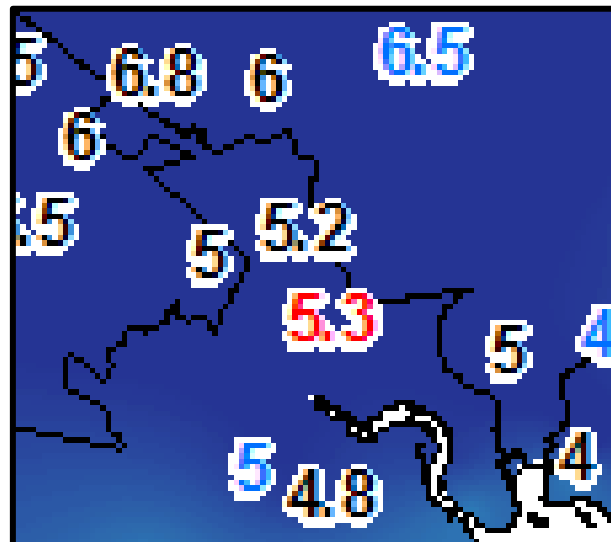
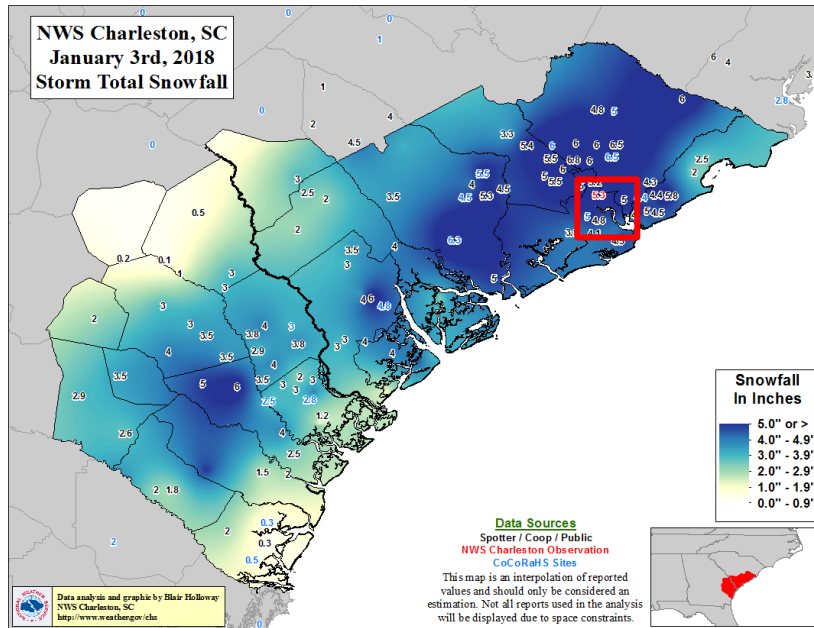
While the Region does not regularly encounter extreme winter storms, some aspects of winter weather occur in the Region annually. With the random nature of this hazard, all jurisdictions are subject to winter weather conditions.

Historical Occurrences

Winter Weather Events Through April 2019	
Total of 10 Events	Total Damage \$233,000

Source: NOAA Climate Data

A rare winter storm affected southeast South Carolina on January 3, 2018. The storm produced a variety of wintry precipitation, including snow, sleet and freezing rain. Charleston Airport (KCHS) measured 5.3 inches of snow, the 3rd greatest daily snowfall on record, just 0.1 inches shy of the 5.4 inches that fell during the 1973 storm (NWS, 2019).



Winter Weather Probability for Each Jurisdiction	
Jurisdiction	Probability
City of North Charleston	51-75%

5.13(b) - City of North Charleston Problem Assessment

5.13.1 - Hazard Vulnerability

The analysis for this section is identical to the analysis under “Hazard Vulnerability” for Unincorporated Charleston County.

5.13.2 - Vulnerable Buildings

The analysis for this section is identical to the analysis under “Vulnerable Buildings” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-13-9

Building Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
Jurisdiction	Dam Failure	Drought	Earthquakes	Flooding	Hazardous Material Incidents	Hurricanes	Sea Level Rise	Tornadoes	Terrorist Incidents	Tsunamis	Wildfires	Winter Weather
City of North Charleston	4	4	3	1	2	2	3	2	3	5	4	3

5.13.3 - Infrastructure Vulnerability

The analysis for this section is identical to the analysis under “Infrastructure Vulnerability” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-13-11

Infrastructure Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
City of North Charleston	2	5	1	3	3	2	4	3	2	4	3	2

Problem Statements and Vulnerability Based on Jurisdiction	
Jurisdiction	Vulnerability Assessment
City of North Charleston	The City of North Charleston is most vulnerable to hurricanes, hazardous materials, earthquakes, terrorism and flooding. There are many low lying areas and at risk populations that live in flood zones. There are also repeatedly flood areas of the City due to lack of stormwater drainage. There is a high number of mobile homes which puts the community at increased risk for hurricanes and tornadoes. With major ports, the airport, major convention center, and military bases, North Charleston is vulnerable to a terrorist attack as a result of being an economic engine for the region with large international businesses.

5.13.4 - Known Flood Damages

The analysis for this section is identical to the analysis under “Known Flood Damages” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

City of North Charleston Higher Regulatory Standards
2' freeboard

5.13.5 – Past Flood Impacts

The analysis for this section is identical to the analysis under “Past Flood Impacts” for Unincorporated Charleston County.

5.13.6 – Emergency Warning Needs

The analysis for this section is identical to the analysis under “Emergency Warning Needs” for Unincorporated Charleston County.

5.13.7 – Critical Facilities

The analysis for this section is identical to the analysis under “Critical Facilities” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-13-13

Critical Facility Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
City of North Charleston	2	5	2	3	3	3	4	2	3	3	4	3

A full list of the capabilities for Charleston County and plan participating partners can be seen in the “Critical Facilities” description in Section 5.1(b).

5.13.8 – Natural and Beneficial Functions of Floodplains

The analysis for this section is identical to the analysis under “Natural and Beneficial Functions of Floodplains” for Unincorporated Charleston County.

5.13.9 – Development and Population Trends

The analysis for this section is identical to the analysis under “Development and Population Trends” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-13-14

Estimated Population 2017-2018 in Charleston County SC		
Jurisdiction	Growth Rate 2010-2017	Projected 2017 Population
Town of Awendaw	9.07%	1,423

Source: U.S. Census Bureau, Population Division 2018

Additional summaries of the anticipated future development trends for the local governments within Charleston County, as provided by the local government entities participating in the Charleston Regional Hazard Mitigation Plan, are outlined in “Development and Population Trends” in Section 5.1(b).

5.13.10 – Economic Impact

The analysis for this section is identical to the analysis under “Economic Impact” for Unincorporated Charleston County.

5.13.11 – Resiliency to Hazards

The analysis for this section is identical to the analysis under “Resiliency to Hazards” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Attachment 5-13-C: Repetitive Loss Areas within the Charleston Region

Repetitive Loss Areas			
Street	City, State	Zip Code	Jurisdiction
Annette Street	N. Charleston, SC	29406-3801	N. Chas.
Arapahoe Drive	N. Charleston, SC	29405-7784	N. Chas.
Auburn Drive	Charleston Heights, SC	29406-9049	N. Chas.
Dorchester Road 100	N. Charleston, SC	29418	N. Chas.
Dorchester Road 400	N. Charleston, SC	29418	N. Chas.
Holden Street	N. Charleston, SC	29418-5823	N. Chas.
Lilac Avenue	N. Charleston, SC	29405-6818	N. Chas.
Maxwell Street	N. Charleston, SC	29405-4171	N. Chas.
Melanie Court	N. Charleston, SC	29418-5414	N. Chas.
New Ryder Road	N. Charleston, SC	29406	N. Chas.
Nightingale Road	Charleston Heights, SC	29405-7387	N. Chas.
Northwoods Blvd.	N. Charleston, SC	29406	N. Chas.
Norwood Street	N. Charleston, SC	29405-8005	N. Chas.
Rivers Avenue	N. Charleston, SC	29406	N. Chas.
Spoletto Lane	N. Charleston, SC	29418	N. Chas.
Spoletto Lane East	N. Charleston, SC	29418	N. Chas.
Spur Street	N. Charleston, SC	29405-6825	N. Chas.
Technical Parkway	N. Charleston, SC	29418-4931	N. Chas.
Temple Street	N. Charleston, SC	29405	N. Chas.

Attachment 5-13-D: Charleston Region Buildings Vulnerable to Flooding Due to Location in the Special Flood Hazard Area (SFHA) Only

Jurisdiction	Total Site-Built Structures	% of Total Site-Built Structures in the SFHA	Mobile Homes in SFHA *	Residential site-built structures in the SFHA		Commercial Structures in the SFHA		Total Structures in the SFHA (including site-built and mobile homes)	
				SFHA	A/AE Zone	V/VE Zone	A/AE Zone	V/VE Zone	A/AW Zone*

City of NC	26,544	11	840	2,141	1	820	18	3,801	19
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* Since most mobile homes in Charleston County are treated as vehicles for tax purposes, the determination of “A” or “V” zones for these homes using the Q-3 digital data was not able to be readily performed. All mobile homes in the SFHA are included in the A-zone total for this table, since most jurisdictions in Charleston County restrict mobile homes from the “V” flood zone areas.

Attachment 5-13-E: Charleston Region Buildings Vulnerable to Flooding Due to Year of Construction and Location in the Special Flood Hazard Area (SFHA)

Jurisdiction	Pre-1985 Site-Built Residential Buildings in SFHA	Pre-1985 Commercial Buildings in SFHA	Total Pre-1985 Site-Built Buildings in SFHA	% of All Site-Built Buildings In Jurisdiction Constructed Pre-1985 and in SFHA	Pre-1985 Mobile Homes in SFHA	Total Site-Built Buildings Pre-1985 & Mobile Homes in SFHA
City of NC	1,651	510	2,161	13.01	262	2,423

Attachment 5-13-F: Charleston Region Average Valuation of Buildings and Mobile Homes

Jurisdiction	Avg. Site-Built Residential Building Value	Avg. Commercial Building Value	Avg. Mobile Home Value**	Estimated Total Pre-1985 Site-Built and Mobile Home Value	Estimated Pre-1985 Site-Built Building And Mobile Home Value in SFHA (mil.\$)
N. Charleston (All)	\$102,529.86	\$647,389.27	\$5,691.65	\$2,070,907,005.00	
Pre-1985 only	\$89,218.41	\$297,351.15	\$2,144.83		\$303,305,027.00

** Valuation data reflected herein is for mobile homes, regardless of age.

Attachment 5-13-G: Charleston Region Average Valuation of Site-Built Buildings by Flood Zone

Jurisdiction	Total Value “A” Zones Site-Built Structures	Total Value “V” Zones Site-Built Structures(mil\$)	Total Value Site-Built Structures Not in the SFHA (mil\$)	Total Value of Site-Built Structures Not Flood-Zone Coded** (mil\$)
City of NC	775,210,185	19,600,400	4,867,107,061	4,358,694,793

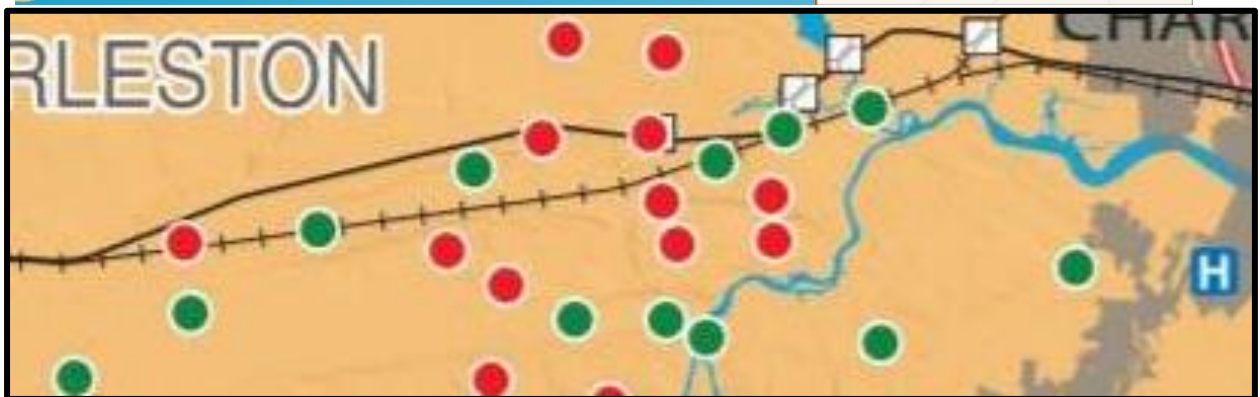
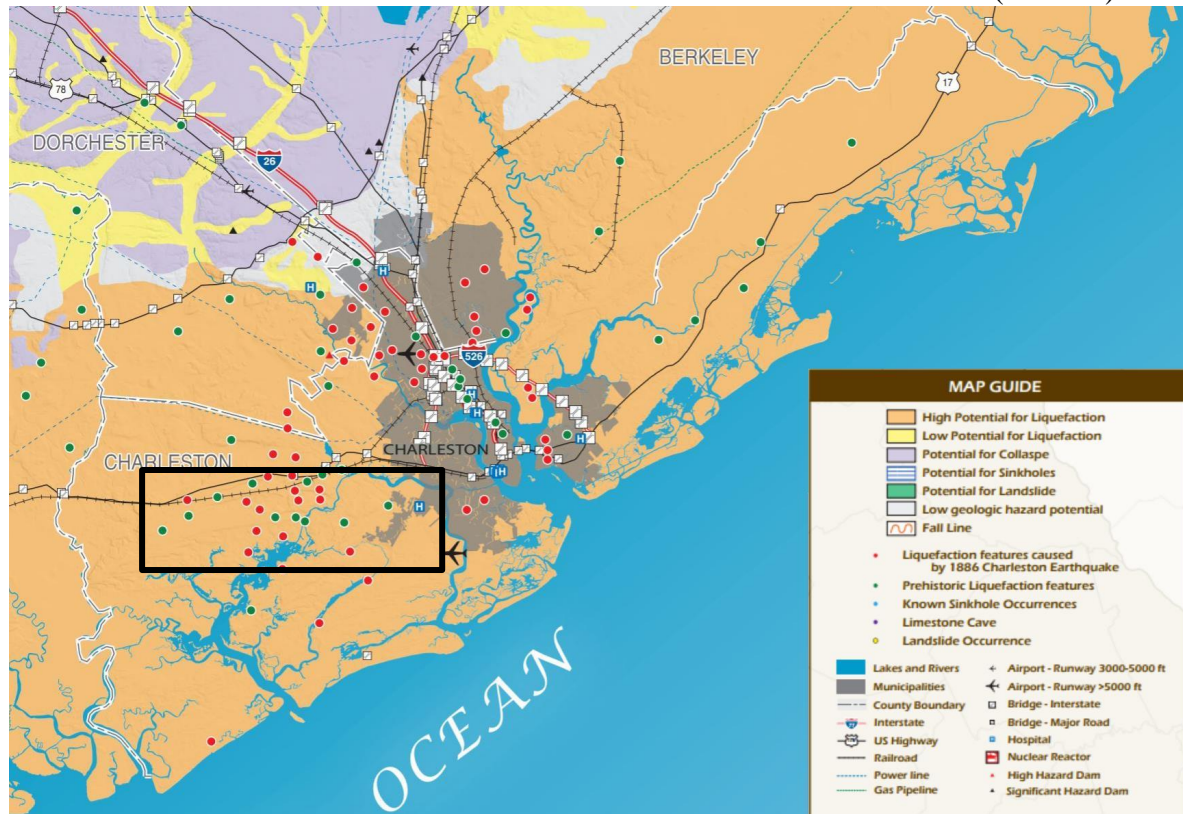
** Valuation data reflected herein is for mobile homes, regardless of age.

5.14(a) – Town of Ravenel

Earthquake

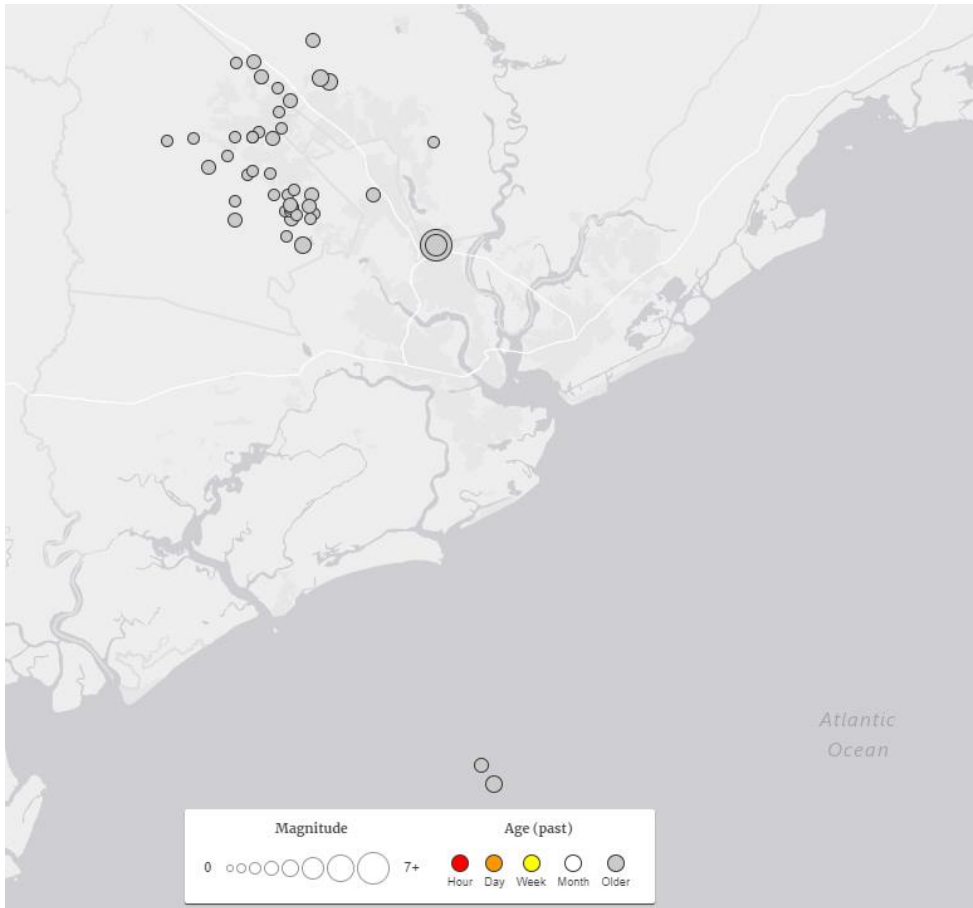
Location

Earthquakes are not an uncommon occurrence in South Carolina. The majority of earthquakes worldwide occur at plate boundaries when plates stick and then jump past each other. The cause of earthquakes in South Carolina is not so clear; the quakes are located within a plate rather than at a plate boundary. In South Carolina, approximately 70 percent of the earthquakes occur in the Coastal Plain and most are located around three areas west and north of Charleston: Ravenel-Adams Run-Hollywood, Middleton Place - Summerville, and Bowman. Geologically, Charleston lies in one of the most seismically active areas in the Eastern United States. This seismic cluster is known as the Middleton Place - Summerville Seismic Zone (MPSSZ).



Source: SC DNR Geologic Hazard of the South Carolina Coastal Plain 2012

Historical Occurrences



Source: USGS Latest Earthquakes 1800-to-date

Time*	Depth	Magnitude	Location
	h	e	
1817-01-08T09:00:00.000Z		5	South Carolina
1886-09-01T02:51:00.000Z		7.03	South Carolina
1959-08-03T06:08:37.200Z	1	4.4	South Carolina
1974-11-22T05:25:55.500Z	18	4.7	South Carolina
1977-01-18T18:29:13.500Z	5	3	South Carolina
1977-12-15T07:15:55.000Z	9	2.5	South Carolina
1977-12-15T19:16:43.100Z	9	3	South Carolina
1978-09-07T22:53:22.300Z	11	2.7	South Carolina
1979-12-07T05:43:35.000Z	15	2.9	South Carolina
1980-09-01T05:44:42.300Z	6	2.7	South Carolina
1981-03-19T04:33:55.720Z	0.1	2.5	South Carolina

Time*	Depth	Magnitude	Location
1982-03-01T03:33:13.560Z	6.7	3	South Carolina
1983-11-06T09:02:19.820Z	9.6	3.3	South Carolina
1986-09-17T09:33:49.460Z	7.7	2.6	South Carolina
1988-01-23T01:57:16.390Z	7.4	3.3	South Carolina
1989-01-02T16:35:16.270Z	4.9	2.6	South Carolina
1990-02-07T07:41:39.920Z	9.3	2.7	South Carolina
1990-05-11T18:23:33.950Z	6.1	2.6	South Carolina
1990-11-13T15:22:13.010Z	3.4	3.2	South Carolina
1992-08-21T16:31:55.160Z	10	4.1	South Carolina
1995-04-17T13:45:57.800Z	10	3.9	South Carolina
1999-03-29T14:49:36.510Z	5	2.9	South Carolina
2002-11-08T13:29:03.190Z	3.9	3.5	South Carolina
2002-11-11T23:39:29.720Z	2.4	4	South Carolina
2003-02-28T07:02:36.500Z	4.3	2.6	7km SW of Ladson, South Carolina
2003-03-02T17:18:26.500Z	6.5	2.9	7km SW of Ladson, South Carolina
2003-05-05T10:53:49.900Z	11.4	3.1	4km NNW of Summerville, South Carolina
2003-06-12T23:33:17.200Z	10.4	2.6	5km WSW of Centerville, South Carolina
2003-07-19T14:22:21.300Z	5.7	2.5	7km SSW of Ladson, South Carolina
2003-10-14T10:45:38.600Z	7.2	2.5	5km S of Centerville, South Carolina
2003-12-22T23:50:26.000Z	5.6	3	8km SSW of Ladson, South Carolina
2004-05-01T04:16:28.300Z	10.7	2.7	3km ENE of Goose Creek, South Carolina
2004-07-20T09:13:14.400Z	10.3	3.1	7km WSW of Centerville, South Carolina

Time*	Depth	Magnitude	Location
2004-08-18T03:43:42.400Z	7.7	2.5	0km NE of Summerville, South Carolina
2004-11-25T22:58:45.900Z	12.9	2.7	4km NNW of Summerville, South Carolina
2005-11-19T20:02:20.000Z	5	2.6	South Carolina
2008-12-16T12:42:17.520Z	15.39	3.6	5km N of Sangaree, South Carolina
2009-01-29T21:11:27.200Z	6.45	2.5	2km SW of Summerville, South Carolina
2009-05-06T17:07:17.090Z	2.02	2.5	2km N of Summerville, South Carolina
2009-08-29T10:37:13.700Z	4.93	3.2	2km NE of Summerville, South Carolina
2010-05-12T09:03:36.760Z	1.26	2.8	6km SSW of Ladson, South Carolina
2011-10-15T07:02:32.820Z	8.05	2.5	4km WSW of Summerville, South Carolina
2011-12-21T21:38:57.670Z	12.33	2.6	7km SW of Centerville, South Carolina
2012-01-04T07:56:03.800Z	4.94	2.6	3km SSW of Centerville, South Carolina
2012-07-31T04:53:09.290Z	8.21	2.8	5km S of Centerville, South Carolina
2013-09-19T19:14:11.170Z	11.44	2.5	8km WSW of Summerville, South Carolina
2014-03-19T22:38:03.330Z	6.91	3	0km S of Centerville, South Carolina

**Sourced from USGS Latest Earthquakes 1800-to-date*

The most significant historical earthquakes in Charleston was the 1886 Charleston earthquake. The August 31, 1886 earthquake, with an estimated magnitude of 7.3 struck the Summerville/Charleston area and is the largest historical earthquake to have occurred in the eastern United States and the most destructive, killing 60 people and causing \$5 to \$6 million dollars (1886 dollars) worth of damage. The Charleston Region lies within the meizoseismal area (area of maximum damage) of the 1886 earthquake, but the effects of the 1886 earthquake were felt throughout the eastern United States. The 1886 earthquake had more than 300 aftershocks that occurred for 35 years after the initial earthquake (South Carolina Seismic Network, 1996, July). The 7.3 magnitude earthquake that occurred in 1886 killed 100 people and destroyed or damaged most of the buildings in Charleston and Summerville. The seismic history of the 1886 quake indicates that it erupts on the average every 500 years. But moderate quakes can and do occur here, and not so rarely. Two 3.6 temblors and one 3.2 temblor have rattled Summerville between 2008 and 2013. Also in 2002, a 4.4 magnitude quake erupted in the ocean off Kiawah Island. Summerville had two 4.1 quakes in the 1990s. They did not do much more than rattle nerves. But a 5 magnitude quake would be 10 times stronger, and some 800 of them occur across the globe every year. Moderate quakes are a great concern to

emergency managers. The County has not experienced an earthquake exceeding a 2.5 magnitude since March 2014.

Earthquake Probability for each Jurisdiction	
Jurisdiction	Probability
Town of Ravenel	26-50%

Wildfire

Location

Wildfire is a potentially serious threat in the Charleston Region, particularly in areas with a high density of vegetation and areas within or surrounding the Francis Marion National Forest. Areas where there is an urban-wild land interface like (St. John’s Fire District) are also at risk. Even urban areas within the Region pose the threat of wildfires, since they are defined as uncontrolled fires, which most fires are. For the purpose of this plan, all areas, buildings and facilities are considered to be equally exposed.

Historical Occurrences

The table below shows the amount of fires and acres buried each fiscal year from 2013 to 2019.

Wildfire Events from 2013-2019							
Year	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019
Fires	19	15	9	6	23	6	Unknown
Acres	656.6	37.5	349.9	134.8	249.2	30.2	Unknown

Source: South Carolina Forestry Commission

Below is a table summarizing fire incidents from 2012-2019 recorded by the Consolidated 9-1-1 system.

Fire Incidents from May 1, 2013 – April 30, 2019							
As Reported by Charleston County Consolidated 9-1-1							
Category	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	
Outside Fires	893	542	632	999	657	573	
Trail/Rail Fires	3	1	2	1	3	0	
Marine Fires	13	5	11	11	21	7	
Vehicle Fire	102	90	111	111	112	124	
Total	1011	638	756	1122	793	704	11,366

Wildfire Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of Ravenel	26-50%

Severe Storm

Location

A thunderstorm event is an atmospheric hazard, and has no geographic boundaries. They can occur in all regions of the United States however, thunderstorms are most common in the central and southern states because atmospheric conditions are more favorable for generating thunderstorms. Since thunderstorms are unpredictable, all jurisdictions are equally exposed to these hazards.

Historical Occurrences

Severe Storm Events (Thunderstorm Winds) 1956 – April 2019

TOTAL: 11 Events	Average Speed: 50.45	Total Damage: \$13,500
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Source: NOAA Storm Events Database

Severe Storm (Hail) Incidents in Charleston County 1957 – April 2019		
Total: 4 Events	AVERAGE SIZE: 1.03	TOTAL DAMAG E: \$ -

Source: NOAA Storm Events Database

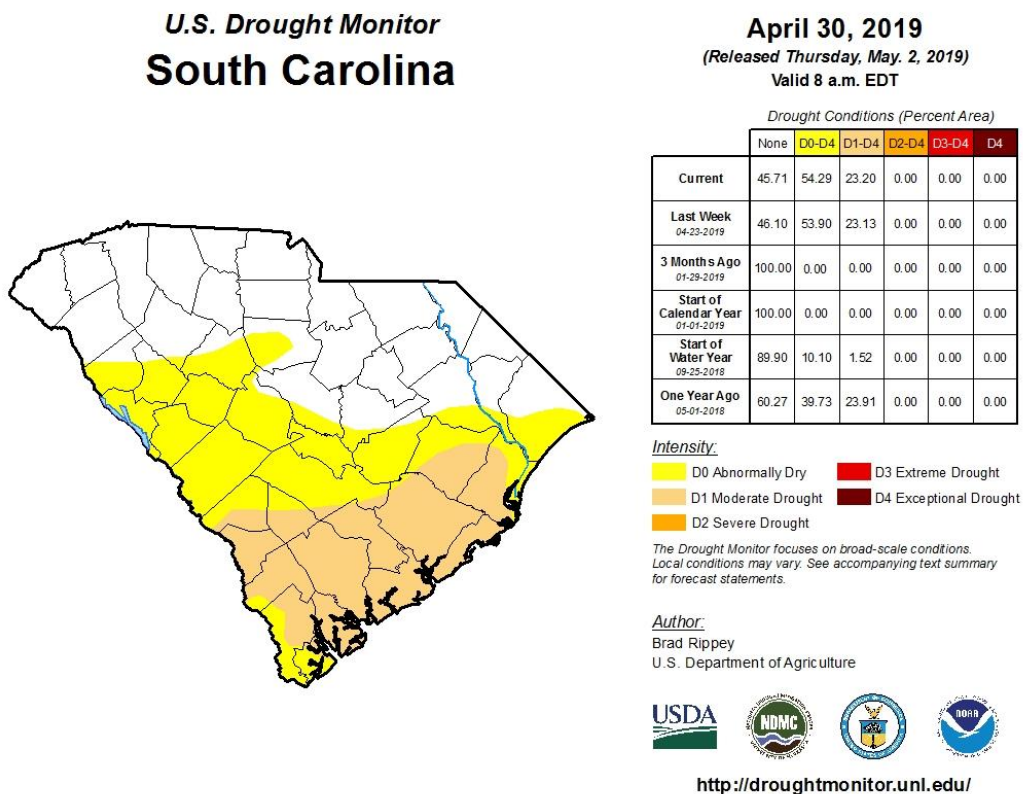
Severe Storm (Lightning) Incidents in Charleston County 1998 – April 2019	
Total: 1 Event	Total Damage: \$5,000

Severe Storm Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of Ravenel	76-100%

Drought

Location

Droughts typically cover a large area and cannot be confined to any geographic boundary. For this purpose, the whole Charleston Region is vulnerable to the threat of a drought.



(An example of the extent of drought that the State experienced in late April 2019)

Historical Occurrences

Year	Number of weeks of Drought Events between May 1, 2013 – April 30, 2019						Description
	None	D0 Abnormally Dry	D1 Moderate Drought	D2 Severe Drought	D3 Extreme Drought	D4 Exceptional Drought	
1999-2000	35	17	2	0	0	0	
2000-2001	17	35	19	5	0	0	
2001-2002	4	48	38	32	19	0	
2002-2003	18	34	20	18	13	0	
2003-2004	46	6	0	0	0	0	
2004-2005	32	20	5	0	0	0	
2005-2006	47	5	0	0	0	0	
2006-2007	27	25	3	0	0	0	
2007-2008	0	53	35	12	0	0	
2008-2009	15	37	22	0	0	0	
2009-2010	38	14	2	0	0	0	
2010-2011	29	23	0	0	0	0	
2011-2012	0	53	50	46	39	3	
2012-2013	7	45	20	9	5	0	
2013-2014	32	20	0	0	0	0	The Region experienced 20 weeks in drought stage. 32 weeks of no drought stage were reported and 20 weeks of D0 drought from October to December.
2014-2015	37	15	0	0	0	0	The Region experienced only 15 weeks of D0 drought. During weeks when drought was experienced, only approximately 10-20 percent of the county was affected. 37 weeks of the year, the Region experienced no drought.
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2016-2017	38	14	6	0	0	0	The Region experienced 20 weeks of drought stage. During these 20 weeks, the drought stage remained at D0 for 14 weeks and D1 for 6 weeks. 38 weeks of the year, the Region experienced no drought.
2017-2018	23	29	14	4	0	0	The Region experienced 29 weeks of drought stage D0 and 14 weeks of D1. In addition, 4 weeks were spent at D2; there were 23 weeks where the Region experienced no drought.
2018-2019	26	26	10	0	0	0	The Region experienced 36 total drought weeks. 26 weeks were spent at D0 and an additional 10 weeks were spent at D1. The Region was no experiencing a drought for 26 weeks.

Source: U.S. Drought Monitor

According to the U.S. Drought Monitor, the Charleston Region was in the D4 (Exceptional Drought) category for a number of weeks in early 2012 with a Palmer Drought Index of at least -5.0 (Extreme Drought). It is possible for severe and exceptional drought periods to return to the Charleston Region.

Drought Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of Ravenel	26-50%

Winter Weather

Location

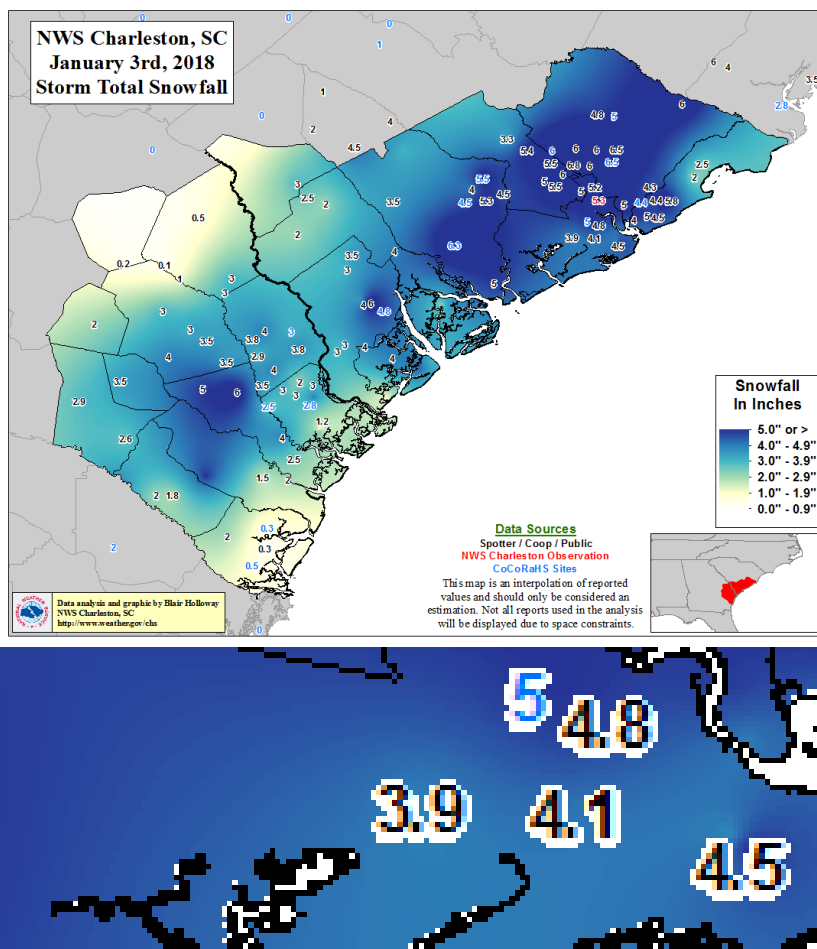
While the Region does not regularly encounter extreme winter storms, some aspects of winter weather occur in the Region annually. With the random nature of this hazard, all jurisdictions are subject to winter weather conditions.

Historical Occurrences

Winter Weather Events Through April 2019	
Total of 10 Events	Total
	Damage
	\$ 233,000

Source: NOAA Climate Data

A rare winter storm affected southeast South Carolina on January 3, 2018. The storm produced a variety of wintry precipitation, including snow, sleet and freezing rain. Charleston Airport (KCHS) measured 5.3 inches of snow, the 3rd greatest daily snowfall on record, just 0.1 inches shy of the 5.4 inches that fell during the 1973 storm (NWS, 2019).



Probability

The Region has experienced 10 winter events between the years of 2000 and 2018. The Region is located in a subtropical climate zone but will still experience low temperatures in the winter season every year. The probability of extreme winter weather events affecting the Region is approximately 55% per year with the probability being equal for all jurisdictions. The vulnerability and impact of the hazard is discussed later in the Plan.

Winter Weather Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of Ravenel	51-75%

5.14(b) – Ravenel Problem Assessment

5.14.1 – Hazard Vulnerability

The analysis for this section is identical to the analysis under “Hazard Vulnerability” for Unincorporated Charleston County.

5.14.2 – Vulnerable Buildings

The analysis for this section is identical to the analysis under “Vulnerable Buildings” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-14-9

Building Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
Jurisdiction	Dam Failure	Drought	Earthquakes	Flooding	Hazardous Material Incidents	Hurricanes	Sea Level Rise	Tornadoes	Terrorist Incidents	Tsunamis	Wildfires	Winter Weather
Town of Ravenel	5	5	4	4	2	2	5	3	3	5	3	3

5.14.3 – Infrastructure Vulnerability

The analysis for this section is identical to the analysis under “Infrastructure Vulnerability” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-14-11

Infrastructure Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
Town of Ravenel	5	5	2	2	1	1	5	2	2	5	2	2

Problem Statements and Vulnerability Based on Jurisdiction	
Jurisdiction	Vulnerability Assessment
Town of Ravenel	The Town of Ravenel is a small rural community accessed by Highways 17 and 165. The Town is located on Mellichamp and Rantowles Creeks, which makes it susceptible to flooding. There are a high number of mobile homes in the community making it vulnerable to tornadoes and hurricanes.

5.14.4 – Known Flood Damages

The analysis for this section is identical to the analysis under “Known Flood Damages” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-14-12

Loss Statistics for Charleston County as of 9/30/2018					
Jurisdiction	Total Losses	Closed Losses	Open Losses	CWOP Losses	Total Payments
RAVENEL, TOWN OF	1	1	0	0	5,066.66
<i>FEMA Policy and Claims Statistics Database, 2019</i>					

Town of Ravenel Higher Regulatory Standards
2' freeboard
1/2 foot rise in floodway
Five year cumulative of all permits is included when conducting a substantial review

5.14.5 – Past Flood Impacts

The analysis for this section is identical to the analysis under “Past Flood Impacts” for Unincorporated Charleston County.

5.14.6 – Emergency Warning Needs

The analysis for this section is identical to the analysis under “Emergency Warning Needs” for Unincorporated Charleston County.

5.14.7 – Critical Facilities

The analysis for this section is identical to the analysis under “Critical Facilities” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-14-13

Critical Facility Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
Town of Ravenel	5	5	3	4	3	2	5	3	3	5	2	3

A full list of the capabilities for Charleston County and plan participating partners can be seen in the “Critical Facilities” description in Section 5.1(b).

5.14.8 – Natural and Beneficial Functions of Floodplains

The analysis for this section is identical to the analysis under “Natural and Beneficial Functions of Floodplains” for Unincorporated Charleston County.

5.14.9 – Development and Population Trends

The analysis for this section is identical to the analysis under “Development and Population Trends” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-14-14

Estimated Population 2017-2018 in Charleston County SC		
Jurisdiction	Growth Rate 2010-2018	Projected 2018 Population
Town of Ravenel	8.50%	2,674

Source: U.S. Census Bureau, Population Division 2018

Additional summaries of the anticipated future development trends for the local governments within Charleston County, as provided by the local government entities participating in the Charleston Regional Hazard Mitigation Plan, are outlined in “Development and Population Trends” in Section 5.1(b).

5.14.10 – Economic Impact

The analysis for this section is identical to the analysis under “Economic Impact” for Unincorporated Charleston County.

5.14.11 – Resiliency to Hazards

The analysis for this section is identical to the analysis under “Resiliency to Hazards” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Attachment 5-14-D: Charleston Region Buildings Vulnerable to Flooding Due to Location in the Special Flood Hazard Area (SFHA) Only

Jurisdiction	Total Site-Built Structures	% of Total Site-Built Structures in the SFHA	Mobile Homes in SFHA*	Residential site-built structures in the SFHA		Commercial Structures in the SFHA		Total Structures in the SFHA (including site-built and mobile homes)	
				SFHA	A/AE Zone	V/VE Zone	A/AEZone	V/VEZone	A/AW Zone*
Ravenel	948	12	86	91	0	19	0	196	0

* Since most mobile homes in Charleston County are treated as vehicles for tax purposes, the determination of “A” or “V” zones for these homes using the Q-3 digital data was not able to be readily performed. All mobile homes in the SFHA are included in the A-zone total for this table, since most jurisdictions in Charleston County restrict mobile homes from the “V” flood zone areas.

Attachment 5-14-E: Charleston Region Buildings Vulnerable to Flooding Due to Year of Construction and Location in the Special Flood Hazard Area (SFHA)

Jurisdiction	Pre-1985 Site-Built Residential Buildings in SFHA	Pre-1985 Commercial Buildings in SFHA	Total Pre-1985 Site-Built Buildings in SFHA	% of All Site-Built Buildings In Jurisdiction Constructed Pre-1985 and in SFHA	Pre-1985 Mobile Homes in SFHA	Total Site-Built Buildings Pre-1985 & Mobile Homes in SFHA
Ravenel	33	5	38	11.14	20	58

Attachment 5-14-F: Charleston Region Average Valuation of Buildings and Mobile Homes

Jurisdiction	Avg. Site-Built Residential Building Value	Avg. Commercial Building Value	Avg. Mobile Home Value**	Estimated Total Pre-1985 Site-Built and Mobile Home Building Value	Estimated Pre-1985 Site-Built Building And Mobile Home Value in SFHA (mil.\$)
Ravenel <i>(All)</i>	\$123,988.67	\$220,887.98	\$9,730.05	\$24,949,182.00	
Pre-1985 only	\$72,565.98	\$72,178.61	\$3,048.76		\$2,716,810.00

** Valuation data reflected herein is for mobile homes, regardless of age.

Attachment 5-14-G: Charleston Region Average Valuation of Site-Built Buildings by Flood Zone

Jurisdiction	Total Value "A" Zones Site-Built Structures	Total Value "V" Zones Site-Built Structures(mil\$)	Total Value Site-Built Structures Not in the SFHA (mil\$)	Total Value of Site-Built Structures Not Flood-Zone Coded** (mil\$)
Ravenel	17,041,600	0	113,020,801	102,477,801

** Valuation data reflected herein is for mobile homes, regardless of age.

5.15(a) - Town of Rockville

Flood

Location

Flooding can occur throughout most of the Charleston Region since around 68% resides within a floodplain. Floodplains are designated by the frequency of the flood that is large enough to cover them. Flood frequencies are determined by plotting a graph of the size of all known floods for an area and calculating how often floods occur. The Federal Emergency Management Agency (FEMA) identifies floodplain areas by producing Flood Insurance Rate Maps (FIRM). These maps show all locations near major bodies of water, and show base flood elevations and floodplain boundaries like the 100-year floodplain boundaries. 100-year flood event is a 1% probability of occurring in any given year. The roughly 68% of the areas located in the floodplain are exposed to the threat of floods but that does not mean the other areas are not vulnerable to a flash flood or flooding events. Damaged infrastructure and roadways can limit mobility for citizens. All areas can experience flooding hazards.

Rockville does not report any flood prone areas at this time.

Historical Occurrences

Flooding Events Between Jan 1, 1950 – April 30, 2019	
Total: 3 Events	Total Damage:
	\$728,550

Source: NOAA Storm Events Database

These flooding events were mainly the result from heavy rain or severe weather (thunderstorms, tropical storms, heavy rain) incidents that caused flooding in the Charleston Region. Charleston broke its record for number of annual-flood days last year. The previous record of 38 days, observed in 2015, was exceeded by 12 days for a total of 50 annual-flood days in 2016. Compared to 1995, trends in flooding during 2016 have increased by 130 percent on average.

Flooding Probability for each Jurisdiction	
Jurisdiction	Probability
Town of Rockville	51-75%

Severe Storm

Location

A thunderstorm event is an atmospheric hazard, and has no geographic boundaries. They can occur in all regions of the United States however, thunderstorms are most common in the central and southern states because atmospheric conditions are more favorable for generating thunderstorms. Since thunderstorms are unpredictable, all jurisdictions are equally exposed to these hazards.

Historical Occurrences

Severe Storm Events (Thunderstorm Winds) 1956 – April 2019		
TOTAL: 13 Events	Average	Total
	Speed:	Damage:
	50.15	\$17,500

Source: NOAA Storm Events Database

Severe Storm (Hail) Incidents in Charleston County 1957 – April 2019		
Total: 1 Event	AVERAGE	TOTAL
	SIZE: .88	DAMAG
		E: \$ -

Source: NOAA Storm Events Database

Severe Storm Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of Rockville	76-100%

Drought

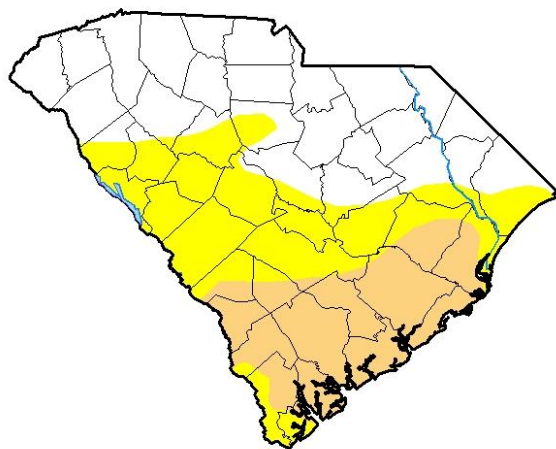
Location

Droughts typically cover a large area and cannot be confined to any geographic boundary. For this purpose, the whole Charleston Region is vulnerable to the threat of a drought.

U.S. Drought Monitor South Carolina

April 30, 2019

(Released Thursday, May. 2, 2019)
Valid 8 a.m. EDT



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	45.71	54.29	23.20	0.00	0.00	0.00
Last Week 04-23-2019	46.10	53.90	23.13	0.00	0.00	0.00
3 Months Ago 01-29-2019	100.00	0.00	0.00	0.00	0.00	0.00
Start of Calendar Year 01-01-2019	100.00	0.00	0.00	0.00	0.00	0.00
Start of Water Year 09-25-2018	89.90	10.10	1.52	0.00	0.00	0.00
One Year Ago 05-01-2018	60.27	39.73	23.91	0.00	0.00	0.00

Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:

Brad Rippey
U.S. Department of Agriculture



<http://droughtmonitor.unl.edu/>

(An example of the extent of drought that the State experienced in late April 2019)

Historical Occurrences

Year	Number of weeks of Drought Events between May 1, 2013 – April 30, 2019						Description
	None	D0 Abnormally Dry	D1 Moderate Drought	D2 Severe Drought	D3 Extreme Drought	D4 Exceptional Drought	
1999-2000	35	17	2	0	0	0	
2000-2001	17	35	19	5	0	0	
2001-2002	4	48	38	32	19	0	
2002-2003	18	34	20	18	13	0	
2003-2004	46	6	0	0	0	0	
2004-2005	32	20	5	0	0	0	

2005-2006	47	5	0	0	0	0	
2006-2007	27	25	3	0	0	0	
2007-2008	0	53	35	12	0	0	
2008-2009	15	37	22	0	0	0	
2009-2010	38	14	2	0	0	0	
2010-2011	29	23	0	0	0	0	
2011-2012	0	53	50	46	39	3	
2012-2013	7	45	20	9	5	0	
2013-2014	32	20	0	0	0	0	The Region experienced 20 weeks in drought stage. 32 weeks of no drought stage were reported and 20 weeks of D0 drought from October to December.
2014-2015	37	15	0	0	0	0	The Region experienced only 15 weeks of D0 drought. During weeks when drought was experienced, only approximately 10-20 percent of the county was affected. 37 weeks of the year, the Region experienced no drought.
2015-2016	36	16	0	0	0	0	The Region experienced 16 weeks of D0 drought. During weeks when drought was experienced, only approximately 10-20 percent of the county was affected. 36 weeks of the year, the Region experienced no drought.
2016-2017	38	14	6	0	0	0	The Region experienced 20 weeks of drought stage. During these 20 weeks, the drought stage remained at D0 for 14 weeks and D1 for 6 weeks. 38 weeks of the year, the Region experienced no drought.
2017-2018	23	29	14	4	0	0	The Region experienced 29 weeks of drought stage D0 and 14 weeks of D1. In addition, 4 weeks were spent at D2; there were 23 weeks where the Region experienced no drought
2018-2019	26	26	10	0	0	0	The Region experienced 36 total drought weeks. 26 weeks were spent at D0 and an additional 10 weeks were spent at D1. The Region was no experiencing a drought for 26 weeks.

Source: U.S. Drought Monitor

According to the U.S. Drought Monitor, the Charleston Region was in the D4 (Exceptional Drought) category for a number of weeks in early 2012 with a Palmer Drought Index of at least -5.0 (Extreme Drought). It is possible for severe and exceptional drought periods to return to the Charleston Region.

Drought Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of Rockville	26-50%

Winter Weather

Location

While the Region does not regularly encounter extreme winter storms, some aspects of winter weather occur in the Region annually. With the random nature of this hazard, all jurisdictions are subject to winter weather conditions.

Historical Occurrences

Winter Weather Events Through April 2019	
Total of 10 Events	Total Damage: \$233,000

Source: NOAA Climate Data

Winter Weather Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of Rockville	51-75%

5.15(b) - Rockville Problem Assessment

5.15.1 - Hazard Vulnerability

The analysis for this section is identical to the analysis under “Hazard Vulnerability” for Unincorporated Charleston County.

5.15.2 - Vulnerable Buildings

The analysis for this section is identical to the analysis under “Vulnerable Buildings” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-15-9

Building Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
Jurisdiction	Dam Failure	Drought	Earthquakes	Flooding	Hazardous Material Incidents	Hurricanes	Sea Level Rise	Tornadoes	Terrorist Incidents	Tsunamis	Wildfires	Winter Weather
Town of Rockville	5	3	4	4	4	3	3	3	4	5	3	3

The Town of Rockville is serviced by Charleston County and therefore reflect their survey responses.

5.15.3 - Infrastructure Vulnerability

The analysis for this section is identical to the analysis under “Infrastructure Vulnerability” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-15-11

Infrastructure Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
Town of Rockville	5	4	1	1	2	1	2	2	2	2	3	3

The Town of Rockville is serviced by Charleston County and therefore reflect their survey responses.

Problem Statements and Vulnerability Based on Jurisdiction	
Jurisdiction	Vulnerability Assessment
Town of Rockville	The town of Rockville is a small, rural riverine community off Bohicket Creek. The main business is the Sea Island Yacht Club. Any damage from hurricanes, wildfire, or flooding could be catastrophic to the Town's economic prosperity. There are also a number of historic sites in Rockville and these are vulnerable to flooding and hurricanes.

5.15.4 – Known Flood Damages

The analysis for this section is identical to the analysis under “Known Flood Damages” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Town of Rockville Higher Regulatory Standards
2' freeboard
1/2 foot rise in floodway
Five year cumulative of all permits is included when conducting a substantial review

5.15.5 – Past Flood Impacts

The analysis for this section is identical to the analysis under “Past Flood Impacts” for Unincorporated Charleston County.

5.15.6 – Emergency Warning Needs

The analysis for this section is identical to the analysis under “Emergency Warning Needs” for Unincorporated Charleston County.

5.15.7 – Critical Facilities

The analysis for this section is identical to the analysis under “Critical Facilities” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-15-13

Critical Facility Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
Town of Rockville	5	3	2	2	3	2	3	3	2	3	3	1

The Town of Rockville is serviced by Charleston County and therefore reflect their survey responses.

A full list of the capabilities for Charleston County and plan participating partners can be seen in the “Critical Facilities” description in Section 5.1(b).

5.15.8 – Natural and Beneficial Functions of Floodplains

The analysis for this section is identical to the analysis under “Natural and Beneficial Functions of Floodplains” for Unincorporated Charleston County.

5.15.9 – Development and Population Trends

The analysis for this section is identical to the analysis under “Development and Population Trends” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-15-14

Estimated Population 2017-2018 in Charleston County SC		
Jurisdiction	Growth Rate 2010-2018	Projected 2018 Population
Town of Rockville	0.9%	138

Source: U.S. Census Bureau, Population Division 2018

Additional summaries of the anticipated future development trends for the local governments within Charleston County, as provided by the local government entities participating in the Charleston Regional Hazard Mitigation Plan, are outlined in “Development and Population Trends” in Section 5.1(b).

5.15.10 – Economic Impact

The analysis for this section is identical to the analysis under “Economic Impact” for Unincorporated Charleston County.

5.15.11 – Resiliency to Hazards

The analysis for this section is identical to the analysis under “Resiliency to Hazards” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Attachment 5-15-D: Charleston Region Buildings Vulnerable to Flooding Due to Location in the Special Flood Hazard Area (SFHA) Only

Jurisdiction	Total Site-Built Structures	% of Total Site-Built Structures in the SFHA	Mobile Homes in SFHA*	Residential site-built structures in the SFHA		Commercial Structures in the SFHA		Total Structures in the SFHA (including site-built and mobile homes)	
				A/AE Zone	V/VE Zone	A/AE Zone	V/VE Zone	A/AW Zone*	V/VE Zone
Rockville	105	73	1	38	37	1	1	40	38

* Since most mobile homes in Charleston County are treated as vehicles for tax purposes, the determination of “A” or “V” zones for these homes using the Q-3 digital data was not able to be readily performed. All mobile homes in the SFHA are included in the A-zone total for this table, since most jurisdictions in Charleston County restrict mobile homes from the “V” flood zone areas.

Attachment 5-15-E: Charleston Region Buildings Vulnerable to Flooding Due to Year of Construction and Location in the Special Flood Hazard Area (SFHA)

Jurisdiction	Pre-1985 Site-Built Residential Buildings in SFHA	Pre-1985 Commercial Buildings in SFHA	Total Pre-1985 Site-Built Buildings in SFHA	% of All Site-Built Buildings In Jurisdiction Constructed Pre-1985 and in SFHA	Pre-1985 Mobile Homes in SFHA	Total Site-Built Buildings Pre-1985 & Mobile Homes in SFHA
Rockville	59	2	61	87.14	1	62

Attachment 5-15-F: Charleston Region Average Valuation of Buildings and Mobile Homes

Jurisdiction	Avg. Site-Built Residential Building Value	Avg. Commercial Building Value	Avg. Mobile Home Value**	Estimated Total Pre-1985 Site-Built and Mobile Home Building Value	Estimated Pre-1985 Site-Built Building And Mobile Home Value in SFHA (mil.\$)
Rockville (<i>All</i>)	\$206,029.70	\$76,525.00	\$5,550.00	\$11,953,500.00	
Pre-1985 only	\$176,437.88	\$76,525.00	\$2,500.00		\$11,272,700.00

** Valuation data reflected herein is for mobile homes, regardless of age.

Attachment 5-15-G: Charleston Region Average Valuation of Site-Built Buildings by Flood Zone

Jurisdiction	Total Value "A" Zones Site-Built Structures	Total Value "V" Zones Site-Built Structures(mil\$)	Total Value Site-Built Structures Not in the SFHA (mil\$)	Total Value of Site-Built Structures Not Flood-Zone Coded** (mil\$)
Rockville	7,524,000	9,600,000	3,991,100	3,991,100

** Valuation data reflected herein is for mobile homes, regardless of age.

5.16(a) - Town of Seabrook Island

Hurricane

Location

Hurricanes and tropical storms threaten the entire Atlantic and Gulf coast of the United States, as well as the Pacific coast. Hurricanes that originate in the Gulf of Mexico can still impact the Charleston Region. With about 68% of the Charleston Region in the floodplain and some jurisdictions located 100% in the floodplain and with the community being a coastal community, the Region is vulnerable to hurricanes and tropical storms and their aftermaths. Since hurricane landing patterns are unpredictable until the storm has formed and is within a short time from landing, the Region can not presume that past strike history will continue into the future, and all areas within the Region are subject to these types of events.

Occurrences

Hurricane Events between August 11 1940 - April 30 2013			
Name	Category	Date	Damage Description
August 11th, 1940 (Name classification started after 1950)	2	August 11th, 1940	Estimated damage to the city was \$1 million. Sullivan's Island and the City of the Isle of Palms suffered minor damage.
Hurricane Hazel	4	October 15th, 1954	Folly Beach, Sullivan's Island, and the Isle of Palms suffered light property damage and slight beach erosion. The City of Charleston experienced no serious damage.
Hurricane Gracie	3	September 29th, 1959	The total damage inflicted by the storm was estimated at \$14 million. High water marks, which were reported near the Town of Edisto Beach, South Carolina, ranged from 7.3 to 11.9 feet.
Hurricane David	3	August 29th - September 7th, 1979	Flooding and minor damage in the City of Charleston.
Hurricane Hugo	4	September 19th, 1989	Tidal surges north of the city were recorded at 19.8 feet and 11.8 feet in the Peninsula City. The hurricane struck at high tide. Its recorded diameter was over 500 miles, Four (4) people were killed and scores injured. Estimated damage of \$7 billion for the total area.
Hurricane Bertha	2	July 12th, 1996	This hurricane came close but did not cause any significant damage. Some coastal areas experienced moderate beach erosion. Tourism estimated loss revenue of 20 million dollars.
Hurricane Fran	3	September 5th, 1996	The storm didn't directly hit the Charleston Region but remnants of this hurricane created power outages with economic losses estimated at 20 million dollars.
Hurricane Bonnie	3	August 26th, 1998	Remnants of this hurricane produced winds that knocked down several trees in the Town of Mount Pleasant as it headed for the North Carolina Coast.
Hurricane Floyd	2	September 15th, 1999	Sustained winds of 58 miles per hour were recorded in downtown Charleston with gusts up to 85 miles per hour. Generally 3-5 inches of rainfall occurred. An estimated \$10.5 million in damages occurred in the Charleston region.
Hurricane Irene	1	October 17th, 1999	This hurricane dropped 3 to 5 inches of rain created minor street flooding. Minor beach erosion. Trees knocked down and power outages in the area.
Tropical Storm Gordon		September 18th, 2000	Remnants of the storm dropped 6-10 inches of rain. Minor beach erosion occurred as a result of this storm.
Tropical Storm Claudette		July 14th, 2003	Two and a half inches of rain, a tree was downed, 11 traffic accidents.
Tropical Depression Seven		July 25th, 2003	Expected to receive as much as 6 inches of rain and wind gusts up to 35 mph from this storm.
Tropical Storm Henri		September 6th, 2003	Folly Beach, Sullivan's Island, and Isle of Palms experienced beach erosion from remnants of the storm, which was predicted to also bring up to 5 inches of rain to the Charleston area.
Hurricane Isabel	2	September 17th, 2003	This storm created 8 foot surf at Kiawah Island and had wind gusts of 40 mph offshore and 20 mph in downtown Charleston when it passed offshore. Coastal erosion was expected, as tides were 6 to 12 inches above normal.
Tropical Storm Alex		August 2nd, 2004	Minor beach erosion was reported on Folly Beach.
Tropical Storm Bonnie		August 12th, 2004	The remnants of this storm caused a tornado and several incidents of wind damage in the Awendaw area.
Hurricane Charley	1	August 14-15th, 2004	An estimated 4 inches of rain fell in 2 hours in the Northern part of Charleston County on August 14, 2004, flooding low lying areas and areas with poor drainage. Storm surge was estimated at 4-6 feet from Oyster Landing to the Cape Romain Wildlife Refuge in the northern portions of Charleston County. Minor property and tree damage occurred as a result of this storm. The storm caused an estimated damage of \$2 million in South Carolina.
Hurricane Gaston	1	August 29th, 2004	Sustained winds of 75 mph. The storm brought a 4 foot storm surge into Bull's Bay, which caused an estimated \$4.8 million in damages to homes, primarily in areas east of the Cooper River creating debris with an estimated clean-up cost of \$2.2 million county-wide, and left nearly all of the customers of South Carolina Electric and Gas without electrical power. Total estimated damages, per the National Weather Service, were \$7.6 million in Charleston County.

Tropical Storm Frances		September 6th, 2004	This storm created nearly 6 ft. surf. Dropped nearly 5 inches of rain, winds of 35 mph, minor damage and flooding.
Tropical Depression Jeanne		September 27th, 2004	Resulted in 40 ft. of beach erosion on the north end of Folly Beach. Maximum wind gusts in Charleston County from this storm were 41 mph in downtown Charleston and at the Charleston airport. Maximum wind gusts at Folly Beach were 38 mph. Non-tornadic damage was limited to a few trees falling on cars.
Tropical Storm Ophelia		September 13th, 2005	Loss of Life, Beach Erosion, minor damage.
Tropical Storm Tammy		October 5th, 2005	Significant Beach Erosion, flooding, minor damage.
Tropical Storm Alberto		June 13th, 2006	Remnants of the storm produced a tornado that touched down near Awendaw, knocking down trees. Street flooding occurred in Charleston and North Charleston as a result of this storm.
Tropical Storm Ernesto		August 31st, 2006	Mt. Pleasant received 6.65 inches of rainfall from this storm system. Street flooding occurred in the City of Charleston and 40 mph gusts.
Tropical Storm Barry		June 2nd, 2007	Remnants of the storm produced heavy rains, strong winds, rough surf, and 3 inches of rain. Loss of electricity to 13,900 customers of SCE&G and Berkeley Electric Cooperative, mostly in the Summerville area, which caused vessels to break their lines, and flood streets, particularly on the Charleston Peninsula. Wind gusts up to 60 mph were recorded.
Tropical Storm Hanna		September 5th, 2008	Resulting in strong wind and localized heavy rain.
Tropical Storm Irene		August 25th, 2011	The Charleston County Folly Beach Park received significant erosion-related damages as a result of this storm, including beach areas and structures.
Tropical Storm Lee		September 6th, 2011	Charleston County sustained scattered showers, thunderstorms, and winds up to 22 mph with a half-inch of rain in some areas.
Tropical Storm Beryl		May 27th, 2012	The region saw tropical storm forced winds, heavy rainfall, and fallen trees as result of the storm.
Tropical Storm Sandy		October 27th, 2012	The storm produced forced winds of 40 mph.

Hurricane Events between May 1, 2013 – January 31, 2019

Name	Category	Date	Damage Description
Tropical Storm Andrea		June 6, 2013	Heavy rainfall 3-7 inches
Tropical Storm Arthur		July 3, 2014	Tropical storm watch was posted for Santee River to Bogue Banks, NC. Wind gusts up to 42 mph (68 km/h) along coastal areas, resulting in scattered power outages
Tropical Storm Ana		May 7-8, 2015	Tropical storm warning from South Santee River to Surf City, NC. Produced a small storm surge along Charleston County coast.
Hurricane Joaquin	4	October 1-5, 2015	Did not make landfall in the US, but caused catastrophic flooding in South Carolina and intense flooding and power outages in Charleston County. South Carolina Governor Haley declared a State of Emergency.
Hurricane Matthew	1	October 7-8, 2016	Once a Category 5 hurricane before ripping through Haiti and eastern Cuba, Hurricane Matthew had downgraded to a Category 1 by the time it hit South Carolina. Even so, 830,000 South Carolinians lost power, 355,000 evacuated from their homes, and 4 lost their lives.
Hurricane Irma	1	9/11-9/12/2017	Once a Category 5 hurricane before ripping through the Caribbean, Hurricane Irma had downgraded to a Category 1, and eventually a tropical storm, by the time the system impacted South Carolina. Even so, over 100,000 South Carolinians lost power, 3 lost their lives, and Charleston recorded its third highest storm surge ever (10ft).
Hurricane Florence	1	9/14/2018	Once a Category 4 hurricane before making landfall north of Charleston County, this storm impacted Charleston County as a tropical depression. No lives were lost in Charleston County although thousands of residents lost power during the storm's peak.

Hurricane Michael	4	10/11/2018	Making landfall as a Category 4 hurricane in Florida's Bay County, this storm impacted Charleston County by bringing 50 mph winds which dismantled many trees and power lines plus a storm surge measured at 2.07 ft in Charleston Harbor. Charleston County saw no lost lives, although the storm directly caused 16 casualties and 43 indirectly, according to the NOAA.
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Hurricane Probability for each Jurisdiction	
Jurisdiction	Probability
Town of Seabrook Island	26-50%

Flood

Location

Flooding can occur throughout most of the Charleston Region since around 68% resides within a floodplain. Floodplains are designated by the frequency of the flood that is large enough to cover them. Flood frequencies are determined by plotting a graph of the size of all known floods for an area and calculating how often floods occur. The Federal Emergency Management Agency (FEMA) identifies floodplain areas by producing Flood Insurance Rate Maps (FIRM). These maps show all locations near major bodies of water, and show base flood elevations and floodplain boundaries like the 100-year floodplain boundaries. 100-year flood event is a 1% probability of occurring in any given year. The roughly 68% of the areas located in the floodplain are exposed to the threat of floods but that does not mean the other areas are not vulnerable to a flash flood or flooding events. Damaged infrastructure and roadways can limit mobility for citizens. All areas can experience flooding hazards.

Below is a list from each participant in the plan for areas of concern for flooding.

Flood Prone Areas of Charleston County	
<i>Jurisdictions Serviced by Charleston County</i>	<i>Area</i>
Town of Seabrook Island	Seabrook Island Road (Landfall Way to Freshfields Traffic Circle)
	Andell Bluff Boulevard (Near Marina Entrance)
	Bohicket Creek Place pond
	Discharge at Oyster Catcher and Catesbys Bluff
	Causeways on Marsh Gate, Marsh Haven, Captain Sam's and Deer Point
	Cattail Pond Road
	Seabrook Island Road near Andell Way
	Gatehouse Area
	SIR and Wood Duck check valve outfall road
	Ocean Winds #7 adjacent to Treeloft Trace
	Ocean Winds #11 drainage channel outfall behind Sealoft Villas
Pond beside #10 Crooked Oaks green	

Historical Occurrences

Flooding Events Between Jan 1, 1950 – April 30, 2019	
Total: 2 Events	Total Damage: \$ -

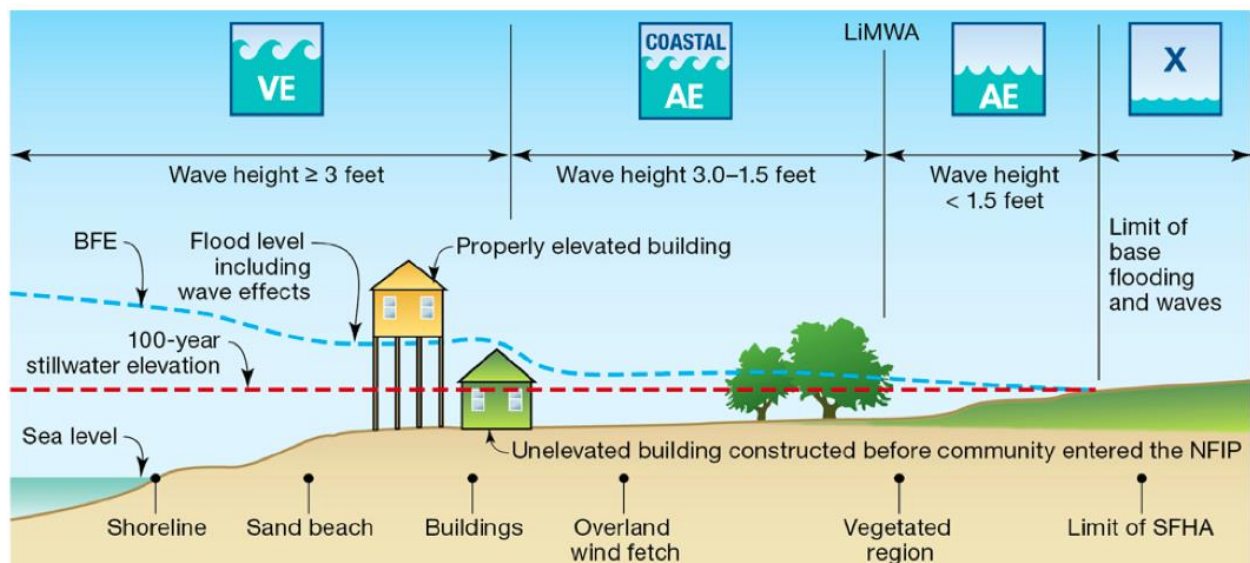
These flooding events were mainly the result from heavy rain or severe weather (thunderstorms, tropical storms, heavy rain) incidents that caused flooding in the Charleston Region. Charleston broke its record for number of annual-flood days last year. The previous record of 38 days, observed in 2015, was exceeded by 12 days for a total of 50 annual-flood days in 2016. Compared to 1995, trends in flooding during 2016 have increased by 130 percent on average.

Flooding Probability for each Jurisdiction	
Jurisdiction	Probability
Town of Seabrook Island	76-100%

Sea Level Rise

Location

Flooding and tidal flooding is a good indicator of what areas are most at risk for sea level rise and the stressors that accompany it: nuisance flooding, increased storm surge, loss of property. Land in the most susceptible flood zones (AE and VE) will be most affected as sea level continues to rise. Areas of the most susceptibility include Eastern Folly Beach and Morris Island, the tips of Sullivan’s Island, the northeastern coast of James Island near SC-30 and Harbor View Rd., all of Seabrook and Edisto’s coastline, eastern Isle of Palms and Caper’s Island, all of Awendaw’s coastline, and the northeastern coastline of Murphy Island and the coast of the Dunes West Golf and Resort Club. Below is an illustration of the definitions of the different flood zones:



Amount of Land Area of Charleston County Above Sea Level										
Elevation above spring high water (m)	0.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00
Area of Land (sq. km)	108.6	175.5	223	305.5	344.2	421.8	464.9	587.2	684.4	858.2
Percent of Total Land Cover	4.6%	7.4%	9.4%	12.9%	14.5%	17.8%	19.6%	24.8%	28.9%	36.2%

Occurrences

King tides, which is the above average high tide occurring when once a lunar cycle, are a good predictor of sea level rise. On average there were over twice as many observed tides than predicted tides. The depth averaged more than a foot deeper than expected. There were 28 more king tides than predicted in 2018 and the highest observed tide was over a foot and a half higher than the highest predicted tide. King tides give a community a glimpse into what it will be like to live with a higher sea level. Communities can expect more king tides in the future as sea level continues to rise.

Duration and Depth* of King Tides in Charleston Area from January 2014 – December 2019				
Year	Predicted Number of Tides	Observed Number of Tides	Highest Predicted Tide (ft)	Highest Observed Tide (ft)
2014	28	46	7	7.6
2015	40	111	7.2	8.7
2016	49	82	7.2	7.9
2017	34	111	7	9.9
2018	44	72	6.9	8.8
Average	39	84.4	7.06	8.58
Total	195	422	35.3	42.9

*Depth is based off of the Charleston Harbor Tide Gauge

**Available data from 2014 onwards gathered through MyCoast.org backed by SC DHEC:
<https://mycoast.org/sc/king-tides>

Sea Level Rise/King Tide Probability for each Jurisdiction	
Jurisdiction	Probability
Town of Seabrook Island	76-100%

Rip Current

Location

The Charleston Region stretches nearly 100 miles along the Atlantic Ocean. The Region's beaches are prone to rip currents daily leaving citizens who enjoy the beaches vulnerable to this threat. This type of hazard does not cost damage to buildings or infrastructure but it continues to take lives of residents and visitors on an annual basis. Since majority of people in

the Region will experience being around the water at some point, the whole Region can be affected.

Historical Occurrences

According to the National Oceanic and Atmospheric Administration (NOAA) and the National Climatic Data Center (NCDC), rip currents will be listed in Storm Data only when they cause a drowning(s), near-drowning(s), result in numerous rescues (i.e., 5 or more at one beach community), or damage watercraft. Events associated with other surf-related currents, such as long-shore or tidal currents, will not be included in Storm Data as Rip Current events. Rip currents can occur any time and any place along beaches or in other bodies of water.

Charleston County Severe Rip Tide Occurrences from January 1, 1950 – April 30th, 2019
Total: 2 Rip Current Events with 0 Deaths and 3 Reported Injuries
<i>Source: NOAA Storm Events Database</i>

Rip Current Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of Seabrook Island	76-100%

Severe Storm

Location

A thunderstorm event is an atmospheric hazard, and has no geographic boundaries. They can occur in all regions of the United States however, thunderstorms are most common in the central and southern states because atmospheric conditions are more favorable for generating thunderstorms. Since thunderstorms are unpredictable, all jurisdictions are equally exposed to these hazards.

Historical Occurrences

Severe Storm Events (Thunderstorm Winds) 1956 – April 2019		
TOTAL: 2 Events	Average Wind Speed: 50	Total Damage: \$4,500

Source: NOAA Storm Events Database

Severe Storm (Hail) Incidents in Charleston County 1957 – April 2019		
Total: 1 Event	AVERAGE SIZE: .88	TOTAL DAMAG E: \$ -

Source: NOAA Storm Events Database

Severe Storm Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of Seabrook Island	76-100%

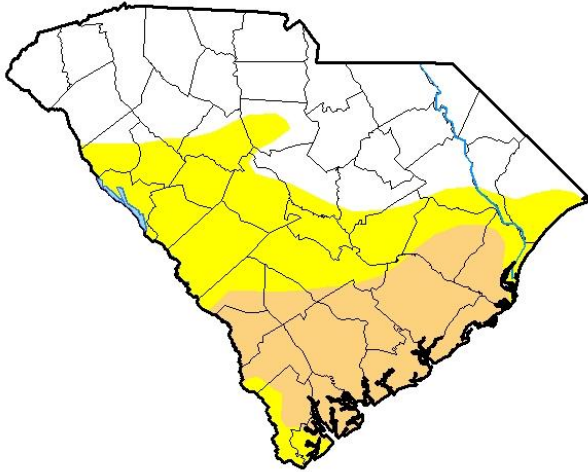
Drought

Location

Droughts typically cover a large area and cannot be confined to any geographic boundary. For this purpose, the whole Charleston Region is vulnerable to the threat of a drought.

U.S. Drought Monitor South Carolina

April 30, 2019
(Released Thursday, May 2, 2019)
Valid 8 a.m. EDT



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	45.71	54.29	23.20	0.00	0.00	0.00
Last Week 04-23-2019	46.10	53.90	23.13	0.00	0.00	0.00
3 Months Ago 01-29-2019	100.00	0.00	0.00	0.00	0.00	0.00
Start of Calendar Year 01-01-2019	100.00	0.00	0.00	0.00	0.00	0.00
Start of Water Year 09-25-2018	89.90	10.10	1.52	0.00	0.00	0.00
One Year Ago 05-01-2018	60.27	39.73	23.91	0.00	0.00	0.00

Intensity:
 D0 Abnormally Dry D3 Extreme Drought
 D1 Moderate Drought D4 Exceptional Drought
 D2 Severe Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:
Brad Rippey
U.S. Department of Agriculture



<http://droughtmonitor.unl.edu/>

(An example of the extent of drought that the State experienced in late April 2019)

Historical Occurrences

Year	Number of weeks of Drought Events between May 1, 2013 – April 30, 2019						Description
	None	D0 Abnormally Dry	D1 Moderate Drought	D2 Severe Drought	D3 Extreme Drought	D4 Exceptional Drought	
1999-2000	35	17	2	0	0	0	
2000-2001	17	35	19	5	0	0	
2001-2002	4	48	38	32	19	0	
2002-2003	18	34	20	18	13	0	
2003-2004	46	6	0	0	0	0	
2004-2005	32	20	5	0	0	0	
2005-2006	47	5	0	0	0	0	
2006-2007	27	25	3	0	0	0	
2007-2008	0	53	35	12	0	0	
2008-2009	15	37	22	0	0	0	
2009-2010	38	14	2	0	0	0	
2010-2011	29	23	0	0	0	0	
2011-2012	0	53	50	46	39	3	
2012-2013	7	45	20	9	5	0	
2013-2014	32	20	0	0	0	0	The Region experienced 20 weeks in drought stage. 32 weeks of no drought stage were reported and 20 weeks of D0 drought from October to December.
2014-2015	37	15	0	0	0	0	The Region experienced only 15 weeks of D0 drought. During weeks when drought was experienced, only

							approximately 10-20 percent of the county was affected. 37 weeks of the year, the Region experienced no drought.
2015-2016	36	16	0	0	0	0	The Region experienced 16 weeks of D0 drought. During weeks when drought was experienced, only approximately 10-20 percent of the county was affected. 36 weeks of the year, the Region experienced no drought.
2016-2017	38	14	6	0	0	0	The Region experienced 20 weeks of drought stage. During these 20 weeks, the drought stage remained at D0 for 14 weeks and D1 for 6 weeks. 38 weeks of the year, the Region experienced no drought.
2017-2018	23	29	14	4	0	0	The Region experienced 29 weeks of drought stage D0 and 14 weeks of D1. In addition, 4 weeks were spent at D2; there were 23 weeks where the Region experienced no drought.
2018-2019	26	26	10	0	0	0	The Region experienced 36 total drought weeks. 26 weeks were spent at D0 and an additional 10 weeks were spent at D1. The Region was no experiencing a drought for 26 weeks.

Source: U.S. Drought Monitor

According to the U.S. Drought Monitor, the Charleston Region was in the D4 (Exceptional Drought) category for a number of weeks in early 2012 with a Palmer Drought Index of at least -5.0 (Extreme Drought). It is possible for severe and exceptional drought periods to return to the Charleston Region.

Drought Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of Seabrook Island	26-50%

Winter Weather

Location

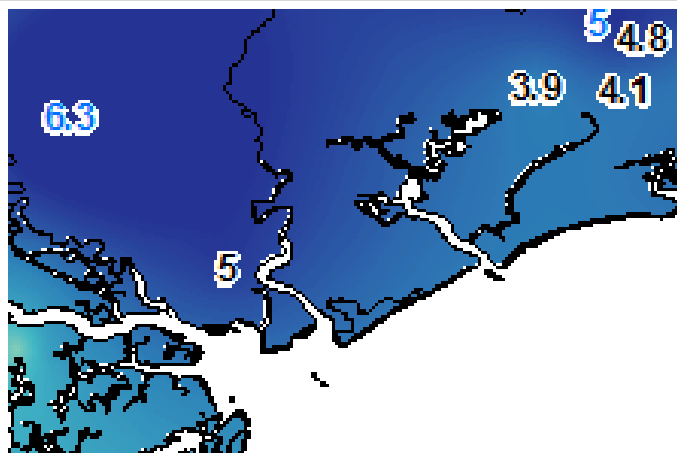
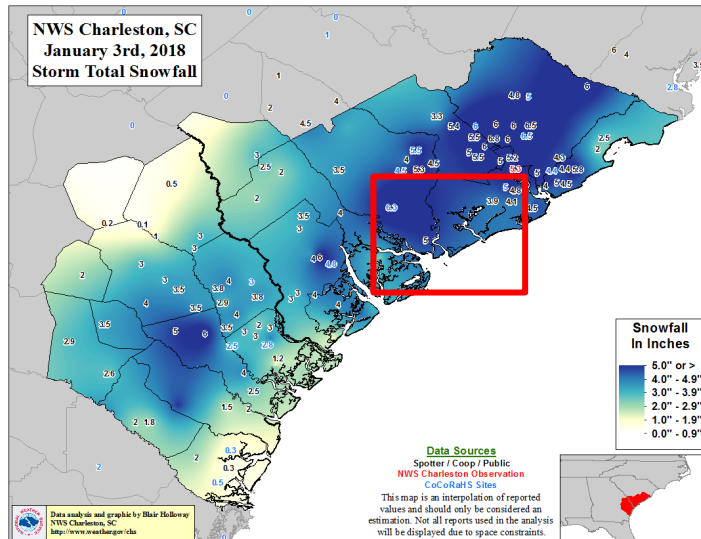
While the Region does not regularly encounter extreme winter storms, some aspects of winter weather occur in the Region annually. With the random nature of this hazard, all jurisdictions are subject to winter weather conditions.

Historical Occurrences

Winter Weather Events Through April 2019	
Total of 10 Events	
	\$ 23,000

Source: NOAA Climate Data

A rare winter storm affected southeast South Carolina on January 3, 2018. The storm produced a variety of wintry precipitation, including snow, sleet and freezing rain. Charleston Airport (KCHS) measured 5.3 inches of snow, the 3rd greatest daily snowfall on record, just 0.1 inches shy of the 5.4 inches that fell during the 1973 storm (NWS, 2019).



Winter Weather Probability for Each Jurisdiction

Jurisdiction	Probability
Town of Seabrook Island	51-75%

5.16(b) – Seabrook Island Problem Assessment

5.16.1 – Hazard Vulnerability

The analysis for this section is identical to the analysis under “Hazard Vulnerability” for Unincorporated Charleston County.

5.16.2 – Vulnerable Buildings

The analysis for this section is identical to the analysis under “Vulnerable Buildings” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-16-9

Building Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
Jurisdiction	Dam Failure	Drought	Earthquakes	Flooding	Hazardous Material Incidents	Hurricanes	Sea Level Rise	Tornadoes	Terrorist Incidents	Tsunamis	Wildfires	Winter Weather
Town of Seabrook Island	5	5	1	2	5	2	2	2	4	2	3	5

5.16.3 – Infrastructure Vulnerability

The analysis for this section is identical to the analysis under “Infrastructure Vulnerability” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-16-11

Infrastructure Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
Town of Seabrook Island	5	5	1	1	5	1	1	4	2	2	4	3

Problem Statements and Vulnerability Based on Jurisdiction	
Jurisdiction	Vulnerability Assessment
Town of Seabrook Island	Town of Seabrook Island is a coastal community with luxury homes and amenities. The beachfront properties are at risk for sea level rise and hurricanes, and the whole island is vulnerable to flooding. Many homes are not occupied year round and used as winter or secondary homes. This poses a vulnerability for preparation and repairs for buildings. Also some roads flood repetitively with rainfall and high tides and including emergency access

roads and the only entry and exit for the island. This coastal community is also vulnerable to tsunamis.

5.16.4 - Known Flood Damages

The analysis for this section is identical to the analysis under “Known Flood Damages” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-16-12

Loss Statistics for Charleston County as of 9/30/2018					
Jurisdiction	Total Losses	Closed Losses	Open Losses	CWOP Losses	Total Payments
SEABROOK ISLAND, TOWN OF	61	41	0	20	690,177.55
<i>FEMA Policy and Claims Statistics Database, 2019</i>					

Town of Seabrook Island Higher Regulatory Standards
2' freeboard
1/2 foot rise in floodway
Five year cumulative of all permits is included when conducting a substantial review

5.16.5 - Past Flood Impacts

The analysis for this section is identical to the analysis under “Past Flood Impacts” for Unincorporated Charleston County.

5.16.6 - Emergency Warning Needs

The analysis for this section is identical to the analysis under “Emergency Warning Needs” for Unincorporated Charleston County.

5.16.7 - Critical Facilities

The analysis for this section is identical to the analysis under “Critical Facilities” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-16-13

Critical Facility Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
Town of Seabrook Island	5	5	1	2	5	2	2	5	2	2	4	3

A full list of the capabilities for Charleston County and plan participating partners can be seen in the “Critical Facilities” description in Section 5.1(b).

5.16.8 – Natural and Beneficial Functions of Floodplains

The analysis for this section is identical to the analysis under “Natural and Beneficial Functions of Floodplains” for Unincorporated Charleston County.

5.16.9 – Development and Population Trends

The analysis for this section is identical to the analysis under “Development and Population Trends” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-16-14

Estimated Population 2017-2018 in Charleston County SC		
Jurisdiction	Growth Rate 2010-2018	Projected 2018 Population
Town of Seabrook Island	6.70%	1,855

Source: U.S. Census Bureau, Population Division 2018

Additional summaries of the anticipated future development trends for the local governments within Charleston County, as provided by the local government entities participating in the Charleston Regional Hazard Mitigation Plan, are outlined in “Development and Population Trends” in Section 5.1(b).

5.16.10 – Economic Impact

The analysis for this section is identical to the analysis under “Economic Impact” for Unincorporated Charleston County.

5.16.11 – Resiliency to Hazards

The analysis for this section is identical to the analysis under “Resiliency to Hazards” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Attachment 5-16-C: Repetitive Loss Areas within the Charleston Region

Repetitive Loss Areas				
Street	City, State	Zip Code	Jurisdiction	PSD / FD
Rascal Run Court	Seabrook Island, SC	29455-6208	Seabrook Isl.	
Seabrook Island Road	Johns Island, SC	29455	Seabrook Isl.	

Attachment 5-16-D: Charleston Region Buildings Vulnerable to Flooding Due to Location in the Special Flood Hazard Area (SFHA) Only

Jurisdiction	Total Site-Built Structures	% of Total Site-Built Structures in the SFHA	Mobile Homes in SFHA *	Residential site-built structures in the SFHA	Commercial Structures in the SFHA	Total Structures in the SFHA (including site-built and mobile homes)

			SFHA	A/A E Zone	V/V E Zone	A/AEZone	V/VEZone	A/A W Zone*	V/VEZone
Seabrook Island	2,547	92	0	2,213	94	34	3	2,247	97

* Since most mobile homes in Charleston County are treated as vehicles for tax purposes, the determination of “A” or “V” zones for these homes using the Q-3 digital data was not able to be readily performed. All mobile homes in the SFHA are included in the A-zone total for this table, since most jurisdictions in Charleston County restrict mobile homes from the “V” flood zone areas.

Attachment 5-16-E: Charleston Region Buildings Vulnerable to Flooding Due to Year of Construction and Location in the Special Flood Hazard Area (SFHA)

Jurisdiction	Pre-1985 Site-Built Residential Buildings in SFHA	Pre-1985 Commercial Buildings in SFHA	Total Pre-1985 Site-Built Buildings in SFHA	% of All Site-Built Buildings In Jurisdiction Constructed Pre-1985 and in SFHA	Pre-1985 Mobile Homes in SFHA	Total Site-Built Buildings Pre-1985 & Mobile Homes in SFHA
Seabrook Island	1,150	7	1,157	99.57	0	1,157

Attachment 5-16-F: Charleston Region Average Valuation of Buildings and Mobile Homes

Jurisdiction	Avg. Site-Built Residential Building Value	Avg. Commercial Building Value	Avg. Mobile Home Value**	Estimated Total Pre-1985 Site-Built and Mobile Home Building Value	Estimated Pre-1985 Site-Built Building And Mobile Home Value in SFHA (mil.\$)
Seabrook Island (All)	\$313,563.38	\$126,646.40	N/A	\$211,397,800.00	
Pre-1985 only	\$181,636.48	\$223,662.50	\$0.00		\$209,406,600.00

** Valuation data reflected herein is for mobile homes, regardless of age.

Attachment 5-16-G: Charleston Region Average Valuation of Site-Built Buildings by Flood Zone

Jurisdiction	Total Value “A” Zones Site-Built Structures	Total Value “V” Zones Site-Built Structures(mil\$)	Total Value Site-Built Structures Not in the SFHA (mil\$)	Total Value of Site-Built Structures Not Flood-Zone Coded** (mil\$)
Seabrook Island	674,074,500	68,482,300	14,280,000	0

** Valuation data reflected herein is for mobile homes, regardless of age.

5.17(a) - Town of Sullivan's Island

Hurricane

Location

Hurricanes and tropical storms threaten the entire Atlantic and Gulf coast of the United States, as well as the Pacific coast. Hurricanes that originate in the Gulf of Mexico can still impact the Charleston Region. With about 68% of the Charleston Region in the floodplain and some jurisdictions located 100% in the floodplain and with the community being a coastal community, the Region is vulnerable to hurricanes and tropical storms and their aftermaths. Since hurricane landing patterns are unpredictable until the storm has formed and is within a short time from landing, the Region can not presume that past strike history will continue into the future, and all areas within the Region are subject to these types of events.

Occurrences

Hurricane Events between August 11 1940 - April 30 2013			
Name	Category	Date	Damage Description
August 11th, 1940 (Name classification started after 1950)	2	August 11th, 1940	Estimated damage to the city was \$1 million. Sullivan's Island and the City of the Isle of Palms suffered minor damage.
Hurricane Hazel	4	October 15th, 1954	Folly Beach, Sullivan's Island, and the Isle of Palms suffered light property damage and slight beach erosion. The City of Charleston experienced no serious damage.
Hurricane Gracie	3	September 29th, 1959	The total damage inflicted by the storm was estimated at \$14 million. High water marks, which were reported near the Town of Edisto Beach, South Carolina, ranged from 7.3 to 11.9 feet.
Hurricane David	3	August 29th - September 7th, 1979	Flooding and minor damage in the City of Charleston.
Hurricane Hugo	4	September 19th, 1989	Tidal surges north of the city were recorded at 19.8 feet and 11.8 feet in the Peninsula City. The hurricane struck at high tide. Its recorded diameter was over 500 miles, Four (4) people were killed and scores injured. Estimated damage of \$7 billion for the total area.
Hurricane Bertha	2	July 12th, 1996	This hurricane came close but did not cause any significant damage. Some coastal areas experienced moderate beach erosion. Tourism estimated loss revenue of 20 million dollars.
Hurricane Fran	3	Septemer 5th, 1996	The storm didn't directly hit the Charleston Region but remnants of this hurricane created power outages with economic losses estimated at 20 million dollars.
Hurricane Bonnie	3	August 26th, 1998	Remnants of this hurricane produced winds that knocked down several trees in the Town of Mount Pleasant as it headed for the North Carolina Coast.
Hurricane Floyd	2	September 15th, 1999	Sustained winds of 58 miles per hour were recorded in downtown Charleston with gusts up to 85 miles per hour. Generally 3-5 inches of rainfall occurred. An estimated \$10.5 million in damages occurred in the Charleston region.
Hurricane Irene	1	October 17th, 1999	This hurricane dropped 3 to 5 inches of rain created minor street flooding. Minor beach erosion. Trees knocked down and power outages in the area.
Tropical Storm Gordon		September 18th, 2000	Remnants of the storm dropped 6-10 inches of rain. Minor beach erosion occurred as a result of this storm.
Tropical Storm Claudette		July 14th, 2003	Two and a half inches of rain, a tree was downed, 11 traffic accidents.
Tropical Depression Seven		July 25th, 2003	Expected to receive as much as 6 inches of rain and wind gusts up to 35 mph from this storm.
Tropical Storm Henri		September 6th, 2003	Folly Beach, Sullivan's Island, and Isle of Palms experienced beach erosion from remnants of the storm, which was predicted to also bring up to 5 inches of rain to the Charleston area.
Hurricane Isabel	2	September 17th, 2003	This storm created 8 foot surf at Kiawah Island and had wind gusts of 40 mph offshore and 20 mph in downtown Charleston when it passed offshore. Coastal erosion was expected, as tides were 6 to 12 inches above normal.
Tropical Storm Alex		August 2nd, 2004	Minor beach erosion was reported on Folly Beach.
Tropical Storm Bonnie		August 12th, 2004	The remnants of this storm caused a tornado and several incidents of wind damage in the Awendaw area.
Hurricane Charley	1	August 14-15th, 2004	An estimated 4 inches of rain fell in 2 hours in the Northern part of Charleston County on August 14, 2004, flooding low lying areas and areas with poor drainage. Storm surge was estimated at 4-6 feet from Oyster Landing to the Cape Romain Wildlife Refuge in the northern portions of Charleston County. Minor property and tree damage occurred as a result of this storm. The storm caused an estimated damage of \$2 million in South Carolina.
Hurricane Gaston	1	August 29th, 2004	Sustained winds of 75 mph. The storm brought a 4 foot storm surge into Bull's Bay, which caused an estimated \$4.8 million in damages to homes, primarily in areas east of the Cooper River creating debris with an estimated clean-up cost of \$2.2 million county-wide, and left nearly all of the customers of South Carolina Electric and Gas without electrical power. Total estimated damages, per the National Weather Service, were \$7.6 million in Charleston County.

Tropical Storm Frances		September 6th, 2004	This storm created nearly 6 ft. surf. Dropped nearly 5 inches of rain, winds of 35 mph, minor damage and flooding.
Tropical Depression Jeanne		September 27th, 2004	Resulted in 40 ft. of beach erosion on the north end of Folly Beach. Maximum wind gusts in Charleston County from this storm were 41 mph in downtown Charleston and at the Charleston airport. Maximum wind gusts at Folly Beach were 38 mph. Non-tornadic damage was limited to a few trees falling on cars.
Tropical Storm Ophelia		September 13th, 2005	Loss of Life, Beach Erosion, minor damage.
Tropical Storm Tammy		October 5th, 2005	Significant Beach Erosion, flooding, minor damage.
Tropical Storm Alberto		June 13th, 2006	Remnants of the storm produced a tornado that touched down near Awendaw, knocking down trees. Street flooding occurred in Charleston and North Charleston as a result of this storm.
Tropical Storm Ernesto		August 31st, 2006	Mt. Pleasant received 6.65 inches of rainfall from this storm system. Street flooding occurred in the City of Charleston and 40 mph gusts.
Tropical Storm Barry		June 2nd, 2007	Remnants of the storm produced heavy rains, strong winds, rough surf, and 3 inches of rain. Loss of electricity to 13,900 customers of SCE&G and Berkeley Electric Cooperative, mostly in the Summerville area, which caused vessels to break their lines, and flood streets, particularly on the Charleston Peninsula. Wind gusts up to 60 mph were recorded.
Tropical Storm Hanna		September 5th, 2008	Resulting in strong wind and localized heavy rain.
Tropical Storm Irene		August 25th, 2011	The Charleston County Folly Beach Park received significant erosion-related damages as a result of this storm, including beach areas and structures.
Tropical Storm Lee		September 6th, 2011	Charleston County sustained scattered showers, thunderstorms, and winds up to 22 mph with a half-inch of rain in some areas.
Tropical Storm Beryl		May 27th, 2012	The region saw tropical storm forced winds, heavy rainfall, and fallen trees as result of the storm.
Tropical Storm Sandy		October 27th, 2012	The storm produced forced winds of 40 mph.

Hurricane Events between May 1, 2013 – January 31, 2019

Name	Category	Date	Damage Description
Tropical Storm Andrea		June 6, 2013	Heavy rainfall 3-7 inches
Tropical Storm Arthur		July 3, 2014	Tropical storm watch was posted for Santee River to Bogue Banks, NC. Wind gusts up to 42 mph (68 km/h) along coastal areas, resulting in scattered power outages
Tropical Storm Ana		May 7-8, 2015	Tropical storm warning from South Santee River to Surf City, NC. Produced a small storm surge along Charleston County coast.
Hurricane Joaquin	4	October 1-5, 2015	Did not make landfall in the US, but caused catastrophic flooding in South Carolina and intense flooding and power outages in Charleston County. South Carolina Governor Haley declared a State of Emergency.
Hurricane Matthew	1	October 7-8, 2016	Once a Category 5 hurricane before ripping through Haiti and eastern Cuba, Hurricane Matthew had downgraded to a Category 1 by the time it hit South Carolina. Even so, 830,000 South Carolinians lost power, 355,000 evacuated from their homes, and 4 lost their lives.
Hurricane Irma	1	9/11-9/12/2017	Once a Category 5 hurricane before ripping through the Caribbean, Hurricane Irma had downgraded to a Category 1, and eventually a tropical storm, by the time the system impacted South Carolina. Even so, over 100,000 South Carolinians lost power, 3 lost their lives, and Charleston recorded its third highest storm surge ever (10ft).
Hurricane Florence	1	9/14/2018	Once a Category 4 hurricane before making landfall north of Charleston County, this storm impacted Charleston County as a tropical depression. No lives were lost in Charleston County although thousands of residents lost power during the storm's peak.

Hurricane Michael	4	10/11/2018	Making landfall as a Category 4 hurricane in Florida's Bay County, this storm impacted Charleston County by bringing 50 mph winds which dismantled many trees and power lines plus a storm surge measured at 2.07 ft in Charleston Harbor. Charleston County saw no lost lives, although the storm directly caused 16 casualties and 43 indirectly, according to the NOAA.
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Hurricane Probability for each Jurisdiction	
Jurisdiction	Probability
Town of Sullivan's Island	26-50%

Flood

Location

Flooding can occur throughout most of the Charleston Region since around 68% resides within a floodplain. Floodplains are designated by the frequency of the flood that is large enough to cover them. Flood frequencies are determined by plotting a graph of the size of all known floods for an area and calculating how often floods occur. The Federal Emergency Management Agency (FEMA) identifies floodplain areas by producing Flood Insurance Rate Maps (FIRM). These maps show all locations near major bodies of water, and show base flood elevations and floodplain boundaries like the 100-year floodplain boundaries. 100-year flood event is a 1% probability of occurring in any given year. The roughly 68% of the areas located in the floodplain are exposed to the threat of floods but that does not mean the other areas are not vulnerable to a flash flood or flooding events. Damaged infrastructure and roadways can limit mobility for citizens. All areas can experience flooding hazards.

Below is a list from each participant in the plan for areas of concern for flooding.

Flood Prone Areas of Charleston County	
<i>Jurisdiction Not Serviced by Charleston County</i>	<i>Area</i>
Town of Sullivan's Island	Station 26.5 to Station 28.5 drainage basin; Currently working with SCDOT, OCRM to replace 8 inch pipe with a 30 " pipe from Marshall Blvd to Jasper Blvd and to create improved outfall to marsh.
	Station 30 and Brownell Ave; Low area with slow drainage.
	Station 18 to 19; Low area with no drainage currently working with the engineers designing a force main system.
	Station 26 and Brownell
	Drainage Outfalls; Currently working with SCDHEC/OCRM to find solution to silting issues at all outfalls to marsh on the Island.

Historical Occurrences

Flooding Events Between Jan 1, 1950 – April 30, 2019	
Total: 1 Event	Total Damage:
	\$ -

Source: NOAA Storm Events Database

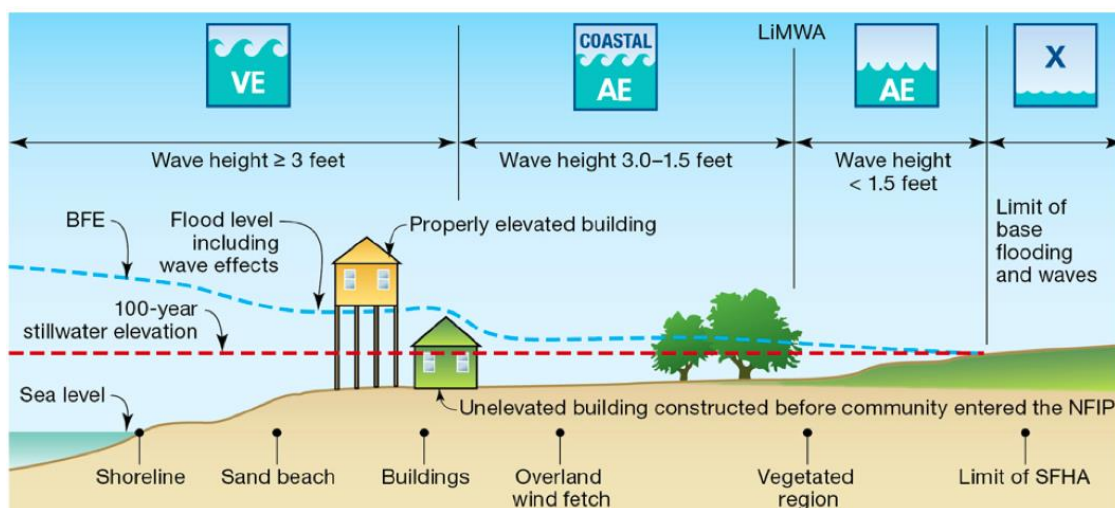
These flooding events were mainly the result from heavy rain or severe weather (thunderstorms, tropical storms, heavy rain) incidents that caused flooding in the Charleston Region. Charleston broke its record for number of annual-flood days last year. The previous record of 38 days, observed in 2015, was exceeded by 12 days for a total of 50 annual-flood days in 2016. Compared to 1995, trends in flooding during 2016 have increased by 130 percent on average.

Flooding Probability for each Jurisdiction	
Jurisdiction	Probability
Town of Sullivan’s Island	76-100%

Sea Level Rise

Location

Flooding and tidal flooding is a good indicator of what areas are most at risk for sea level rise and the stressors that accompany it: nuisance flooding, increased storm surge, loss of property. Land in the most susceptible flood zones (AE and VE) will be most affected as sea level continues to rise. Areas of the most susceptibility include Eastern Folly Beach and Morris Island, the tips of Sullivan’s Island, the northeastern coast of James Island near SC-30 and Harbor View Rd., all of Seabrook and Edisto’s coastline, eastern Isle of Palms and Caper’s Island, all of Awendaw’s coastline, and the northeastern coastline of Murphy Island and the coast of the Dunes West Golf and Resort Club. Below is an illustration of the definitions of the different flood zones:



Amount of Land Area of Charleston County Above Sea Level										
Elevation above spring high water (m)	0.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00
Area of Land (sq. km)	108.6	175.5	223	305.5	344.2	421.8	464.9	587.2	684.4	858.2
Percent of Total Land Cover	4.6%	7.4%	9.4%	12.9%	14.5%	17.8%	19.6%	24.8%	28.9%	36.2%

Occurrences

King tides, which is the above average high tide occurring when once a lunar cycle, are a good predictor of sea level rise. On average there were over twice as many observed tides than predicted tides. The depth averaged more than a foot deeper than expected. There were 28 more king tides than predicted in 2018 and the highest observed tide was over a foot and a half higher than the highest predicted tide. King tides give a community a glimpse into what it will be like to live with a higher sea level. Communities can expect more king tides in the future as sea level continues to rise.

Duration and Depth* of King Tides in Charleston Area from January 2014 – December 2019				
Year	Predicted Number of Tides	Observed Number of Tides	Highest Predicted Tide (ft)	Highest Observed Tide (ft)
2014	28	46	7	7.6
2015	40	111	7.2	8.7
2016	49	82	7.2	7.9
2017	34	111	7	9.9
2018	44	72	6.9	8.8
Average	39	84.4	7.06	8.58
Total	195	422	35.3	42.9

*Depth is based off of the Charleston Harbor Tide Gauge

**Available data from 2014 onwards gathered through MyCoast.org backed by SC DHEC:
<https://mycoast.org/sc/king-tides>

Sea Level Rise/King Tide Probability for each Jurisdiction	
Jurisdiction	Probability
Town of Sullivan's Island	76-100%

Tsunami

Location

A tsunami poses the threat on all coastal communities even though tsunamis are generally considered to be a significant hazard threat primarily for land areas near the Pacific Ocean, and are considered to be a rare phenomenon in the Atlantic Ocean. Historical evidence does indicate that tsunamis have affected the Eastern United States but are not the result of traditional sources of tsunami waves (i.e., subduction zones such as the Cascadia Subduction Zone in the Pacific Ocean). They are typically the result of slumping or land sliding associated with local earthquakes or with wave action associated with strong storms such as hurricanes. Other possible causes of tsunami-like activity along the East Coast could include explosive

decompression of underwater methane deposits, the impact of a heavenly body (i.e., an asteroid, comet or oceanic meteor splashdown), or a large underwater explosion. The Charleston County area is not an “at-risk” area for a significant type of Atlantic Ocean tsunamis. Consequently, the Charleston County area would not generally be expected to experience a tsunami but as with any coastal community along the Atlantic Ocean, there is still an extremely remote chance of events happening that can cause a tsunami.

Historical Occurrences

With the report of 1 event with limited information on damage and extent which was likely tied to the record earthquake that occurred on August 31st, 1886, the Charleston Region hasn’t experienced any tsunami events since. Through the National Climatic Data Center from National Oceanic and Atmospheric Administration (NOAA), the database shows zero events from the years 2008 through April 30th, 2019.

Tsunami Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of Sullivan’s Island	0-25%

Rip Current

Location

The Charleston Region stretches nearly 100 miles along the Atlantic Ocean. The Region’s beaches are prone to rip currents daily leaving citizens who enjoy the beaches vulnerable to this threat. This type of hazard does not cost damage to buildings or infrastructure but it continues to take lives of residents and visitors on an annual basis. Since majority of people in the Region will experience being around the water at some point, the whole Region can be affected.

Historical Occurrences

According to the National Oceanic and Atmospheric Administration (NOAA) and the National Climatic Data Center (NCDC), rip currents will be listed in Storm Data only when they cause a drowning(s), near-drowning(s), result in numerous rescues (i.e., 5 or more at one beach community), or damage watercraft. Events associated with other surf-related currents, such as long-shore or tidal currents, will not be included in Storm Data as Rip Current events. Rip currents can occur any time and any place along beaches or in other bodies of water.

Charleston County Severe Rip Tide Occurrences from January 1, 1950 – April 30 th , 2019
Total: 3 Rip Current Events with 1 Death and 3 Reported Injuries
<i>Source: NOAA Storm Events Database</i>

Rip Current Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of Sullivan’s Island	76-100%

Severe Storm

Location

A thunderstorm event is an atmospheric hazard, and has no geographic boundaries. They can occur in all regions of the United States however, thunderstorms are most common in the central and southern states because atmospheric conditions are more favorable for generating

thunderstorms. Since thunderstorms are unpredictable, all jurisdictions are equally exposed to these hazards.

Historical Occurrences

Severe Storm Events (Thunderstorm Winds) 1956 – April 2019		
TOTAL: 5 Events	Average Wind Speed: 53	Total Damage: \$9,000

Source: NOAA Storm Events Database

Severe Storm (Lightning) Incidents in Charleston County 1998 – April 2019	
Total: 2 Events	Total Damage: \$5,000

Source: NOAA Storm Events Database

Severe Storm Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of Sullivan’s Island	76-100%

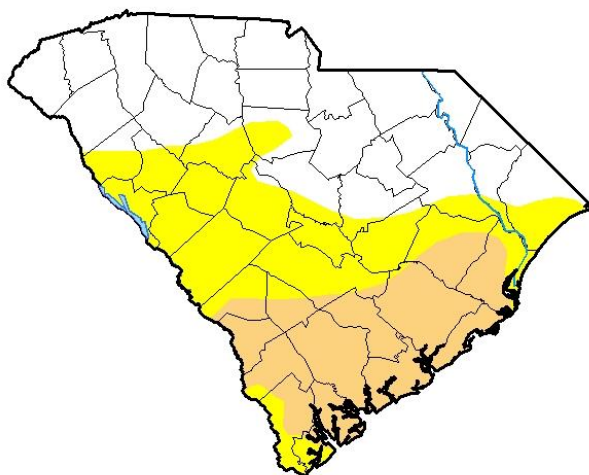
Drought

Location

Droughts typically cover a large area and cannot be confined to any geographic boundary. For this purpose, the whole Charleston Region is vulnerable to the threat of a drought.

U.S. Drought Monitor South Carolina

April 30, 2019
(Released Thursday, May 2, 2019)
Valid 8 a.m. EDT



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	45.71	54.29	23.20	0.00	0.00	0.00
Last Week 04-23-2019	46.10	53.90	23.13	0.00	0.00	0.00
3 Months Ago 01-29-2019	100.00	0.00	0.00	0.00	0.00	0.00
Start of Calendar Year 01-01-2019	100.00	0.00	0.00	0.00	0.00	0.00
Start of Water Year 09-25-2018	89.90	10.10	1.52	0.00	0.00	0.00
One Year Ago 05-01-2018	60.27	39.73	23.91	0.00	0.00	0.00

Intensity:
■ D0 Abnormally Dry ■ D3 Extreme Drought
■ D1 Moderate Drought ■ D4 Exceptional Drought
■ D2 Severe Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:
Brad Rippey
U.S. Department of Agriculture



<http://droughtmonitor.unl.edu/>

(An example of the extent of drought that the State experienced in late April 2019)

Historical Occurrences

Number of weeks of Drought Events between May 1, 2013 – April 30, 2019							
Year	Category						Description
	None	D0 Abnormally Dry	D1 Moderate Drought	D2 Severe Drought	D3 Extreme Drought	D4 Exceptional Drought	
1999-2000	35	17	2	0	0	0	
2000-2001	17	35	19	5	0	0	
2001-2002	4	48	38	32	19	0	
2002-2003	18	34	20	18	13	0	
2003-2004	46	6	0	0	0	0	
2004-2005	32	20	5	0	0	0	
2005-2006	47	5	0	0	0	0	
2006-2007	27	25	3	0	0	0	
2007-2008	0	53	35	12	0	0	
2008-2009	15	37	22	0	0	0	
2009-2010	38	14	2	0	0	0	
2010-2011	29	23	0	0	0	0	
2011-2012	0	53	50	46	39	3	
2012-2013	7	45	20	9	5	0	
2013-2014	32	20	0	0	0	0	The Region experienced 20 weeks in drought stage. 32 weeks of no drought stage were reported and 20 weeks of D0 drought from October to December.
2014-2015	37	15	0	0	0	0	The Region experienced only 15 weeks of D0 drought. During weeks when drought was experienced, only approximately 10-20 percent of the county was affected. 37 weeks of the year, the Region experienced no drought.
2015-2016	36	16	0	0	0	0	The Region experienced 16 weeks of D0 drought. During weeks when drought was experienced, only approximately 10-20 percent of the county was affected. 36 weeks of the year, the Region experienced no drought.
2016-2017	38	14	6	0	0	0	The Region experienced 20 weeks of drought stage. During these 20 weeks, the drought stage remained at D0 for 14 weeks and D1 for 6 weeks. 38 weeks of the year, the Region experienced no drought.
2017-2018	23	29	14	4	0	0	The Region experienced 29 weeks of drought stage D0 and 14 weeks of D1. In addition, 4 weeks were spent at D2; there were 23 weeks where the Region experienced no drought
2018-2019	26	26	10	0	0	0	The Region experienced 36 total drought weeks. 26 weeks were spent at D0 and an additional 10 weeks were spent at D1. The Region was no experiencing a drought for 26 weeks.

Source: U.S. Drought Monitor

According to the U.S. Drought Monitor, the Charleston Region was in the D4 (Exceptional Drought) category for a number of weeks in early 2012 with a Palmer Drought Index of at least -5.0 (Extreme Drought). It is possible for severe and exceptional drought periods to return to the Charleston Region.

Drought Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of Sullivan’s Island	26-50%

Winter Weather

Location

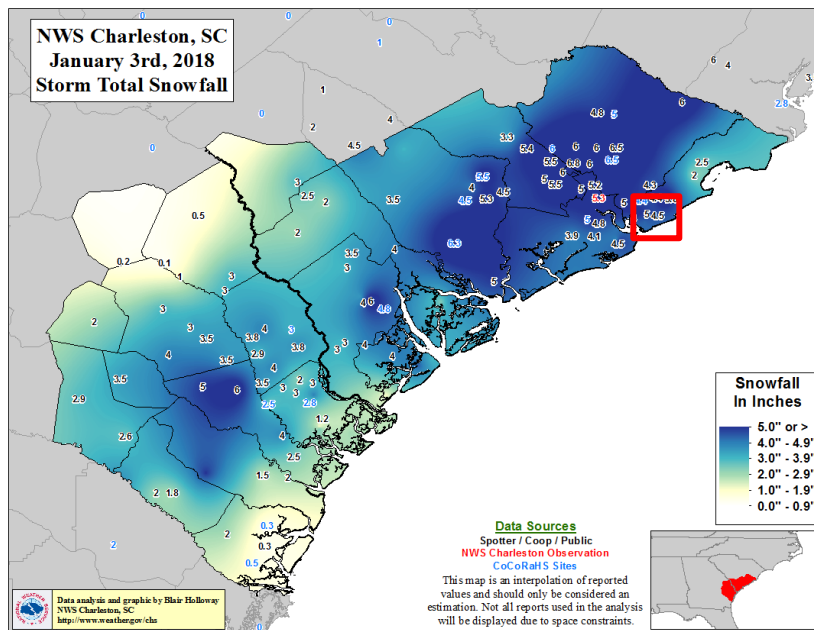
While the Region does not regularly encounter extreme winter storms, some aspects of winter weather occur in the Region annually. With the random nature of this hazard, all jurisdictions are subject to winter weather conditions.

Historical Occurrences

Winter Weather Events Through April 2019	
Total of 10 Events	Total
	Damage:
	\$233,000

Source: NOAA Climate Data

A rare winter storm affected southeast South Carolina on January 3, 2018. The storm produced a variety of wintry precipitation, including snow, sleet and freezing rain. Charleston Airport (KCHS) measured 5.3 inches of snow, the 3rd greatest daily snowfall on record, just 0.1 inches shy of the 5.4 inches that fell during the 1973 storm (NWS, 2019).



Winter Weather Probability for Each Jurisdiction	
Jurisdiction	Probability
Town of Sullivan's Island	51-75%

5.17(b) - Sullivan's Island Problem Assessment

5.17.1 - Hazard Vulnerability

The analysis for this section is identical to the analysis under "Hazard Vulnerability" for Unincorporated Charleston County.

5.17.2 - Vulnerable Buildings

The analysis for this section is identical to the analysis under "Vulnerable Buildings" for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-17-9

Building Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
Jurisdiction	Dam Failure	Drought	Earthquakes	Flooding	Hazardous Material Incidents	Hurricanes	Sea Level Rise	Tornadoes	Terrorist Incidents	Tsunamis	Wildfires	Winter Weather
Town of Sullivan's Island	5	4	4	3	2	3	2	2	2	4	3	4

5.17.3 - Infrastructure Vulnerability

The analysis for this section is identical to the analysis under "Infrastructure Vulnerability" for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-17-11

Infrastructure Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
Town of Sullivan's Island	5	5	3	3	5	3	3	3	3	3	5	5

Problem Statements and Vulnerability Based on Jurisdiction	
Jurisdiction	Vulnerability Assessment
Town of Seabrook Island	Town of Seabrook Island is a coastal community with luxury homes and amenities. The beachfront properties are at risk for sea level rise and hurricanes, and the whole island is vulnerable to flooding. Many homes are not occupied year round and used as winter or secondary homes. This poses a vulnerability for preparation and repairs for buildings. Also some roads flood repetitively with rainfall and high tides and including emergency access roads and the only entry and exit for the island. This coastal community is also vulnerable to tsunamis.

5.17.4 - Known Flood Damages

The analysis for this section is identical to the analysis under “Known Flood Damages” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-17-12

Loss Statistics for Charleston County as of 9/30/2018					
Jurisdiction	Total Losses	Closed Losses	Open Losses	CWOP Losses	Total Payments
SULLIVANS ISLAND, TOWN OF	849	659	0	190	21,015,828.74
<i>FEMA Policy and Claims Statistics Database, 2019</i>					

Town of Sullivan's Island
1' freeboard
2 CFM on staff
All inspectors are State certified
Limit solid wall enclosures to 200 sq. ft. in AE and VE zones.
Hydrostatic venting is required in solid walls in AE and VE zones.
All Lattice and solid walls must be breakaway and designed by a design professional in AE and VE zones.
All structures must be designed by a licensed design professional and must provide design certifications in AE and VE zones prior to construction and at the completion of construction.
Limit fill on all properties to no more than one foot above natural grade. Decrease in natural grade is prohibited except for minimal retention areas for stormwater retention.
Require a drainage plan certified by a design professional for any land disturbance over 625 square feet. Stormwater of 2 inches per hour or less must be retained on site by dry wells or retention areas. Plan must be provided prior to construction and must be verified and signed off as a functional storm water system at final inspection by a South Carolina licensed certified stormwater professional.
Limit impervious surface to no more than 30% of lot.
Limit unnatural surfaces to no more than 50% of a lot and 50% of a lot must be Natural vegetated surfaces or natural planting beds.
Limit the placement of any unnatural surfaces in the road right of way and limit the property to one driveway 12 feet wide at property line and no more than a 5-foot radius taper at the street pavement. Currently working with SCDOT on a pilot program to allow homeowners to place pervious designed parking areas in ROW to assist with road drainage.
Setback from critical lines, base lines and toe of dunes are 30 feet and do not allow the destruction of dunes or changes to the topography of a lot.

We perform a flood inspection at frame and final inspection requiring an elevation certificate to be provided prior to the inspections.
Approximately 80% of the shoreline is protected by natural and beneficial shoreline and this area is protected by deed restrictions by the Lowcountry Open Land Trust. We allow trimming and pruning only in this area. No destruction of vegetation is permitted.
We require all substantial improvements and new construction to sign a non-conversion agreement stating that they will not alter the area below BFE and the document is recorded as a deed restriction to the property. Inspections are performed yearly to insure the area below BFE has not been altered.

5.17.5 – Past Flood Impacts

The analysis for this section is identical to the analysis under “Past Flood Impacts” for Unincorporated Charleston County.

5.17.6 – Emergency Warning Needs

The analysis for this section is identical to the analysis under “Emergency Warning Needs” for Unincorporated Charleston County.

5.17.7 – Critical Facilities

The analysis for this section is identical to the analysis under “Critical Facilities” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-17-13

Critical Facility Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
Town of Sullivan's Island	5	5	4	4	3	4	4	4	4	4	5	5

A full list of the capabilities for Charleston County and plan participating partners can be seen in the “Critical Facilities” description in Section 5.1(b).

5.17.8 – Natural and Beneficial Functions of Floodplains

The analysis for this section is identical to the analysis under “Natural and Beneficial Functions of Floodplains” for Unincorporated Charleston County.

5.17.9 – Development and Population Trends

The analysis for this section is identical to the analysis under “Development and Population Trends” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-17-14

Estimated Population 2017-2018 in Charleston County SC		
Jurisdiction	Growth Rate 2010-2018	Projected 2018 Population
Town of Sullivan's Island	7.25%	1,921

Source: U.S. Census Bureau, Population Division 2018

Additional summaries of the anticipated future development trends for the local governments within Charleston County, as provided by the local government entities participating in the Charleston Regional Hazard Mitigation Plan, are outlined in “Development and Population Trends” in Section 5.1(b).

5.17.10 – Economic Impact

The analysis for this section is identical to the analysis under “Economic Impact” for Unincorporated Charleston County.

5.17.11 – Resiliency to Hazards

The analysis for this section is identical to the analysis under “Resiliency to Hazards” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Attachment 5-17-C: Repetitive Loss Areas within the Charleston Region

Repetitive Loss Areas			
Street	City, State	Zip Code	Jurisdiction
Atlantic Ave.	Sullivan's Island, SC	29482	Sullivan's Isl.
Bayone St.	Sullivan's Island, SC	29482	Sullivan's Isl.
Brownell Ave.	Sullivan's Island, SC	29482	Sullivan's Isl.
I'on Ave.	Sullivan's Island, SC	29482	Sullivan's Isl.
Jasper Blvd.	Sullivan's Island, SC	29482	Sullivan's Isl.
Marshall Blvd.	Sullivan's Island, SC	29482	Sullivan's Isl.
Middle Street	Sullivan's Island, SC	29482	Sullivan's Isl.
Myrtle Ave.	Sullivan's Island, SC	29482	Sullivan's Isl.
Osceola St.	Sullivan's Island, SC	29482	Sullivan's Isl.
Seabreeze Lane	Sullivan's Island, SC	29482	Sullivan's Isl.

Attachment 5-17-D: Charleston Region Buildings Vulnerable to Flooding Due to Location in the Special Flood Hazard Area (SFHA) Only

Jurisdiction	Total Site-Built Structures	% of Total Site-Built Structures in the SFHA	Mobile Homes in SFHA *	Residential site-built structures in the SFHA		Commercial Structures in the SFHA		Total Structures in the SFHA (including site-built and mobile homes)	
				A/AE Zone	V/VE Zone	A/AE Zone	V/VE Zone	A/AE Zone*	V/VE Zone
			SFHA						

Sullivan's Isle	1,079	99	0	503	536	16	12	519	548
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* Since most mobile homes in Charleston County are treated as vehicles for tax purposes, the determination of "A" or "V" zones for these homes using the Q-3 digital data was not able to be readily performed. All mobile homes in the SFHA are included in the A-zone total for this table, since most jurisdictions in Charleston County restrict mobile homes from the "V" flood zone areas.

Attachment 5-17-E: Charleston Region Buildings Vulnerable to Flooding Due to Year of Construction and Location in the Special Flood Hazard Area (SFHA)

Jurisdiction	Pre-1985 Site-Built Residential Buildings in SFHA	Pre-1985 Commercial Buildings in SFHA	Total Pre-1985 Site-Built Buildings in SFHA	% of All Site-Built Buildings In Jurisdiction Constructed Pre-1985 and in SFHA	Pre-1985 Mobile Homes in SFHA	Total Site-Built Buildings Pre-1985 & Mobile Homes in SFHA
Sullivan's Isle	612	15	627	98.58	0	627

Attachment 5-17-F: Charleston Region Average Valuation of Buildings and Mobile Homes

Jurisdiction	Avg. Site-Built Residential Building Value	Avg. Commercial Building Value	Avg. Mobile Home Value**	Estimated Total Pre-1985 Site-Built and Mobile Home Building Value	Estimated Pre-1985 Site-Built Building And Mobile Home Value in SFHA (mil.\$)
Sullivan's Isl. (All)	\$427,734.81	\$247,303.85	N/A	\$173,615,113.00	
Pre-1985 only	\$276,419.83	\$163,200.00	\$0.00		\$173,150,513.00

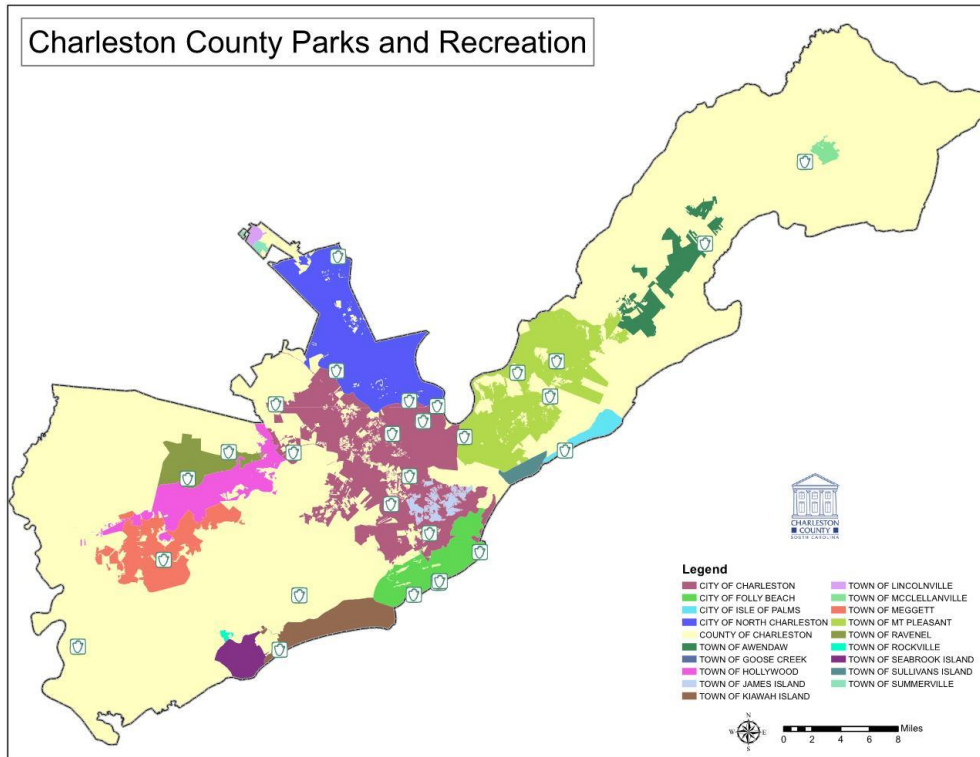
** Valuation data reflected herein is for mobile homes, regardless of age.

Attachment 5-17-G: Charleston Region Average Valuation of Site-Built Buildings by Flood Zone

Jurisdiction	Total Value "A" Zones Site-Built Structures	Total Value "V" Zones Site-Built Structures(mil\$)	Total Value Site-Built Structures Not in the SFHA (mil\$)	Total Value of Site-Built Structures Not Flood-Zone Coded** (mil\$)
Sullivan's Isle	197,831,914	254,043,000	3,248,800	0

** Valuation data reflected herein is for mobile homes, regardless of age.

5.18 - Charleston County Parks & Recreation



Charleston County Parks and Recreation (CCPR) currently holds facilities located in Unincorporated Charleston County as well as a number of jurisdictions. For this reason, please refer to the hazard summary for a CCPR facility’s location to assess that facility’s hazard vulnerability. The following table contains a summary of relevant jurisdictions and their most pertinent hazards. Please note that while all jurisdictions are equally probable of encountering each hazard, the list highlights hazards for which a jurisdiction is especially vulnerable.

Jurisdiction	Number of CCPR Facilities	Hazards
Unincorporated Charleston County	3	Flood, Hurricanes, Wildfire, Severe Storm, Drought, Winter Weather
Town of Awendaw	1	Sea Level Rise, Wildfire, Severe Storm, Drought, Winter Weather, Hurricanes
City of Charleston	9	Flood, Hazardous Materials, Terrorism, Severe Storm, Drought, Winter Weather, Hurricanes
City of Folly Beach	4	Hurricane, Flood, Sea Level Rise, Tsunami, Rip Current, Severe Storm, Drought, Winter Weather
City of Isle of Palms	1	Hurricane, Flood, Sea Level Rise, Tsunami, Rip Current, Severe Storm, Drought, Winter Weather
Town of Kiawah Island	1	Hurricane, Flood, Sea Level Rise, Rip current, Severe Storm, Drought, Winter Weather
Town of Meggett	1	Flood, Wildfire, Severe Storm, Drought, Winter Weather

Town of Mt Pleasant	4	Hurricane, Hazardous Materials, Terrorism, Wildfire, Severe Storm, Drought, Winter Weather
City of North Charleston	2	Flood, Earthquake, Hazardous Materials, Dam Failure, Severe Storm, Drought, Winter Weather
Town of Ravenel	2	Earthquake, Wildfire, Severe Storm, Drought, Winter Weather

As a whole, CCPR reports nine hazards for which it is especially vulnerable: hurricane, flood, sea level rise, wildfire, tsunami, rip current, severe storm, drought, and winter weather.

Hurricane

Since CCPR possesses beachfront facilities, its hurricane vulnerability is high since these locations can be the first point of hurricane landfall, especially in the Kiawah Island, Folly Beach, and Isle of Palms jurisdictions. In the past year, Hurricane Florence delivered power outages to many residents while Hurricane Michael brought 50 mph winds to the county while dismantling power lines and uprooting some trees. No lives were lost.

Hurricane Probability for each Jurisdiction	
Jurisdiction	Probability
Charleston County Parks & Recreation Commission	26-50%

Flood

CCPR's coastal facilities as well as those in North Charleston and Meggett are especially susceptible to flooding. While Hurricane Michael did deliver a 2.07 ft storm surge to the Charleston Harbor, NOAA does not report any significant flooding events related to this jurisdiction since the last HMP update.

Flooding Probability for each Jurisdiction	
Jurisdiction	Probability
Charleston County Parks & Recreation Commission	51-75%

Sea Level Rise

Charleston again surpassed its expected amount of king tides during the past year, meaning residents saw exceptionally high tides compared to the typical extent of a high tide. For beachfront CCPR facilities, this hazard is routinely present.

2019 Predicted King Tides
January 21-22
April 19-20
July 3-4
July 30-August 3
August 28-September 1
September 25-October 2
October 26-31
November 25-28

Sea Level Rise/King Tide Probability for each Jurisdiction	
Jurisdiction	Probability
Charleston County Parks & Recreation Commission	51-75%

Wildfire

Inland facilities susceptible to wildfire are seeing a decline in incidents from previous years as well as other fire incidents reported by Charleston County Consolidated 9-1-1. While the County reports decreases from the previous year's incidents of outside fires, trail/rail fires, and marine fires, there was a slight increase in vehicle fire occurrences throughout the county from 2017-2018 to 2018-2019.

Wildfire Probability for Each Jurisdiction	
Jurisdiction	Probability
Charleston County Parks & Recreation Commission	26-50%

Tsunami

Charleston County maintains its current status of experiencing zero tsunami incidents. CCPR, however, is still likely to experience an incident and maintains steps in its action plan to mitigate such an incident's impacts.

Tsunami Probability for Each Jurisdiction	
Jurisdiction	Probability
Charleston County Parks & Recreation Commission	0-25%

Rip Current

Coastal facilities specifically in Folly Beach and Isle of Palms report incidents of injuries or death resulting from rip currents in their respective hazard history sections. The county reports two new occurrences in the past year in the Isle of Palms and Kiawah jurisdictions.

Rip Current Probability for Each Jurisdiction	
Jurisdiction	Probability
Charleston County Parks & Recreation Commission	51-75%

Severe Storm

Charleston County as a whole is susceptible to severe storms on a largely equal basis between jurisdictions since thunderstorms are unpredictable in terms of their size, path, and characteristics. All CCPR facilities, therefore, are equally probable of encountering severe storm hazards. Please refer to severe storm hazard histories separated by high winds, hail, and lightning in Unincorporated Charleston County's hazard history section.

Severe Storm Probability for Each Jurisdiction	
Jurisdiction	Probability
Charleston County Parks & Recreation Commission	76-100%

Drought

All of Charleston County experiences drought impacts uniformly since the U.S. Drought Monitor reports data for the County as a whole rather than by jurisdiction. Charleston County experienced 2 additional weeks without drought in 2018-2019 as compared to 2017-2018 and none of these weeks experienced a classification above “moderate drought.”

Drought Probability for Each Jurisdiction	
Jurisdiction	Probability
Charleston County Parks & Recreation Commission	26-50%

Winter Weather

The 2018-2019 year did not yield significant winter weather occurrences warranting a hazardous classification. Please refer to the winter weather hazard history under Unincorporated Charleston County for a record of previous hazard events as reported by NOAA.

Winter Weather Probability for Each Jurisdiction	
Jurisdiction	Probability
Charleston County Parks & Recreation Commission	26-50%

5.18(b) - Charleston County Parks and Recreation Problem Assessment

Charleston County Parks and Recreation has facilities within the following jurisdictions: Unincorporated Charleston County, Town of Awendaw, City of Charleston, City of Folly Beach, City of Isle of Palms, Town of Kiawah Island, Town of Meggett, Town of Mt Pleasant, City of North Charleston, Town of Ravenel. Problem assessments for these jurisdictions should, therefore, be referenced when assessing CCPR’s situation.

5.18.1 - Hazard Vulnerability

The analysis for this section is identical to the analysis under “Hazard Vulnerability” for Unincorporated Charleston County.

5.18.2 - Vulnerable Buildings

The analysis for this section is identical to the analysis under “Vulnerable Buildings” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-18-9

Building Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
Jurisdiction	Dam Failure	Drought	Earthquakes	Flooding	Hazardous Material Incidents	Hurricanes	Sea Level Rise	Tornadoes	Terrorist Incidents	Tsunamis	Wildfires	Winter Weather
Charleston County Parks and Recreation Commission	5	n/a	1	2	1	1	2	4	3	3	5	n/a

Survey data is from the FEMA Approved 2018 HMP to account for the lack of participation in the 2019 update survey.

5.18.3 - Infrastructure Vulnerability

The analysis for this section is identical to the analysis under “Infrastructure Vulnerability” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-18-11

Infrastructure Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
Charleston County Parks and Recreation Commission	5	n/a	2	1	5	1	2	5	2	4	3	n/a

Survey data is from the FEMA Approved 2018 HMP to account for the lack of participation in the 2019 update survey.

Problem Statements and Vulnerability Based on Jurisdiction	
Jurisdiction	Vulnerability Assessment
Charleston County Parks and Recreation	The parks system is spread throughout the County jurisdictions. Most of the parks are limited infrastructure. Parks located on Isle of Palms, Folly Beach and Kiawah Island are also vulnerable to sea level rise, flooding and hurricane. Rural parks near McClellanville and Awendaw are vulnerable to dam failure and wildfire. Other parks on James Island, West of the Ashley River, and into North Charleston are vulnerable to flooding.

5.18.4 - Known Flood Damages

The analysis for this section is identical to the analysis under “Known Flood Damages” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

5.18.5 - Past Flood Impacts

The analysis for this section is identical to the analysis under “Past Flood Impacts” for Unincorporated Charleston County.

5.18.6 - Emergency Warning Needs

The analysis for this section is identical to the analysis under “Emergency Warning Needs” for Unincorporated Charleston County.

5.18.7 - Critical Facilities

The analysis for this section is identical to the analysis under “Critical Facilities” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-18-13

Critical Facility Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
Charleston County Parks and Recreation Commission	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

A full list of the capabilities for Charleston County and plan participating partners can be seen in the “Critical Facilities” description in Section 5.1(b).

5.18.8 - Natural and Beneficial Functions of Floodplains

The analysis for this section is identical to the analysis under “Natural and Beneficial Functions of Floodplains” for Unincorporated Charleston County.

5.18.9 – Development and Population Trends

The analysis for this section is identical to the analysis under “Development and Population Trends” for Unincorporated Charleston County.

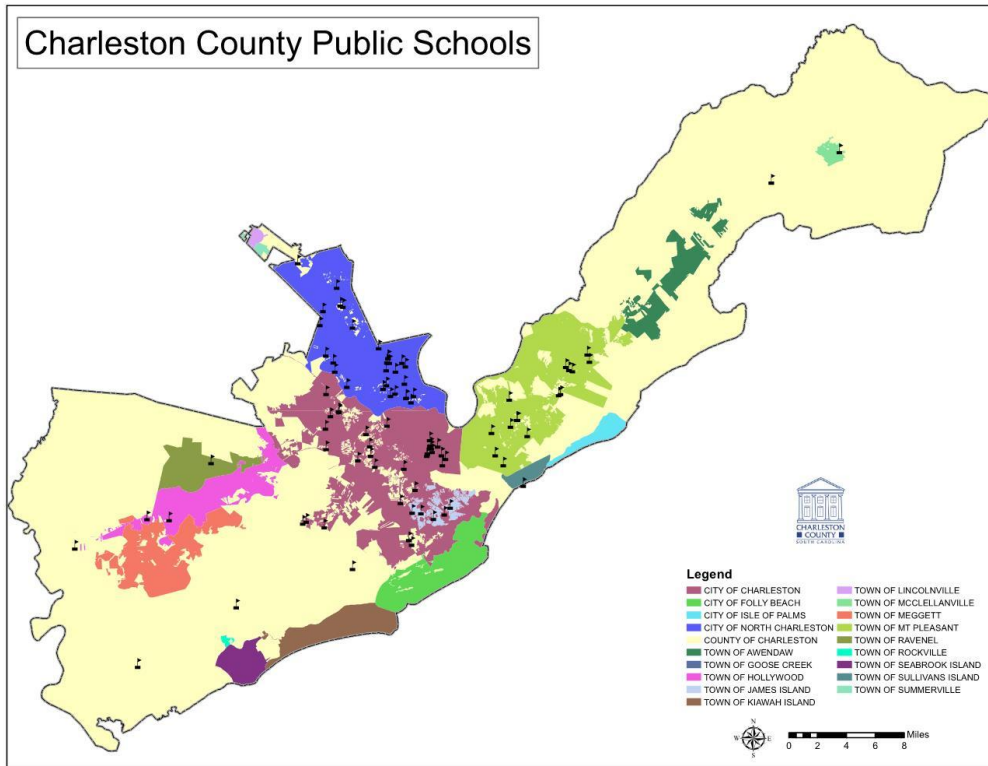
5.18.10 – Economic Impact

The analysis for this section is identical to the analysis under “Economic Impact” for Unincorporated Charleston County.

5.18.11 – Resiliency to Hazards

The analysis for this section is identical to the analysis under “Resiliency to Hazards” for Unincorporated Charleston County.

5.19(a) - Charleston County School District



Charleston County Public Schools are located in many of the County’s jurisdictions as well as unincorporated territory. This makes the District vulnerable to multiple hazards since it has properties in coastal, inland, low-lying, and elevated areas. While it is possible for any hazard in this plan to affect CCSD, it identifies the following hazards as ones it is most vulnerable to: flood, wildfire, tsunami, severe storm, drought, and winter weather.

For histories of hazard occurrences, as well as descriptions of additional hazards that individual jurisdictions containing CCSD facilities are vulnerable to, please refer to the hazard history for the jurisdiction in question.

Flood

CCSD facilities in often-flooded jurisdictions like the City of Charleston, City of North Charleston, Town of Sullivan’s Island, and the Town of Mt. Pleasant are most vulnerable to flooding incidents. Especially in the past year, the City of Charleston saw the most flooding events compared to nearby jurisdictions. Please refer to the hazard history sections in these jurisdictions for complete records of flooding from NOAA.

Flooding Probability for each Jurisdiction	
Jurisdiction	Probability
Charleston County School District	76-100%

Wildfire

Inland facilities susceptible to wildfire are seeing a decline in incidents from previous years as well as other fire incidents reported by Charleston County Consolidated 9-1-1. While the

County reports decreases from the previous year’s incidents of outside fires, trail/rail fires, and marine fires, there was a slight increase in vehicle fire occurrences throughout the county from 2017-2018 to 2018-2019.

Wildfire Probability for Each Jurisdiction	
Jurisdiction	Probability
Charleston County School District	26-50%

Tsunami

Charleston County maintains its current status of experiencing zero tsunami incidents. CCSD, however, is still likely to experience an incident and maintains steps in its action plan to mitigate such an incident’s impacts.

Tsunami Probability for Each Jurisdiction	
Jurisdiction	Probability
Charleston County School District	0-25%

Severe Storm

Charleston County as a whole is susceptible to severe storms on a largely equal basis between jurisdictions since thunderstorms are unpredictable in terms of their size, path, and characteristics. All CCSD facilities, therefore, are equally probable of encountering severe storm hazards. Please refer to severe storm hazard histories separated by high winds, hail, and lightning in Unincorporated Charleston County’s hazard history section.

Severe Storm Probability for Each Jurisdiction	
Jurisdiction	Probability
Charleston County School District	76-100%

Drought

All of Charleston County experiences drought impacts uniformly since the U.S. Drought Monitor reports data for the County as a whole rather than by jurisdiction. Charleston County experienced 2 additional weeks without drought in 2018-2019 as compared to 2017-2018 and none of these weeks experienced a classification above “moderate drought.”

Drought Probability for Each Jurisdiction	
Jurisdiction	Probability
Charleston County School District	26-50%

Winter Weather

The 2018-2019 year did not yield significant winter weather occurrences warranting a hazardous classification. Please refer to the winter weather hazard history under Unincorporated Charleston County for a record of previous hazard events as reported by NOAA.

Winter Weather Probability for Each Jurisdiction	
Jurisdiction	Probability

5.19(b) -Charleston County School District Problem Assessment

Charleston County School District has facilities across the Charleston County area. The following list identifies jurisdictions containing CCSD structures. For a problem assessment concerning specific CCSD facilities, please refer to the assessment for that facility’s corresponding jurisdiction.

Charleston County Public School Jurisdiction			
School	Jurisdiction		
		Laing Swing Space	TOWN OF MT PLEASANT
Academic Magnet High School	CITY OF NORTH CHARLESTON	Lambs ES	CITY OF NORTH CHARLESTON
Angel Oak ES	CITY OF CHARLESTON	Laurel Hill ES	TOWN OF MT PLEASANT
Apple Charter School	TOWN OF JAMES ISLAND	Liberty Hill Academy	CITY OF NORTH CHARLESTON
Ashley River ES	CITY OF CHARLESTON	Lincoln MS & HS	COUNTY OF CHARLESTON
Baptist Hill MS & HS	TOWN OF HOLLYWOOD	Mary Ford ES	CITY OF NORTH CHARLESTON
Belle Hall ES	TOWN OF MT PLEASANT	Meeting Street ES at Brentwood	CITY OF NORTH CHARLESTON
Blaney ES	TOWN OF HOLLYWOOD	Memminger ES	CITY OF CHARLESTON
Buist Academy	CITY OF CHARLESTON	Midland Park Primary	CITY OF NORTH CHARLESTON
Burke HS	CITY OF CHARLESTON	Military Magnet Acad.	CITY OF NORTH CHARLESTON
Burns ES	CITY OF NORTH CHARLESTON	Minnie Hughes ES	COUNTY OF CHARLESTON
Camp Road MS	CITY OF CHARLESTON	Mitchell ES	CITY OF CHARLESTON
Cario MS	TOWN OF MT PLEASANT	Montessori Comm.	CITY OF CHARLESTON
Carolina Park ES	TOWN OF MT PLEASANT	Morningside MS	CITY OF NORTH CHARLESTON
Carolina Voyager Charter School	CITY OF CHARLESTON	Moultrie MS	TOWN OF MT PLEASANT
Charleston Co. School of Arts	CITY OF NORTH CHARLESTON	Mt. Pleasant Acad. ES	TOWN OF MT PLEASANT
Charleston Development Academy	CITY OF CHARLESTON	Mt. Zion ES	COUNTY OF CHARLESTON
Charleston Progressive Academy	CITY OF NORTH CHARLESTON	Murray-LaSaine ES	CITY OF CHARLESTON
Charleston Progressive Academy	CITY OF CHARLESTON	N. Charleston Creative Arts Elementary	CITY OF NORTH CHARLESTON
Chicora ES	CITY OF NORTH CHARLESTON	North Charleston ES	CITY OF NORTH CHARLESTON
Child and Family Dev Center	CITY OF NORTH CHARLESTON	North Charleston HS	CITY OF NORTH CHARLESTON
Corcoran ES	CITY OF NORTH CHARLESTON	Northwoods MS	CITY OF NORTH CHARLESTON
Daniel Jenkins Academy	CITY OF NORTH CHARLESTON	Oakland ES	CITY OF CHARLESTON
Drayton Hall ES	CITY OF CHARLESTON	Orange Grove ES	CITY OF CHARLESTON
Dunston ES	CITY OF NORTH CHARLESTON	Pattison’s Academy	CITY OF CHARLESTON
East Cooper Montessori	TOWN OF MT PLEASANT	Pepperhill ES	CITY OF NORTH CHARLESTON
Ellington ES	TOWN OF RAVENEL	Pinckney ES	TOWN OF MT PLEASANT
Fort Johnson MS	TOWN OF JAMES ISLAND	Pinehurst ES	CITY OF NORTH CHARLESTON
Frierson ES	COUNTY OF CHARLESTON	Saint Andrews MS	CITY OF CHARLESTON
Garrett Academy	CITY OF NORTH CHARLESTON	Saint John’s HS	CITY OF CHARLESTON
Goodwin ES	CITY OF NORTH CHARLESTON	Sanders-Clyde ES	CITY OF CHARLESTON
Greg Mathis HS	CITY OF NORTH CHARLESTON	School for Math and Science	CITY OF CHARLESTON
Harbor View ES	CITY OF CHARLESTON	Septima P. Clark Academy	COUNTY OF CHARLESTON
Haut Gap MS	CITY OF CHARLESTON	Simmons Pinckney MS	CITY OF CHARLESTON
Hunley Park ES	CITY OF NORTH CHARLESTON	Springfield ES	CITY OF CHARLESTON
Hursey ES	CITY OF NORTH CHARLESTON	St. Andrews ES	CITY OF CHARLESTON
James B. Edwards ES	TOWN OF MT PLEASANT	St. James-Santee ES	COUNTY OF CHARLESTON
James Island Charter HS	CITY OF CHARLESTON	Stall HS	CITY OF NORTH CHARLESTON
James Island ES	COUNTY OF CHARLESTON	Stiles Point ES	CITY OF CHARLESTON
James Simons ES	CITY OF CHARLESTON	Stono Park ES	CITY OF CHARLESTON
Jane Edwards ES	COUNTY OF CHARLESTON	Sullivan’s Island ES	TOWN OF SULLIVANS ISLAND
Jennie Moore ES	TOWN OF MT PLEASANT	Wando HS	TOWN OF MT PLEASANT
Jennie Moore ES	TOWN OF MT PLEASANT	West Ashley HS	CITY OF CHARLESTON
Ladson ES	COUNTY OF CHARLESTON	West Ashley MS	CITY OF CHARLESTON
Laing Swing Space	TOWN OF MT PLEASANT	Whitesides ES	TOWN OF MT PLEASANT
Lambs ES	CITY OF NORTH CHARLESTON	Williams MS	CITY OF CHARLESTON
		Zucker MS	CITY OF NORTH CHARLESTON

5.19.1 - Hazard Vulnerability

The analysis for this section is identical to the analysis under “Hazard Vulnerability” for Unincorporated Charleston County.

5.19.2 - Vulnerable Buildings

The analysis for this section is identical to the analysis under “Vulnerable Buildings” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-19-9

Building Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
Jurisdiction	Dam Failure	Drought	Earthquakes	Flooding	Hazardous Material Incidents	Hurricanes	Sea Level Rise	Tornadoes	Terrorist Incidents	Tsunamis	Wildfires	Winter Weather
Charleston County School District	4	5	2	2	3	2	4	2	3	4	4	4

5.19.3 - Infrastructure Vulnerability

The analysis for this section is identical to the analysis under “Infrastructure Vulnerability” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-19-11

Infrastructure Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
Charleston County School District	3	5	2	2	2	2	4	2	3	4	4	2

Problem Statements and Vulnerability Based on Jurisdiction	
Jurisdiction	Vulnerability Assessment
Charleston County School District	<p>The Charleston County School District (CCSD) is located in the Lowcountry area of South Carolina, which is threatened by multiple natural and technological hazards. The threat posed by these hazards is both immediate [e.g., hazardous chemical spill, act of terrorism, hurricane, tornado] and long-term/inherent to the challenges of school district [e.g. accidents, criminal activity]. These hazards have the potential to disrupt day-to-day activities, cause extensive property damage, and create mass casualties. They can range in time from a few minutes to many days or weeks and occur with little to no warning. Historically, the greatest risk to life safety and property was perceived to be from natural hazards [e.g., hurricane, tornadoes, earthquakes, floods, etc.]. However, the continued expansion of chemical usage, terrorist attacks on the World Trade Center, The Pentagon and in San Bernadino, California and active shooter situations like at the Emanuel AME Church here in Charleston and at Parkland High School in Florida show the need for CCSD to prepare for threats like these as well. The CCSD Safety/Emergency Operations Plan addresses threats and hazards that most endanger our students, teachers and staff.</p>

5.19.4 - Known Flood Damages

The analysis for this section is identical to the analysis under “Known Flood Damages” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

5.19.5 – Past Flood Impacts

The analysis for this section is identical to the analysis under “Past Flood Impacts” for Unincorporated Charleston County.

5.19.6 – Emergency Warning Needs

The analysis for this section is identical to the analysis under “Emergency Warning Needs” for Unincorporated Charleston County.

5.19.7 – Critical Facilities

The analysis for this section is identical to the analysis under “Critical Facilities” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-19-13

Critical Facility Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
Charleston County School District	4	5	3	2	2	2	4	2	2	4	4	4

A full list of the capabilities for Charleston County and plan participating partners can be seen in the “Critical Facilities” description in Section 5.1(b).

5.19.8 – Natural and Beneficial Functions of Floodplains

The analysis for this section is identical to the analysis under “Natural and Beneficial Functions of Floodplains” for Unincorporated Charleston County.

5.19.9 – Development and Population Trends

The analysis for this section is identical to the analysis under “Development and Population Trends” for Unincorporated Charleston County.

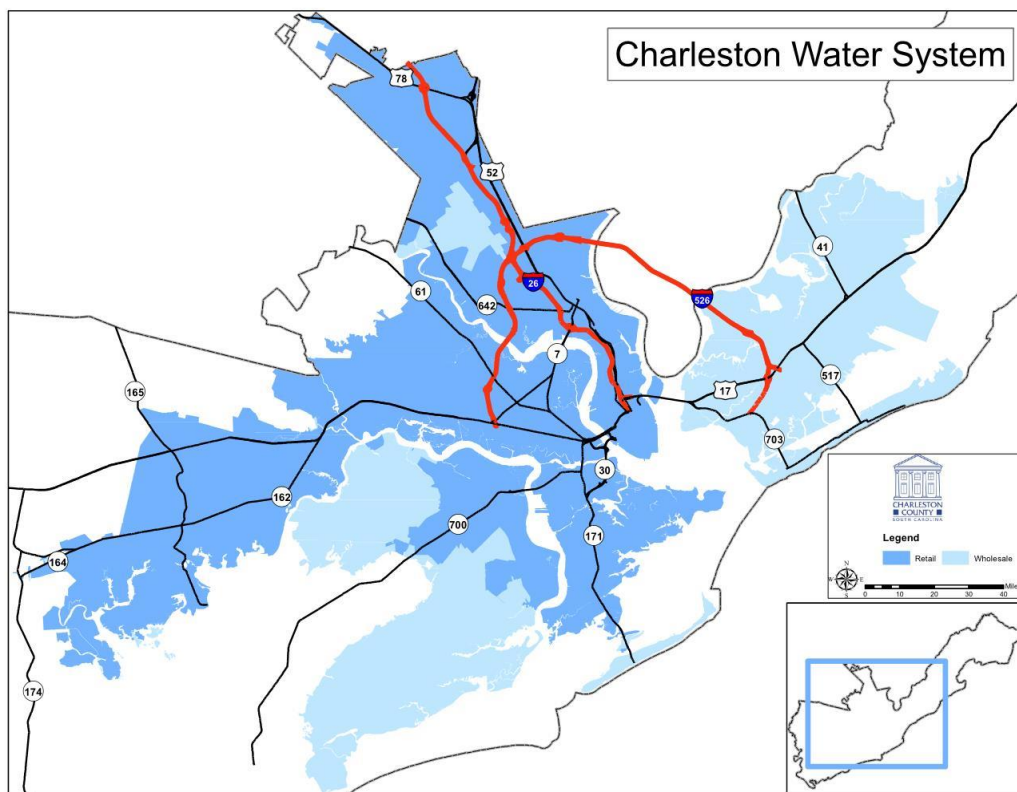
5.19.10 – Economic Impact

The analysis for this section is identical to the analysis under “Economic Impact” for Unincorporated Charleston County.

5.19.11 – Resiliency to Hazards

The analysis for this section is identical to the analysis under “Resiliency to Hazards” for Unincorporated Charleston County.

5.20(a) - Charleston Water System



Charleston Water System spans over nearly the entire county with the exception of jurisdictions north of Mt. Pleasant and southwest of Hollywood and Ravenel. This makes the system vulnerable to all hazards addressed in this report. In particular, Charleston Water System identifies particular vulnerability to flooding, severe storms, drought, and winter weather. Complete hazard histories for these events are listed under Unincorporated Charleston County.

Flood

CCSD facilities in often-flooded jurisdictions like the City of Charleston, City of North Charleston, Town of Sullivan’s Island, and the Town of Mt. Pleasant are most vulnerable to flooding incidents. Especially in the past year, the City of Charleston saw the most flooding events compared to nearby jurisdictions. Please refer to the hazard history sections in these jurisdictions for complete records of flooding from NOAA.

Flooding Probability for each Jurisdiction	
Jurisdiction	Probability
Charleston County School District	76-100%

Severe Storm

Charleston County as a whole is susceptible to severe storms on a largely equal basis between jurisdictions since thunderstorms are unpredictable in terms of their size, path, and characteristics. All Charleston Water facilities, therefore, are equally probable of encountering severe storm hazards. Please refer to severe storm hazard histories separated by high winds, hail, and lightning in Unincorporated Charleston County’s hazard history section.

Severe Storm Probability for Each Jurisdiction

Jurisdiction	Probability
Charleston Water System	76-100%

Drought

All of Charleston County experiences drought impacts uniformly since the U.S. Drought Monitor reports data for the County as a whole rather than by jurisdiction. Charleston County experienced 2 additional weeks without drought in 2018-2019 as compared to 2017-2018 and none of these weeks experienced a classification above “moderate drought.”

Charleston Water System has two raw water sources, Bushy Park Reservoir and Edisto River that serve the water plant. The reservoir source is fed continuously by the USACOE mandated discharge into the Cooper River from Lake Moultrie.

Drought Probability for Each Jurisdiction	
Jurisdiction	Probability
Charleston Water System	26-50%

Winter Weather

The 2018-2019 year did not yield significant winter weather occurrences warranting a hazardous classification. Please refer to the winter weather hazard history under Unincorporated Charleston County for a record of previous hazard events as reported by NOAA.

Winter Weather Probability for each Jurisdiction	
Jurisdiction	Probability
Charleston County School District	51-75%

5.20(b) - Charleston Water System Problem Assessment

5.20.1 - Hazard Vulnerability

The analysis for this section is identical to the analysis under “Hazard Vulnerability” for Unincorporated Charleston County.

5.20.2 - Vulnerable Buildings

The analysis for this section is identical to the analysis under “Vulnerable Buildings” for Unincorporated Charleston County.

5.20.3 - Infrastructure Vulnerability

The analysis for this section is identical to the analysis under “Infrastructure Vulnerability” for Unincorporated Charleston County.

Problem Statements and Vulnerability Based on Jurisdiction	
Jurisdiction	Vulnerability Assessment
Charleston Water System	This commission supplies water service to a majority of Charleston County, and sewer service to a lesser extent as there are six other sewer service providers in the county. CWS infrastructure would be at risk of dam failure and flooding as there are low lying areas.

5.20.4 – Known Flood Damages

The analysis for this section is identical to the analysis under “Known Flood Damages” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

5.20.5 – Past Flood Impacts

The analysis for this section is identical to the analysis under “Past Flood Impacts” for Unincorporated Charleston County.

5.20.6 – Emergency Warning Needs

The analysis for this section is identical to the analysis under “Emergency Warning Needs” for Unincorporated Charleston County.

5.20.7 – Critical Facilities

The analysis for this section is identical to the analysis under “Critical Facilities” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-20-13

Critical Facility Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
Charleston Water System	5	5	1	1	3	1	1	3	2	1	3	4

A full list of the capabilities for Charleston County and plan participating partners can be seen in the “Critical Facilities” description in Section 5.1(b).

5.20.8 – Natural and Beneficial Functions of Floodplains

The analysis for this section is identical to the analysis under “Natural and Beneficial Functions of Floodplains” for Unincorporated Charleston County.

5.20.9 – Development and Population Trends

The analysis for this section is identical to the analysis under “Development and Population Trends” for Unincorporated Charleston County.

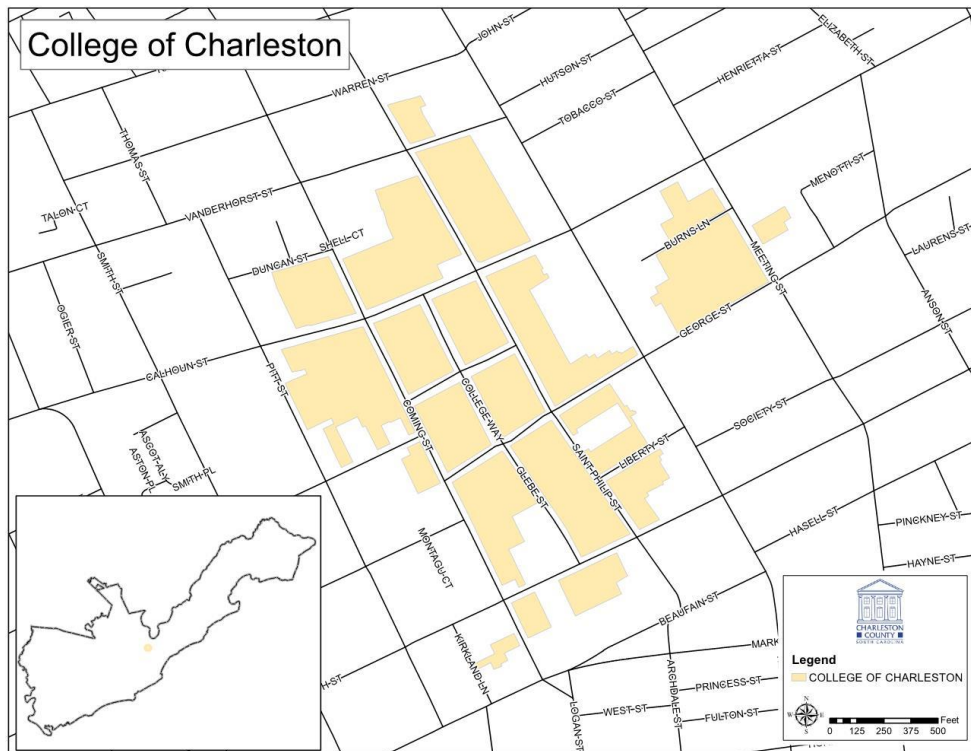
5.20.10 – Economic Impact

The analysis for this section is identical to the analysis under “Economic Impact” for Unincorporated Charleston County.

5.20.11 – Resiliency to Hazards

The analysis for this section is identical to the analysis under “Resiliency to Hazards” for Unincorporated Charleston County.

5.21(a) - College of Charleston



The College of Charleston’s main campus is located in the City of Charleston. While being susceptible to all hazards affecting the County, the College is especially vulnerable to hazards impacting downtown Charleston. These hazards include flooding, severe storms, drought, and winter weather. Within the past year, the College experienced minimal impacts resulting from hazard events, but this does not affect future hazard probabilities on a year-to-year basis. Please refer to the City of Charleston’s hazard history for complete records of hazard events to which the City is most vulnerable. While these hazards are identified by the College as most significant for this jurisdiction, the College is vulnerable to all hazards in this plan.

Flood

In the past year, the City of Charleston saw the most flooding events compared to nearby jurisdictions. Please refer to the hazard history sections in this jurisdiction for complete records of flooding from NOAA.

Flooding Probability for each Jurisdiction	
Jurisdiction	Probability
College of Charleston	76-100%

Severe Storm

Charleston County as a whole is susceptible to severe storms on a largely equal basis between jurisdictions since thunderstorms are unpredictable in terms of their size, path, and characteristics. All College of Charleston facilities, therefore, are equally probable of encountering severe storm hazards. Please refer to severe storm hazard histories separated by high winds, hail, and lightning in Unincorporated Charleston County’s hazard history section.

Severe Storm Probability for Each Jurisdiction

Jurisdiction	Probability
College of Charleston	76-100%

Drought

All of Charleston County experiences drought impacts uniformly since the U.S. Drought Monitor reports data for the County as a whole rather than by jurisdiction. Charleston County experienced 2 additional weeks without drought in 2018-2019 as compared to 2017-2018 and none of these weeks experienced a classification above “moderate drought.”

Drought Probability for Each Jurisdiction	
Jurisdiction	Probability
College of Charleston	26-50%

Winter Weather

The 2018-2019 year did not yield significant winter weather occurrences warranting a hazardous classification. Please refer to the winter weather hazard history under Unincorporated Charleston County for a record of previous hazard events as reported by NOAA.

Winter Weather Probability for Each Jurisdiction	
Jurisdiction	Probability
College of Charleston	51-75%

5.21(b) - College of Charleston Problem Assessment

5.21.1 - Hazard Vulnerability

The analysis for this section is identical to the analysis under “Hazard Vulnerability” for Unincorporated Charleston County.

5.21.2 - Vulnerable Buildings

The analysis for this section is identical to the analysis under “Vulnerable Buildings” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-21-9

Building Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
Jurisdiction	Dam Failure	Drought	Earthquakes	Flooding	Hazardous Material Incidents	Hurricanes	Sea Level Rise	Tornadoes	Terrorist Incidents	Tsunamis	Wildfires	Winter Weather
College of Charleston	3	n/a	2	3	3	2	5	4	3	4	3	n/a

Survey data is from the FEMA Approved 2018 HMP to account for the lack of participation in the 2019 update survey.

5.21.3 – Infrastructure Vulnerability

The analysis for this section is identical to the analysis under “Infrastructure Vulnerability” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-21-11

Infrastructure Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
College of Charleston	3	n/a	1	1	1	1	3	3	1	3	5	n/a

Survey data is from the FEMA Approved 2017 HMP to account for the lack of participation in the 2019 update survey.

Problem Statements and Vulnerability Based on Jurisdiction	
Jurisdiction	Vulnerability Assessment
College of Charleston	College of Charleston is situated on peninsular Charleston and sits in some low lying areas and even uses some historic buildings. Campus is susceptible to flooding and can sometimes render classrooms and facilities unusable if a hurricane occurs and water intrudes the building. College of Charleston is also vulnerable to an earthquake if infrastructure damage were to occur from a severe enough event. Also, since the College houses many out of state students, this poses a challenge with evacuation for events. The disruption of class and job functions is also a problem for the College.

5.21.4 – Known Flood Damages

The analysis for this section is identical to the analysis under “Known Flood Damages” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

5.21.5 – Past Flood Impacts

The analysis for this section is identical to the analysis under “Past Flood Impacts” for Unincorporated Charleston County.

5.21.6 – Emergency Warning Needs

The analysis for this section is identical to the analysis under “Emergency Warning Needs” for Unincorporated Charleston County.

5.21.7 – Critical Facilities

The analysis for this section is identical to the analysis under “Critical Facilities” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-21-13

Critical Facility Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
College of Charleston	3	n/a	3	2	4	3	4	3	3	5	3	n/a

Survey data is from the FEMA Approved 2018 HMP to account for the lack of participation in the 2019 update survey.

A full list of the capabilities for Charleston County and plan participating partners can be seen in the “Critical Facilities” description in Section 5.1(b).

5.21.8 – Natural and Beneficial Functions of Floodplains

The analysis for this section is identical to the analysis under “Natural and Beneficial Functions of Floodplains” for Unincorporated Charleston County.

5.21.9 – Development and Population Trends

The analysis for this section is identical to the analysis under “Development and Population Trends” for Unincorporated Charleston County.

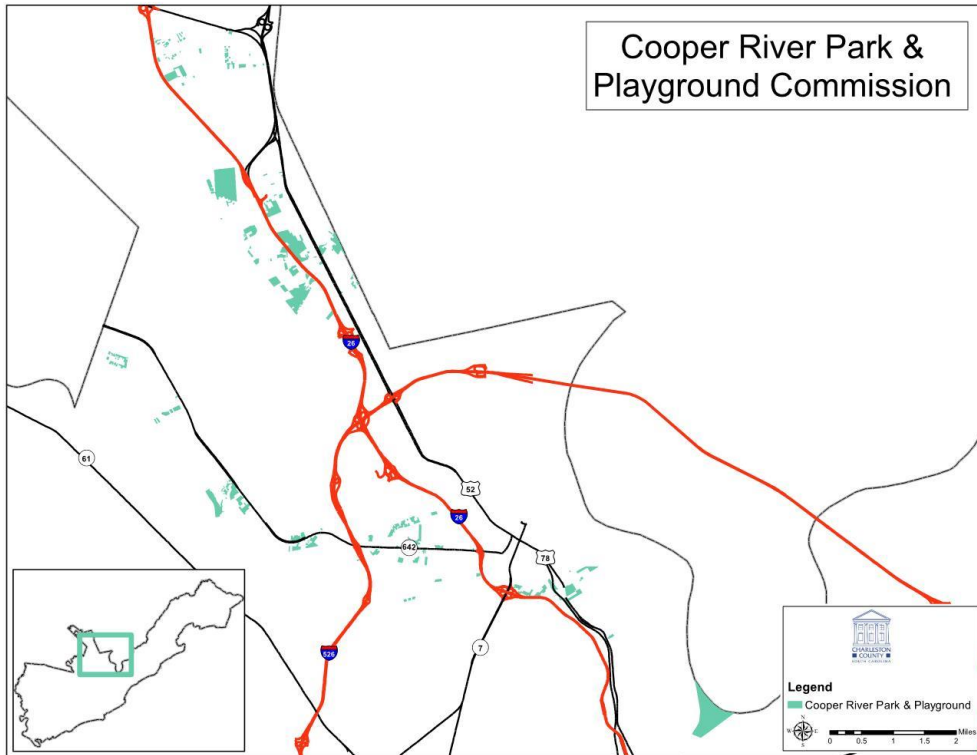
5.21.10 – Economic Impact

The analysis for this section is identical to the analysis under “Economic Impact” for Unincorporated Charleston County.

5.21.11 – Resiliency to Hazards

The analysis for this section is identical to the analysis under “Resiliency to Hazards” for Unincorporated Charleston County.

5.22(a) - Cooper River Parks & Playground Commission



Cooper River Parks & Playground Commission’s (CRPPC) facilities primarily lie in North Charleston, meaning it is most vulnerable to hazards common in higher-ground areas. Since it shares most of its territory with North Charleston, descriptions and histories of hazards impacting this jurisdiction can be found under Section 5.13. CRPPC, though, is susceptible to all hazards in this plan since each hazard has a possibility of impacting any part of Charleston County.

Flood

While significant flooding events have not occurred as frequently as a decade ago in North Charleston, the City remains prepared for flash flooding events. Areas along the Cooper and Ashley riverbanks are most vulnerable to this hazard.

Flooding Probability for each Jurisdiction	
Jurisdiction	Probability
Cooper River Parks & Playground Commission	51-75%

Earthquake

USGS reports no notable earthquakes from May 1st, 2018 to April 30th, 2019. In general, the County experiences earthquakes originating northwest of Lincolville and North Charleston, meaning Cooper River Park and Playground Commission has a higher probability of encountering this hazard than many other jurisdictions.

Earthquake Probability for each Jurisdiction	
Jurisdiction	Probability
Cooper River Parks & Playground Commission	76-100%

Hazardous Materials

North Charleston’s industrial development, commercial expansion, and tourism increase the area’s risk of hazardous materials. In the past year, hazardous material incidents slightly declined from the preceding year. Charleston County Consolidated 9-1-1 reports 15 hazmat incidents, 67 fuel spills, and 363 gas leak/odor incidents for the County from May 1st, 2018 to April 30th, 2019.

Hazardous Material Incident Probability for Each Jurisdiction	
Jurisdiction	Probability
Cooper River Parks & Playground Commission	76-100%

Severe Storm

CRPPC’s surrounding area sustained no notable damages from severe storm events in the past year. The NOAA Storm Events Database actually records no significant storm events in the area since 2006. Regardless, the unpredictable nature of storms in Charleston County keeps the probability for this hazard event high.

Severe Storm Probability for Each Jurisdiction	
Jurisdiction	Probability
Cooper River Parks and Playground Commission	76-100%

Drought

All of Charleston County experiences drought impacts uniformly since the U.S. Drought Monitor reports data for the County as a whole rather than by jurisdiction. Charleston County experienced 2 additional weeks without drought in 2018-2019 as compared to 2017-2018 and none of these weeks experienced a classification above “moderate drought.”

Drought Probability for Each Jurisdiction	
Jurisdiction	Probability
Cooper River Parks and Playground Commission	26-50%

Winter Weather

The 2018-2019 year did not yield significant winter weather occurrences warranting a hazardous classification. Please refer to the winter weather hazard history under Unincorporated Charleston County for a record of previous hazard events as reported by NOAA.

Winter Weather Probability for Each Jurisdiction	
Jurisdiction	Probability
Cooper River Parks and Playground Commission	51-75%

5.22(b) – Cooper River Parks and Playground Commission Problem Assessment

5.22.1 - Hazard Vulnerability

The analysis for this section is identical to the analysis under “Hazard Vulnerability” for Unincorporated Charleston County.

5.22.2 - Vulnerable Buildings

The analysis for this section is identical to the analysis under “Vulnerable Buildings” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-22-9

Building Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
Jurisdiction	Dam Failure	Drought	Earthquakes	Flooding	Hazardous Material Incidents	Hurricanes	Sea Level Rise	Tornadoes	Terrorist Incidents	Tsunamis	Wildfires	Winter Weather
Cooper River Parks and Playground	4	4	3	1	2	2	3	2	3	5	4	3

5.22.3 - Infrastructure Vulnerability

The analysis for this section is identical to the analysis under “Infrastructure Vulnerability” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-22-11

Infrastructure Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
Cooper River Parks and Playground	2	5	1	3	3	2	4	3	2	4	3	2

Problem Statements and Vulnerability Based on Jurisdiction	
Jurisdiction	Vulnerability Assessment
Cooper River Park and Playground Commission	This is entirely located in City of North Charleston. They are vulnerable for flooding and hazard materials with their proximity to the industrial centers of the County as well as earthquakes as it is close to the fault line.

5.22.4 – Known Flood Damages

The analysis for this section is identical to the analysis under “Known Flood Damages” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

5.22.5 – Past Flood Impacts

The analysis for this section is identical to the analysis under “Past Flood Impacts” for Unincorporated Charleston County.

5.22.6 – Emergency Warning Needs

The analysis for this section is identical to the analysis under “Emergency Warning Needs” for Unincorporated Charleston County.

5.22.7 – Critical Facilities

The analysis for this section is identical to the analysis under “Critical Facilities” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-22-13

Critical Facility Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
Cooper River Parks and Playground	2	5	2	3	3	3	4	2	3	3	4	3

A full list of the capabilities for Charleston County and plan participating partners can be seen in the “Critical Facilities” description in Section 5.1(b).

5.22.8 – Natural and Beneficial Functions of Floodplains

The analysis for this section is identical to the analysis under “Natural and Beneficial Functions of Floodplains” for Unincorporated Charleston County.

5.22.9 – Development and Population Trends

The analysis for this section is identical to the analysis under “Development and Population Trends” for Unincorporated Charleston County.

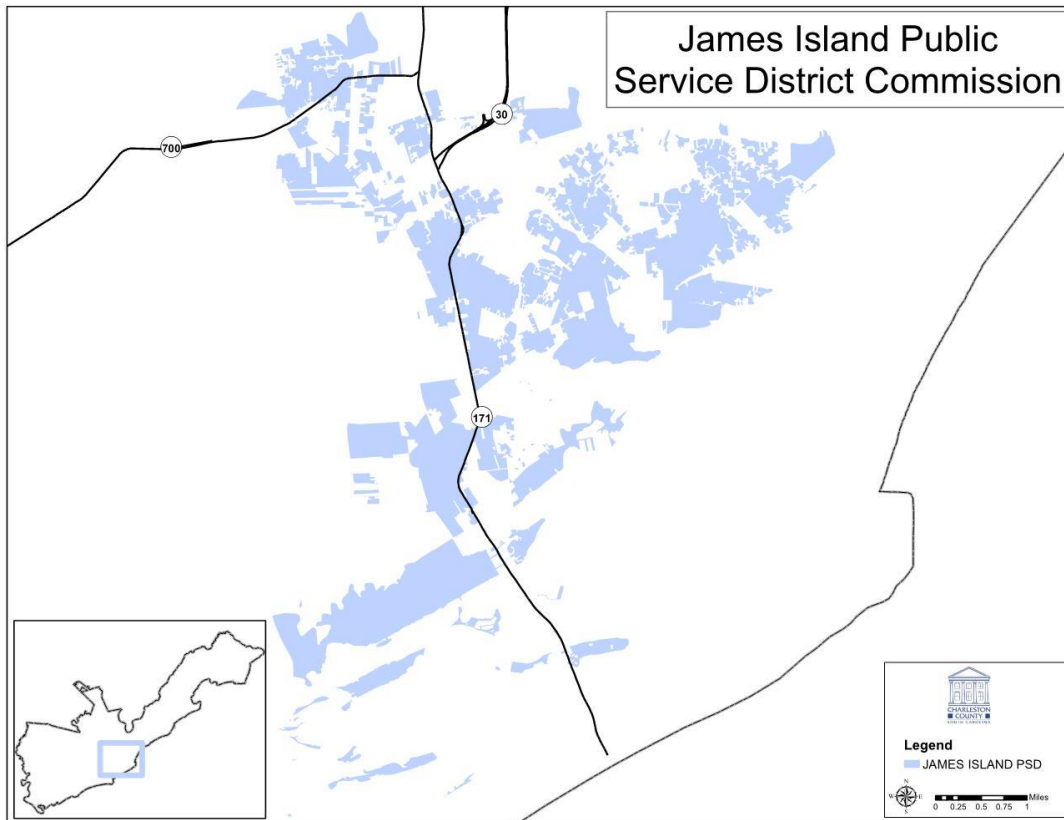
5.22.10 – Economic Impact

The analysis for this section is identical to the analysis under “Economic Impact” for Unincorporated Charleston County.

5.22.11 – Resiliency to Hazards

The analysis for this section is identical to the analysis under “Resiliency to Hazards” for Unincorporated Charleston County.

5.23 – James Island Public Service District Commission



James Island Public Service District Commission (PSD) services residents of unincorporated James Island plus those living in the Town of James Island and additional customers in the Cities of Charleston and Folly Beach. While the PSD is vulnerable to all hazards affecting the County, it identifies flooding, sea level rise, severe storms, drought, and winter weather as hazards posing the highest threat to the jurisdiction. Complete hazard histories can be found in sections for Town of James Island, City of Charleston, and City of Folly Beach as well as Unincorporated Charleston County.

Flood

Flooding on James Island in the past five years is limited according to NOAA data with the most recent recorded incident occurring in 2015. Regardless, James Island PSD remains vulnerable to flooding since it contains many waterways that are prone to flooding either from storm surges or runoff from upstream sources.

Flooding Probability for each Jurisdiction	
Jurisdiction	Probability
James Island Public Service District Commission	76-100%

Sea Level Rise

James Island PSD is especially vulnerable to sea level rise compared to the County's other jurisdictions because of its low-lying territory and abundance of waterways. In 2018, it experienced 28 more king tides than expected with an observed height of 1.9 ft higher than the highest predicted tide.

Sea Level Rise/King Tide Probability for each Jurisdiction	
Jurisdiction	Probability
James Island Public Service District Commission	76-100%

Severe Storm

Severe Storm incidents impacting James Island PSD within the past year are minimal. Most notably, lightning incurred damage to one resident’s vehicle in July 2018. Full records of storm events from NOAA are located in the James Island hazard history section.

Severe Storm Probability for Each Jurisdiction	
Jurisdiction	Probability
James Island Public Service District Commission	76-100%

Drought

All of Charleston County experiences drought impacts uniformly since the U.S. Drought Monitor reports data for the County as a whole rather than by jurisdiction. Charleston County experienced 2 additional weeks without drought in 2018-2019 as compared to 2017-2018 and none of these weeks experienced a classification above “moderate drought.”

Drought Probability for Each Jurisdiction	
Jurisdiction	Probability
James Island Public Service District Commission	26-50%

Winter Weather

The 2018-2019 year did not yield significant winter weather occurrences warranting a hazardous classification. Please refer to the winter weather hazard history under Unincorporated Charleston County for a record of previous hazard events as reported by NOAA.

Winter Weather Probability for Each Jurisdiction	
Jurisdiction	Probability
James Island Public Service District Commission	51-75%

5.23(b) – James Island Public Service Commission Problem Assessment

5.23.1 – Hazard Vulnerability

The analysis for this section is identical to the analysis under “Hazard Vulnerability” for Unincorporated Charleston County.

5.23.2 – Vulnerable Buildings

The analysis for this section is identical to the analysis under “Vulnerable Buildings” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-23-9

Building Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
Jurisdiction	Dam Failure	Drought	Earthquakes	Flooding	Hazardous Material Incidents	Hurricanes	Sea Level Rise	Tornadoes	Terrorist Incidents	Tsunamis	Wildfires	Winter Weather
James Island Public Service District	4	2	4	4	2	3	3	4	3	5	3	3

5.23.3 – Infrastructure Vulnerability

The analysis for this section is identical to the analysis under “Infrastructure Vulnerability” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-23-11

Infrastructure Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
James Island Public Service District	3	2	3	3	3	2	3	2	4	4	3	3

Problem Statements and Vulnerability Based on Jurisdiction	
Jurisdiction	Vulnerability Assessment

**Charleston County
Parks and Recreation**

The parks system is spread throughout the County jurisdictions. Most of the parks are limited infrastructure. Parks located on Isle of Palms, Folly Beach and Kiawah Island are also vulnerable to sea level rise, flooding and hurricane. Rural parks near McClellanville and Awendaw are vulnerable to dam failure and wildfire. Other parks on James Island, West of the Ashley River, and into North Charleston are vulnerable to flooding.

5.23.4 - Known Flood Damages

The analysis for this section is identical to the analysis under “Known Flood Damages” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

5.23.5 - Past Flood Impacts

The analysis for this section is identical to the analysis under “Past Flood Impacts” for Unincorporated Charleston County.

5.23.6 - Emergency Warning Needs

The analysis for this section is identical to the analysis under “Emergency Warning Needs” for Unincorporated Charleston County.

5.23.7 - Critical Facilities

The analysis for this section is identical to the analysis under “Critical Facilities” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-23-13

Critical Facility Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
James Island Public Service District	2	2	3	2	2	3	2	2	4	4	3	3

A full list of the capabilities for Charleston County and plan participating partners can be seen in the “Critical Facilities” description in Section 5.1(b).

5.23.8 - Natural and Beneficial Functions of Floodplains

The analysis for this section is identical to the analysis under “Natural and Beneficial Functions of Floodplains” for Unincorporated Charleston County.

5.23.9 - Development and Population Trends

The analysis for this section is identical to the analysis under “Development and Population Trends” for Unincorporated Charleston County.

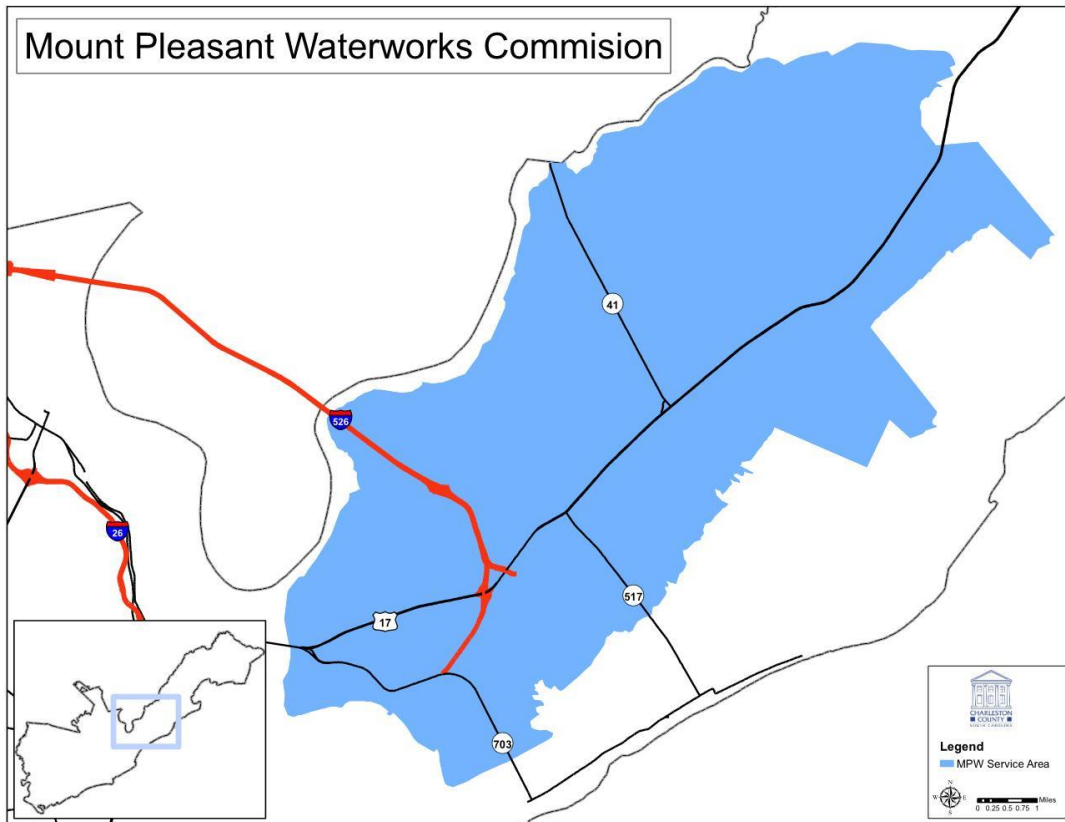
5.23.10 – Economic Impact

The analysis for this section is identical to the analysis under “Economic Impact” for Unincorporated Charleston County.

5.23.11 – Resiliency to Hazards

The analysis for this section is identical to the analysis under “Resiliency to Hazards” for Unincorporated Charleston County.

5.24(a) – Mt. Pleasant Water Works Commission



Mt. Pleasant Water Works Commission services the Town of Mt. Pleasant. Please refer to Mt. Pleasant’s hazard history section for records of previous hazard incidents affecting this jurisdiction. Additionally, the Commission identifies principal vulnerability to floods, severe storms, droughts, and winter weather occurrences. It is also vulnerable to the other hazards affecting the County at large.

Flood

While flood incidences in Mt. Pleasant are comparatively low in contrast to other low-lying jurisdictions, the area is still likely to experience flooding events due to its coastal proximity and the presence of waterways in the area. Since the jurisdiction borders the Charleston harbor, data from the harbor’s tidal gauge listed under Unincorporated Charleston County’s hazard history is also applicable to this jurisdiction.

Flooding Probability for each Jurisdiction	
Jurisdiction	Probability
Mt. Pleasant Water Works Commission	51-75%

Severe Storm

While NOAA does not report any severe storm events in the past year for Mt. Pleasant, this jurisdiction remains at high risk for this hazard since storms are unpredictable and can manifest unexpectedly.

Severe Storm Probability for Each Jurisdiction	
Jurisdiction	Probability

Mt. Pleasant Water Works Commission	76-100%
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Drought

All of Charleston County experiences drought impacts uniformly since the U.S. Drought Monitor reports data for the County as a whole rather than by jurisdiction. Charleston County experienced 2 additional weeks without drought in 2018-2019 as compared to 2017-2018 and none of these weeks experienced a classification above “moderate drought.”

Drought Probability for Each Jurisdiction	
Jurisdiction	Probability
Mt. Pleasant Water Works Commission	26-50%

Winter Weather

The 2018-2019 year did not yield significant winter weather occurrences warranting a hazardous classification. Please refer to the winter weather hazard history under Unincorporated Charleston County for a record of previous hazard events as reported by NOAA.

Winter Weather Probability for Each Jurisdiction	
Jurisdiction	Probability
Mt Pleasant Water Works Commission	51-75%

5.24(b) – Mt Pleasant Water Works Problem Assessment

5.24.1 – Hazard Vulnerability

The analysis for this section is identical to the analysis under “Hazard Vulnerability” for Unincorporated Charleston County.

5.24.2 – Vulnerable Buildings

The analysis for this section is identical to the analysis under “Vulnerable Buildings” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-24-9

Building Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
Jurisdiction	Dam Failure	Drought	Earthquakes	Flooding	Hazardous Material Incidents	Hurricanes	Sea Level Rise	Tornadoes	Terrorist Incidents	Tsunamis	Wildfires	Winter Weather
Mount Pleasant Water & Sewer Commission	4	4	1	3	4	1	3	1	4	2	4	2

5.24.3 – Infrastructure Vulnerability

The analysis for this section is identical to the analysis under “Infrastructure Vulnerability” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-24-11

Infrastructure Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
Mount Pleasant Water & Sewer Commission	4	5	1	1	5	2	3	5	2	1	4	2

Problem Statements and Vulnerability Based on Jurisdiction	
Jurisdiction	Vulnerability Assessment
Mt. Pleasant Water Works	This commission supplies water and sewer to the Mount Pleasant area. Their infrastructure would be at risk of dam failure and flooding as there are low lying areas. Also a hazardous material spill near purification or supplies centers would be catastrophic as well.

5.24.4 – Known Flood Damages

The analysis for this section is identical to the analysis under “Known Flood Damages” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

5.24.5 – Past Flood Impacts

The analysis for this section is identical to the analysis under “Past Flood Impacts” for Unincorporated Charleston County.

5.24.6 – Emergency Warning Needs

The analysis for this section is identical to the analysis under “Emergency Warning Needs” for Unincorporated Charleston County.

5.24.7 – Critical Facilities

The analysis for this section is identical to the analysis under “Critical Facilities” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-24-13

Critical Facility Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
Mount Pleasant Water & Sewer Commission	3	5	1	3	4	1	n/a	2	1	1	4	2

A full list of the capabilities for Charleston County and plan participating partners can be seen in the “Critical Facilities” description in Section 5.1(b).

5.24.8 – Natural and Beneficial Functions of Floodplains

The analysis for this section is identical to the analysis under “Natural and Beneficial Functions of Floodplains” for Unincorporated Charleston County.

5.24.9 – Development and Population Trends

The analysis for this section is identical to the analysis under “Development and Population Trends” for Unincorporated Charleston County.

5.24.10 – Economic Impact

The analysis for this section is identical to the analysis under “Economic Impact” for Unincorporated Charleston County.

5.24.11 – Resiliency to Hazards

The analysis for this section is identical to the analysis under “Resiliency to Hazards” for Unincorporated Charleston County.

5.25(a) –North Charleston District

The North Charleston District is fully serviced by the City of North Charleston and remaining District areas are expected to be annexed by the City of North Charleston. For histories of hazard occurrences in the District, please refer to North Charleston section 5.13

Flood

While significant flooding events have not occurred as frequently as a decade ago in North Charleston, the City remains prepared for flash flooding events. Areas along the Cooper and Ashley riverbanks are most vulnerable to this hazard.

Flooding Probability for each Jurisdiction	
Jurisdiction	Probability
North Charleston District	51-75%

Earthquake

USGS reports no notable earthquakes from May 1st, 2018 to April 30th, 2019. In general, the County experiences earthquakes originating northwest of Lincolville and North Charleston, meaning Cooper River Park and Playground Commission has a higher probability of encountering this hazard than many other jurisdictions.

Earthquake Probability for each Jurisdiction	
Jurisdiction	Probability
Cooper River Parks & Playground Commission	51-75%

Hazardous Materials

North Charleston’s industrial development, commercial expansion, and tourism increase the area’s risk of hazardous materials. In the past year, hazardous material incidents slightly declined from the preceding year. Charleston County Consolidated 9-1-1 reports 15 hazmat incidents, 67 fuel spills, and 363 gas leak/odor incidents for the County from May 1st, 2018 to April 30th, 2019.

Hazardous Material Incident Probability for Each Jurisdiction	
Jurisdiction	Probability
North Charleston District	76-100%

Dam Failure

There have been no recorded historical incidents regarding the Santee Cooper Dam and Pinopolis Dam, which are the only two dams that would impact the Charleston Region during a failure.

Dam Failure Probability for Each Jurisdiction	
Jurisdiction	Probability
North Charleston District	51-75%

Severe Storm

The District’s surrounding area sustained no notable damages from severe storm events in the past year. The NOAA Storm Events Database actually records no significant storm events in the area since 2006. Regardless, the unpredictable nature of storms in Charleston County keeps the probability for this hazard event high.

Severe Storm Probability for Each Jurisdiction	
Jurisdiction	Probability
North Charleston District	76-100%

Drought

All of Charleston County experiences drought impacts uniformly since the U.S. Drought Monitor reports data for the County as a whole rather than by jurisdiction. Charleston County experienced 2 additional weeks without drought in 2018-2019 as compared to 2017-2018 and none of these weeks experienced a classification above “moderate drought.”

Drought Probability for Each Jurisdiction	
Jurisdiction	Probability
North Charleston District	26-50%

Winter Weather

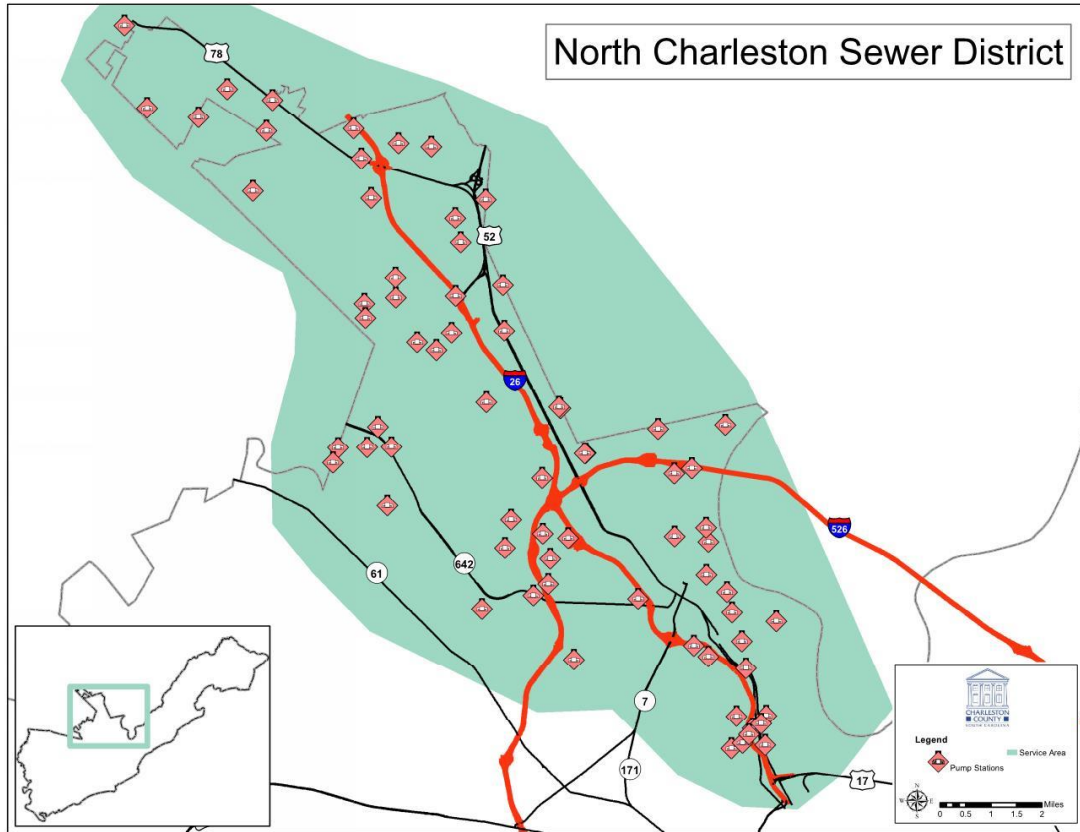
The 2018-2019 year did not yield significant winter weather occurrences warranting a hazardous classification. Please refer to the winter weather hazard history under Unincorporated Charleston County for a record of previous hazard events as reported by NOAA.

Winter Weather Probability for Each Jurisdiction	
Jurisdiction	Probability
North Charleston District	51-75%

5.25(b) - North Charleston District Problem Assessment

Problem Statements and Vulnerability Based on Jurisdiction	
Jurisdiction	Vulnerability Assessment
North Charleston District	The North Charleston Sewer District lies entirely within the City of North Charleston and has no infrastructure or resources of its own.

5.26(a) - North Charleston Sewer District



The North Charleston Sewer District provides services to the City of North Charleston and some adjacent areas. Full hazard histories for jurisdictions receiving services from the District can be found under each jurisdiction’s respective section in this plan. While the North Charleston Sewer District is vulnerable to all hazards in this plan, the District identifies particular vulnerability to floods, earthquakes, dam failures, hazardous materials, hurricanes, severe storms, and winter weather events.

Flood

Flooding Probability for each Jurisdiction	
Jurisdiction	Probability
North Charleston Sewer District	76-100%

Earthquake

Earthquake Probability for each Jurisdiction	
Jurisdiction	Probability
North Charleston Sewer District	51-75%

Dam Failure

Dam Failure Probability for Each Jurisdiction	
Jurisdiction	Probability
North Charleston Sewer District	51-75%

Hazardous Materials

Hazardous Material Incident Probability for Each Jurisdiction	
Jurisdiction	Probability
North Charleston Sewer District	0-25%

Severe Storm

Severe Storm Probability for Each Jurisdiction	
Jurisdiction	Probability
North Charleston Sewer District	76-100%

Hurricane

Hurricane Probability for Each Jurisdiction	
Jurisdiction	Probability
North Charleston Sewer District	51-75%

Drought

Drought Probability for Each Jurisdiction	
Jurisdiction	Probability
North Charleston Sewer District	26-50%

Winter Weather

Drought Probability for Each Jurisdiction	
Jurisdiction	Probability
North Charleston Sewer District	2

5.26(b) - North Charleston Sewer District Problem Assessment

5.26.1 - Hazard Vulnerability

The analysis for this section is identical to the analysis under “Hazard Vulnerability” for Unincorporated Charleston County.

5.26.2 - Vulnerable Buildings

The analysis for this section is identical to the analysis under “Vulnerable Buildings” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-26-9

Building Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
Jurisdiction	Dam Failure	Drought	Earthquakes	Flooding	Hazardous Material Incidents	Hurricanes	Sea Level Rise	Tornadoes	Terrorist Incidents	Tsunamis	Wildfires	Winter Weather
North Charleston Sewer District	4	5	1	3	5	1	5	1	5	5	5	3

5-26.3 - Infrastructure Vulnerability

The analysis for this section is identical to the analysis under “Infrastructure Vulnerability” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-26-11

Infrastructure Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
North Charleston Sewer District	4	5	1	1	5	1	4	5	2	3	5	3

Problem Statements and Vulnerability Based on Jurisdiction	
Jurisdiction	Vulnerability Assessment
North Charleston Sewer District	Earthquakes, hurricanes, and flooding are the three main vulnerabilities that the Sewer District is concerned about. There are many low lying areas where pump stations are. They service the North Charleston area and thus close to a fault line. The sewer district is vulnerable to this hazard as well. The District owns the fire station at 7159 Stall Rd so it would be vulnerable to flooding or earthquakes. North Charleston Sewer District owns properties from Lincolnville down to Mount Pleasant St into City of Charleston. Vulnerability is once again flooding and earthquakes.

5.26.4 - Known Flood Damages

The analysis for this section is identical to the analysis under “Known Flood Damages” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

5.26.5 - Past Flood Impacts

The analysis for this section is identical to the analysis under “Past Flood Impacts” for Unincorporated Charleston County.

5.26.6 – Emergency Warning Needs

The analysis for this section is identical to the analysis under “Emergency Warning Needs” for Unincorporated Charleston County.

5.26.7 – Critical Facilities

The analysis for this section is identical to the analysis under “Critical Facilities” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-26-13

Critical Facility Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
North Charleston Sewer District	3	5	1	2	5	1	5	5	1	1	5	3

A full list of the capabilities for Charleston County and plan participating partners can be seen in the “Critical Facilities” description in Section 5.1(b).

5.26.8 – Natural and Beneficial Functions of Floodplains

The analysis for this section is identical to the analysis under “Natural and Beneficial Functions of Floodplains” for Unincorporated Charleston County.

5.26.9 – Development and Population Trends

The analysis for this section is identical to the analysis under “Development and Population Trends” for Unincorporated Charleston County.

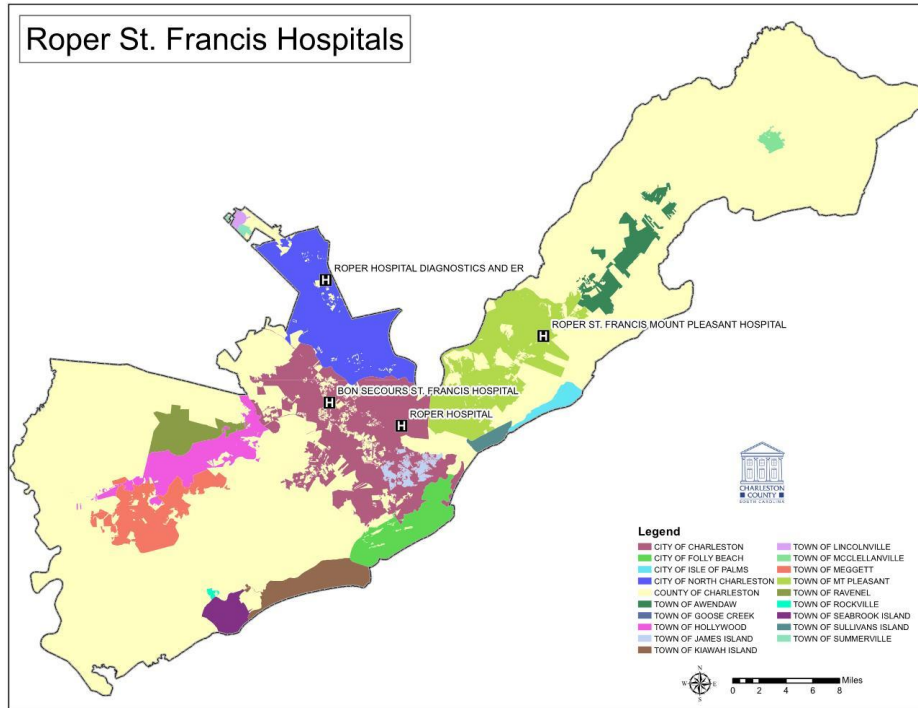
5.26.10 – Economic Impact

The analysis for this section is identical to the analysis under “Economic Impact” for Unincorporated Charleston County.

5.26.11 – Resiliency to Hazards

The analysis for this section is identical to the analysis under “Resiliency to Hazards” for Unincorporated Charleston County.

5.27(a) – Roper St. Francis



Roper St. Francis Healthcare has four acute care hospitals in the region, one located in The City of Charleston, City of North Charleston, and Town of Mt Pleasant in Charleston County and one opening in October 2019 at Carnes Crossroads in Berkeley County. Refer to hazard histories for these jurisdictions for complete records of hazard events affecting Roper St. Francis hospitals.

Flood

Locations in downtown Charleston report the most flooding since they experience identical hazard events as the City of Charleston.

Flooding Probability for Each Jurisdiction	
Jurisdiction	Probability
Roper St. Francis Healthcare	76-100%

Earthquake

Earthquake Probability for each Jurisdiction	
Jurisdiction	Probability
Roper St. Francis Healthcare	51-75%

Hazardous Materials

Hazardous Materials Probability for each Jurisdiction	
Jurisdiction	Probability
Roper St. Francis Healthcare	51-75%

Severe Storm

Severe Storm Probability for each Jurisdiction	
Jurisdiction	Probability
Roper St. Francis Healthcare	51-75%

Drought

Drought Probability for Each Jurisdiction	
Jurisdiction	Probability
Roper St. Francis Healthcare	26-50%

Winter Weather

Winter Weather Probability for Each Jurisdiction	
Jurisdiction	Probability
Roper St. Francis Healthcare	2

5.27(b) – Roper St Francis Problem Assessment

5.27.1 – Hazard Vulnerability

The analysis for this section is identical to the analysis under “Hazard Vulnerability” for Unincorporated Charleston County.

5.27.2 – Vulnerable Buildings

The analysis for this section is identical to the analysis under “Vulnerable Buildings” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-27-9

Building Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
Jurisdiction	Dam Failure	Drought	Earthquakes	Flooding	Hazardous Material Incidents	Hurricanes	Sea Level Rise	Tornadoes	Terrorist Incidents	Tsunamis	Wildfires	Winter Weather
Roper St. Francis Healthcare	5	5	3	2	3	2	2	2	2	2	5	5

5.27.3 – Infrastructure Vulnerability

The analysis for this section is identical to the analysis under “Infrastructure Vulnerability” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-27-11

Infrastructure Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
Roper St. Francis Healthcare	3	5	1	1	4	1	1	3	3	1	5	2

Problem Statements and Vulnerability Based on Jurisdiction	
Jurisdiction	Vulnerability Assessment
Roper St. Francis Healthcare	There are four Roper St. Francis hospitals located in Mt. Pleasant, City of Charleston, North Charleston and Carnes Crossroads (Berkeley County). These hospitals are at risk for the same hazards as the listed jurisdictions including: flooding, earthquakes, hurricanes, hazardous materials, sea level rise and winter weather. These are also critical facilities and have a vulnerability from that perspective. The statements for their associated townships are accurate for the vulnerability of each facility. Of note, the most vulnerable facilities are those located on the peninsula which are Roper Hospital, Doughty Garage, Lucas Garage, Barre Street Lot, 4th Street lot, Calhoun Street lot (under construction), Lucas House, Governor Bennett House and Roper Marketing on Barre Street.

5.27.4 - Known Flood Damages

The analysis for this section is identical to the analysis under “Known Flood Damages” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

5.27.5 - Past Flood Impacts

The analysis for this section is identical to the analysis under “Past Flood Impacts” for Unincorporated Charleston County.

5.27.6 - Emergency Warning Needs

The analysis for this section is identical to the analysis under “Emergency Warning Needs” for Unincorporated Charleston County.

5.27.7 - Critical Facilities

The analysis for this section is identical to the analysis under “Critical Facilities” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-27-13

Critical Facility Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
Roper St. Francis Healthcare	5	5	2	2	5	2	2	5	2	2	5	3

A full list of the capabilities for Charleston County and plan participating partners can be seen in the “Critical Facilities” description in Section 5.1(b).

5.27.8 – Natural and Beneficial Functions of Floodplains

The analysis for this section is identical to the analysis under “Natural and Beneficial Functions of Floodplains” for Unincorporated Charleston County.

5.27.9 – Development and Population Trends

The analysis for this section is identical to the analysis under “Development and Population Trends” for Unincorporated Charleston County.

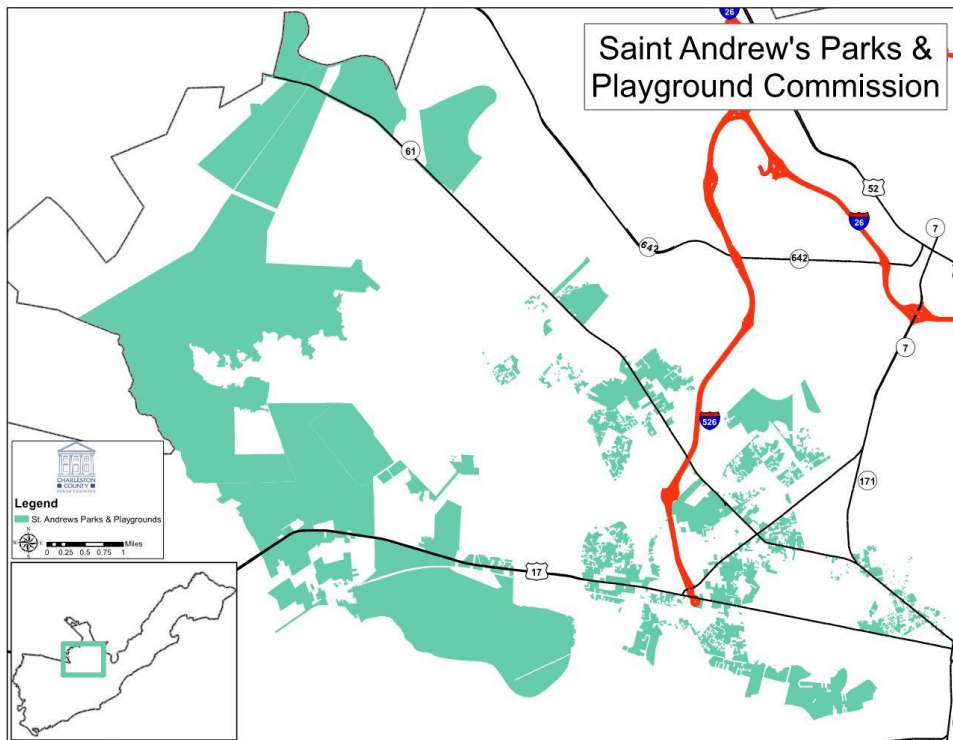
5.27.10 – Economic Impact

The analysis for this section is identical to the analysis under “Economic Impact” for Unincorporated Charleston County.

5.27.11 – Resiliency to Hazards

The analysis for this section is identical to the analysis under “Resiliency to Hazards” for Unincorporated Charleston County.

5.28(a) -St. Andrews Parish Parks and Playground Commission



St Andrew’s Parks and Playground Commission is in close proximity to the City of Charleston, North Charleston, Hollywood, and Ravenel. Please refer to sections concerning these jurisdictions for full hazard descriptions and histories.

Flood

The following areas experience the most flooding occurrences:

St. Andrew's Parks and Playground	1095 Playground Road Brinker Field
	1095 Playground Road Administrative Office
	1095 Playground Road Gymnasium
	1642 Sam Rittenberg Blvd Pool Pump Room
	1710 Dogwood Road Garage

Flooding Probability for each Jurisdiction

Jurisdiction	Probability
St. Andrews Parish Park & Recreation Commission	51-75%

Severe Storm

Severe Storm Probability for Each Jurisdiction

Jurisdiction	Probability
St. Andrews Parish Park & Recreation Commission	76-100%

Drought

Drought Probability for Each Jurisdiction	
Jurisdiction	Probability
St. Andrews Parish Park & Recreation Commission	26-50%

Winter Weather

Winter Weather Probability for Each Jurisdiction	
Jurisdiction	Probability
St. Andrews Parish Park & Recreation Commission	51-75%

5.28(b) – St Andrews Parish Parks and Playground Commission Problem Assessment

5.28.1 – Hazard Vulnerability

The analysis for this section is identical to the analysis under “Hazard Vulnerability” for Unincorporated Charleston County.

5.28.2 – Vulnerable Buildings

The analysis for this section is identical to the analysis under “Vulnerable Buildings” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-28-9

Building Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
Jurisdiction	Dam Failure	Drought	Earthquakes	Flooding	Hazardous Material Incidents	Hurricanes	Sea Level Rise	Tornadoes	Terrorist Incidents	Tsunamis	Wildfires	Winter Weather
St. Andrews Parish Park & Playground Commission	4	3	3	2	3	1	2	1	1	4	4	1

5.28.3 – Infrastructure Vulnerability

The analysis for this section is identical to the analysis under “Infrastructure Vulnerability” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-28-11

Infrastructure Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
St. Andrews Parish Park & Playground Commission	3	3	2	1	3	1	1	1	1	4	4	1

Problem Statements and Vulnerability Based on Jurisdiction	
Jurisdiction	Vulnerability Assessment
St. Andrew's Parks and Playground Commission	The parks are vulnerable to flooding and hurricanes with infrastructure and accessibility being the main concern. The Commission owns large tracts of land that could be susceptible to wildfire.

5.28.4 - Known Flood Damages

The analysis for this section is identical to the analysis under “Known Flood Damages” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

5.28.5 - Past Flood Impacts

The analysis for this section is identical to the analysis under “Past Flood Impacts” for Unincorporated Charleston County.

5.28.6 - Emergency Warning Needs

The analysis for this section is identical to the analysis under “Emergency Warning Needs” for Unincorporated Charleston County.

5.28.7 - Critical Facilities

The analysis for this section is identical to the analysis under “Critical Facilities” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-28-13

Critical Facility Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
St. Andrews Parish Park & Playground Commission	4	3	2	1	3	1	2	1	2	4	4	2

A full list of the capabilities for Charleston County and plan participating partners can be seen in the “Critical Facilities” description in Section 5.1(b).

5.28.8 – Natural and Beneficial Functions of Floodplains

The analysis for this section is identical to the analysis under “Natural and Beneficial Functions of Floodplains” for Unincorporated Charleston County.

5.28.9 – Development and Population Trends

The analysis for this section is identical to the analysis under “Development and Population Trends” for Unincorporated Charleston County.

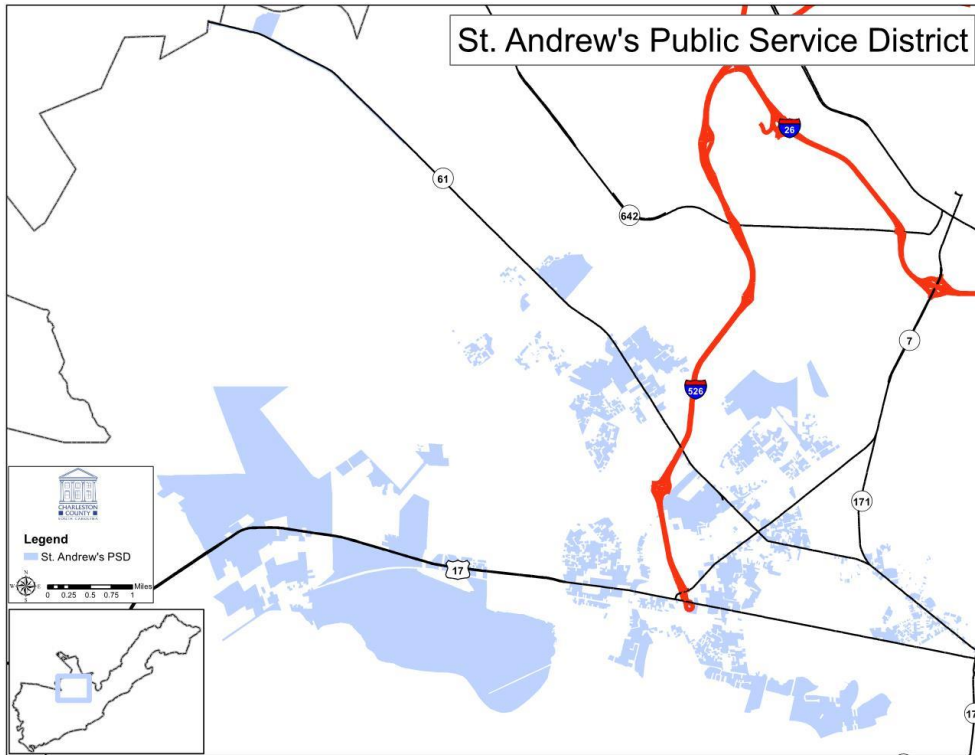
5.28.10 – Economic Impact

The analysis for this section is identical to the analysis under “Economic Impact” for Unincorporated Charleston County.

5.28.11 – Resiliency to Hazards

The analysis for this section is identical to the analysis under “Resiliency to Hazards” for Unincorporated Charleston County.

5.29(a) - St. Andrews Public Service District



St Andrew’s Parks and Playground Commission is in close proximity to the City of Charleston, North Charleston, Hollywood, and Ravenel. Please refer to sections concerning these jurisdictions for full hazard descriptions and histories.

Flood

In addition to flooding areas in the City of Charleston, North Charleston, and Towns of Ravenel and Hollywood, St. Andrew’s Public Service District also sees routine flooding in the service area of Shadowmoss.

Flooding Probability for each Jurisdiction	
Jurisdiction	Probability
St. Andrews Public Service District	51-75%

Wildfire

Flooding Probability for each Jurisdiction	
Jurisdiction	Probability
St. Andrews Public Service District	51-75%

Severe Storm

Severe Storm Probability for Each Jurisdiction	
Jurisdiction	Probability
St. Andrews Public Service District	4

Drought

Drought Probability for Each Jurisdiction	
Jurisdiction	Probability
St. Andrews Public Service District	26-50%

Winter Weather

Drought Probability for Each Jurisdiction	
Jurisdiction	Probability
St. Andrews Public Service District	26-50%

5.29(b) – St. Andrew’s Public Service District Problem Assessment

5.29.1 – Hazard Vulnerability

The analysis for this section is identical to the analysis under “Hazard Vulnerability” for Unincorporated Charleston County.

5.29.2 – Vulnerable Buildings

The analysis for this section is identical to the analysis under “Vulnerable Buildings” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-29-9

Building Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
Jurisdiction	Dam Failure	Drought	Earthquakes	Flooding	Hazardous Material Incidents	Hurricanes	Sea Level Rise	Tornadoes	Terrorist Incidents	Tsunamis	Wildfires	Winter Weather
St. Andrews PSD	5	5	3	2	3	2	3	3	3	4	4	3

5.29.3 – Infrastructure Vulnerability

The analysis for this section is identical to the analysis under “Infrastructure Vulnerability” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-29-11

Infrastructure Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
St. Andrews PSD	5	5	3	3	4	3	4	4	3	5	5	3

Problem Statements and Vulnerability Based on Jurisdiction	
Jurisdiction	Vulnerability Assessment
St. Andrew's Public Service District	St. Andrew's services some of the West Ashley area of the City of Charleston. Infrastructure is vulnerable to flooding as well as hurricanes. Low lying roads within the service area can limit services provided when inundated by water after a flood.

5.29.4 - Known Flood Damages

The analysis for this section is identical to the analysis under “Known Flood Damages” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

5.29.5 - Past Flood Impacts

The analysis for this section is identical to the analysis under “Past Flood Impacts” for Unincorporated Charleston County.

5.29.6 - Emergency Warning Needs

The analysis for this section is identical to the analysis under “Emergency Warning Needs” for Unincorporated Charleston County.

5.29.7 - Critical Facilities

The analysis for this section is identical to the analysis under “Critical Facilities” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-29-13

Critical Facility Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
St. Andrews PSD	5	5	2	2	3	2	2	3	2	5	4	3

A full list of the capabilities for Charleston County and plan participating partners can be seen in the “Critical Facilities” description in Section 5.1(b).

5.29.8 - Natural and Beneficial Functions of Floodplains

The analysis for this section is identical to the analysis under “Natural and Beneficial Functions of Floodplains” for Unincorporated Charleston County.

5.29.9 - Development and Population Trends

The analysis for this section is identical to the analysis under “Development and Population Trends” for Unincorporated Charleston County.

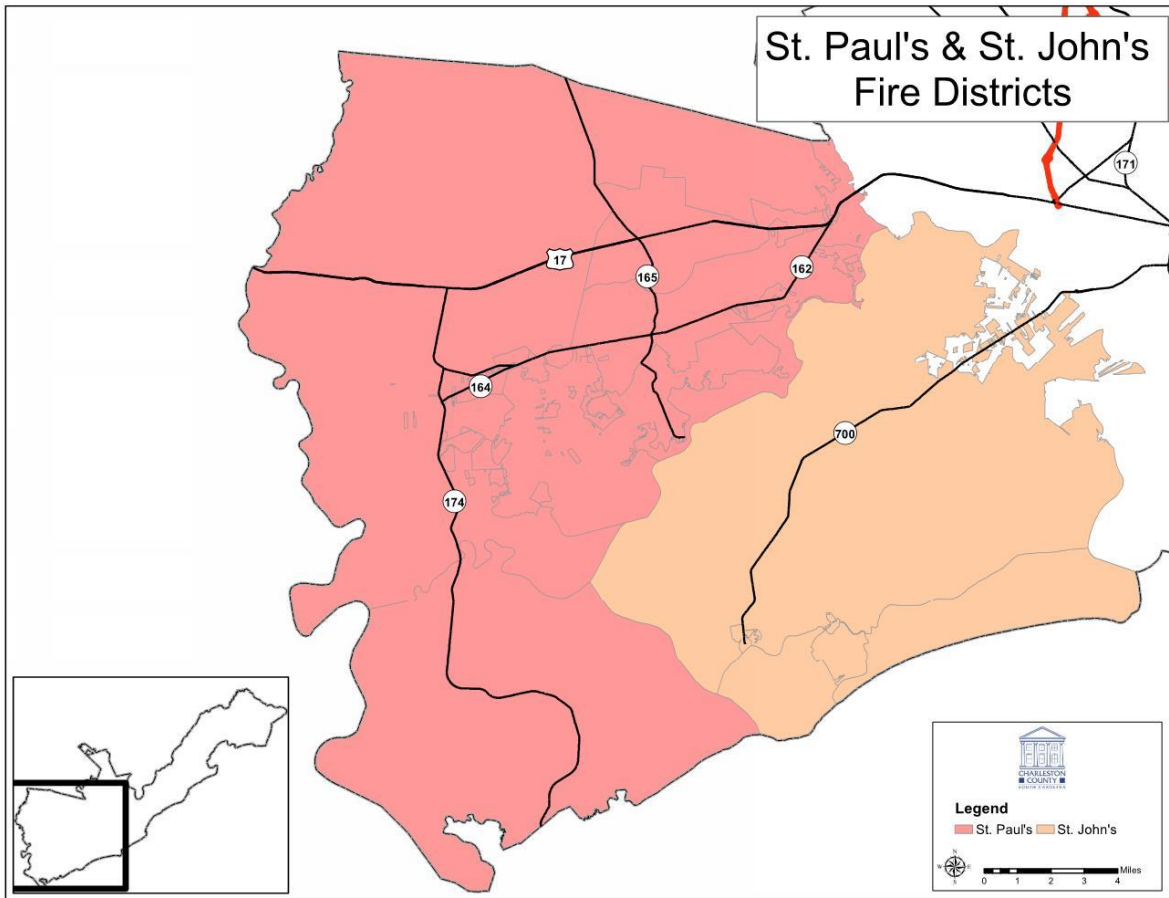
5.29.10 – Economic Impact

The analysis for this section is identical to the analysis under “Economic Impact” for Unincorporated Charleston County.

5.29.11 – Resiliency to Hazards

The analysis for this section is identical to the analysis under “Resiliency to Hazards” for Unincorporated Charleston County.

5.30(a) – St. John’s Fire District Commission



St John’s Fire District experiences hazards similarly to the Cities of Charleston and Folly Beach as well as the Town of James Island. Refer to hazard histories for these jurisdictions for full records of hazards St. John’s Fire District is most susceptible to.

Wildfire

Wildfire Probability for Each Jurisdiction	
Jurisdiction	Probability
St. John’s Fire District Commission	26-50%

Severe Storm

Severe Storm Probability for Each Jurisdiction	
Jurisdiction	Probability
St. John’s Fire District Commission	76-100%

Drought

Drought Probability for Each Jurisdiction	
Jurisdiction	Probability
St. John’s Fire District Commission	26-50%

Winter Weather

Winter Weather Probability for Each Jurisdiction	
Jurisdiction	Probability
St. John’s Fire District Commission	51-75%

5.30(b) – St. John’s Fire District Commission Problem Assessment

5.30.1 – Hazard Vulnerability

The analysis for this section is identical to the analysis under “Hazard Vulnerability” for Unincorporated Charleston County.

5.30.2 – Vulnerable Buildings

The analysis for this section is identical to the analysis under “Vulnerable Buildings” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-30-9

Building Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
Jurisdiction	Dam Failure	Drought	Earthquakes	Flooding	Hazardous Material Incidents	Hurricanes	Sea Level Rise	Tornadoes	Terrorist Incidents	Tsunamis	Wildfires	Winter Weather
St. Johns Fire District	5	5	2	2	4	2	2	2	3	2	3	3

5.30.3 – Infrastructure Vulnerability

The analysis for this section is identical to the analysis under “Infrastructure Vulnerability” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-30-11

Infrastructure Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
St. Johns Fire District	5	5	2	1	2	2	2	4	3	3	4	1

Problem Statements and Vulnerability Based on Jurisdiction	
Jurisdiction	Vulnerability Assessment
St. John's Fire District	This is a rural service district at risk for flooding, wildfires, sea level rise, hurricanes, and tornadoes. There are fire stations susceptible to flooding and access routes that can be blocked by downed trees or flood waters after an event.

5.30.4 - Known Flood Damages

The analysis for this section is identical to the analysis under “Known Flood Damages” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

5.30.5 - Past Flood Impacts

The analysis for this section is identical to the analysis under “Past Flood Impacts” for Unincorporated Charleston County.

5.30.6 - Emergency Warning Needs

The analysis for this section is identical to the analysis under “Emergency Warning Needs” for Unincorporated Charleston County.

5.30.7 - Critical Facilities

The analysis for this section is identical to the analysis under “Critical Facilities” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-30-13

Critical Facility Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
St. Johns Fire District	5	5	3	3	4	2	2	3	2	2	5	3

A full list of the capabilities for Charleston County and plan participating partners can be seen in the “Critical Facilities” description in Section 5.1(b).

5.30.8 - Natural and Beneficial Functions of Floodplains

The analysis for this section is identical to the analysis under “Natural and Beneficial Functions of Floodplains” for Unincorporated Charleston County.

5.30.9 - Development and Population Trends

The analysis for this section is identical to the analysis under “Development and Population Trends” for Unincorporated Charleston County.

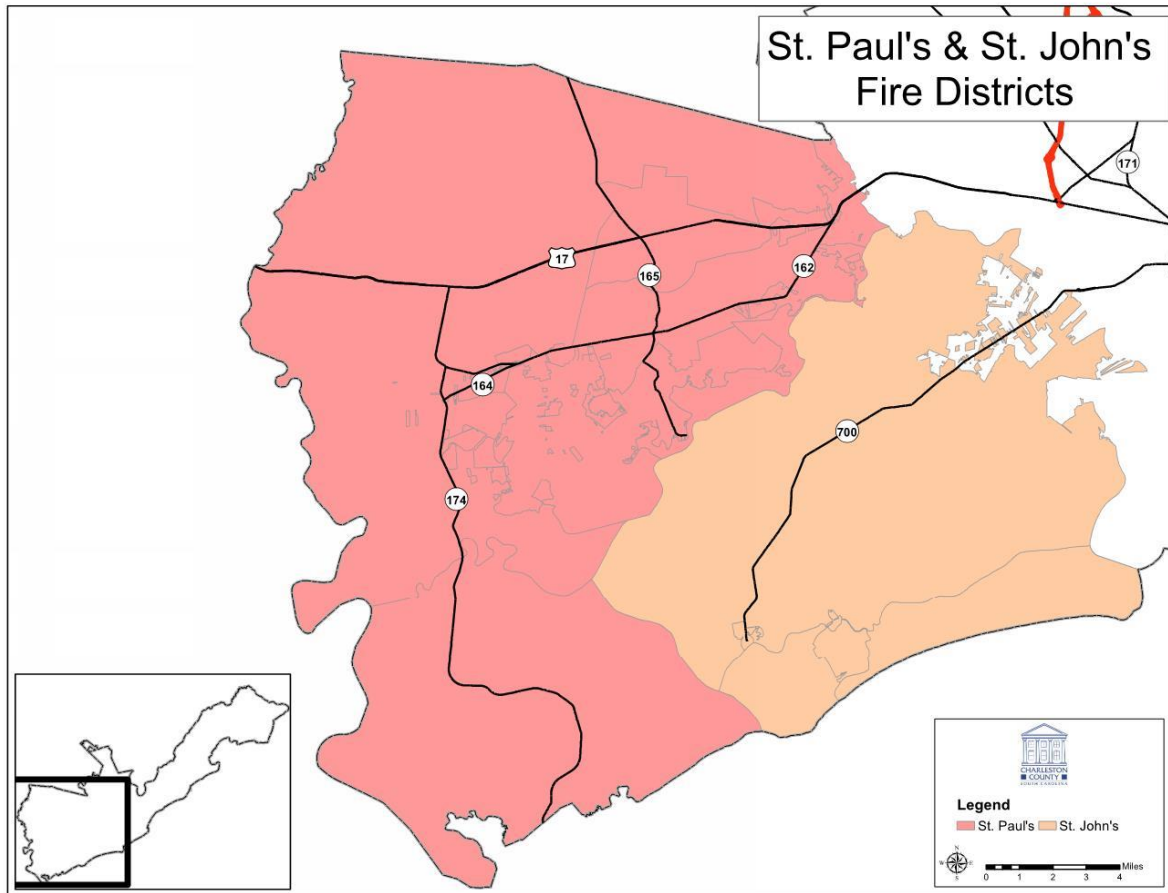
5.30.10 - Economic Impact

The analysis for this section is identical to the analysis under “Economic Impact” for Unincorporated Charleston County.

5.30.11 - Resiliency to Hazards

The analysis for this section is identical to the analysis under “Resiliency to Hazards” for Unincorporated Charleston County.

5.31 -St. Paul's Fire District Commission



Severe Storm

Severe Storm Probability for Each Jurisdiction	
Jurisdiction	Probability
St. John's Fire District Commission	76-100%

Drought

Drought Probability for Each Jurisdiction	
Jurisdiction	Probability
St. John's Fire District Commission	26-50%

Winter Weather

Winter Weather Probability for Each Jurisdiction	
Jurisdiction	Probability
St. John's Fire District Commission	51-75%

5.31(b) - St. Paul's Fire District Commission Problem Assessment

5.31.1 - Hazard Vulnerability

The analysis for this section is identical to the analysis under “Hazard Vulnerability” for Unincorporated Charleston County.

5.31.2 - Vulnerable Buildings

The analysis for this section is identical to the analysis under “Vulnerable Buildings” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-31-9

Building Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
Jurisdiction	Dam Failure	Drought	Earthquakes	Flooding	Hazardous Material Incidents	Hurricanes	Sea Level Rise	Tornadoes	Terrorist Incidents	Tsunamis	Wildfires	Winter Weather
St. Paul's Fire District	4	5	1	3	4	1	3	1	4	4	3	3

5.31.3 - Infrastructure Vulnerability

The analysis for this section is identical to the analysis under “Infrastructure Vulnerability” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-31-11

Infrastructure Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
St. Paul's Fire District	5	5	1	1	2	1	2	2	2	2	2	2

Problem Statements and Vulnerability Based on Jurisdiction	
Jurisdiction	Vulnerability Assessment
St. Paul's Fire District	This is a suburban / rural service district at risk for flooding, wildfires, sea level rise, hurricanes, severe storms, drought, winter weather, terrorism (homegrown), tornadoes, and Hazardous materials (transported by railway and Highway), earthquakes (fault line runs from Ethel Post office road through Dorchester County and ends near Palmetto Commerce Parkway). The fire stations susceptible to flooding, high wind, damage, fires, hazardous

material releases, and earthquakes. These events can impact access routes to and from the fire stations.

5.31.4 - Known Flood Damages

The analysis for this section is identical to the analysis under “Known Flood Damages” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

5.31.5 - Past Flood Impacts

The analysis for this section is identical to the analysis under “Past Flood Impacts” for Unincorporated Charleston County.

5.31.6 - Emergency Warning Needs

The analysis for this section is identical to the analysis under “Emergency Warning Needs” for Unincorporated Charleston County.

5.31.7 - Critical Facilities

The analysis for this section is identical to the analysis under “Critical Facilities” for Unincorporated Charleston County. Tables outlining jurisdiction-specific information can be found below.

Table 5-31-13

Critical Facility Vulnerability Assessment of Hazards Based on Jurisdiction -- 1 (most) - 5 (least)												
JURISDICTION	DAM FAILURE	DROUGHT	EARTHQUAKES	FLOODING	HAZARDOUS MATERIAL INCIDENTS	HURRICANES	SEA LEVEL RISE	TERRORIST INCIDENTS	TORNADOES	TSUNAMIS	WILDFIRES	WINTER WEATHER
St. Paul's Fire District	4	5	1	2	3	1	3	3	1	3	1	3

A full list of the capabilities for Charleston County and plan participating partners can be seen in the “Critical Facilities” description in Section 5.1(b).

5.31.8 - Natural and Beneficial Functions of Floodplains

The analysis for this section is identical to the analysis under “Natural and Beneficial Functions of Floodplains” for Unincorporated Charleston County.

5.31.9 - Development and Population Trends

The analysis for this section is identical to the analysis under “Development and Population Trends” for Unincorporated Charleston County.

5.31.10 - Economic Impact

The analysis for this section is identical to the analysis under “Economic Impact” for Unincorporated Charleston County.

5.31.11 - Resiliency to Hazards

The analysis for this section is identical to the analysis under “Resiliency to Hazards” for Unincorporated Charleston County.

Section 6 Possible Activities

6.1 – Prioritizing Projects

Since this plan is a regional plan intended for applicability to all jurisdictions within the Charleston County area, specific project selection is not included within this plan. (An exception to this pertains to those projects that are ongoing within the Region and are therefore already funded through designated sources.) Separate committees consisting of interested parties from the jurisdictions, businesses, non-profit sector, and/or the public at large have been established to actually select projects to be performed and to identify potential funding sources for those projects that are not ongoing projects. The individual jurisdictions have also been encouraged to identify and implement projects applicable to their jurisdictions as they deem appropriate.

Data received from the 2014-15 questionnaire was used for project prioritization ranking because the 2017 survey was focused on hazard risk assessment in addition to resiliency. The results of this survey are as follows:

1. Project technical feasibility.
2. Jurisdiction/agency in agreement with/support project
3. Use of structure.
4. Property affected by project is a repetitive (flood) loss property
5. Environmental considerations.
6. Nature of structure.
7. Property owners are in agreement with/support project.
8. Ability to recover expenditures.
9. Historic nature of property.
10. Location of project.
11. FEMA cost benefit analysis used to rank projects.
12. Ability of property owners to afford mitigation measure (lower income first)

These prioritization factors from the questionnaire surveys, are (with the exception of the repetitive flood loss property factor) not hazard-specific, so consequently would apply to all hazards identified in the quantitative risk assessments (e.g. State of South Carolina Hazards Assessment and the frequency/severity of hazard events risk assessment methodologies) discussed in the Problem Assessment section of this plan. The ranking of the repetitive flood loss property prioritization factor is still relatively high and is generally consistent with the high ranking of the flood hazard in this plan. These prioritization factors are utilized by the multiple committees who provide input into this plan as criteria for assigning a 1 to 4 priority rating for action items in the action plans for the adopting entities (1 through 4 with 1 being the highest). The members of the committees also conduct a cost benefit review of the action items in determining these priority ratings (1 to 4). This review includes, but is not limited to, discussion of which action items have the lowest cost for the highest benefit, funding availability for the types of projects, and whether the proposed activity/project complies with National Flood Insurance Program (NFIP) requirements (and local flood ordinances when these exceed NFIP requirements). The highest ranking items were deemed to be the most beneficial. Several of these project prioritization factors are specific to a particular type of activity. The following sections of this plan describe the factors that are applicable to the six categories of activities (e.g. preventive activities, property protection, natural and beneficial functions of floodplains, emergency services, structural projects and meeting PPI standards) are used to classify potential hazard mitigation projects.

6.2 - Public Information Plan

In an effort to achieve the goals and requirements for a Program for Public Information Plan for Community Rating System credit, the Public Information Plan for the *Charleston Regional Hazard Mitigation Plan* is now included in this document as an Appendix. This document, though still a part of the *Charleston Regional Hazard Mitigation Plan*, can also act as a stand-alone document for specific use as a public information document. The history of the program that established the Plan, the Committee, topics, messages and target audiences, outreach projects, and many other elements are all included in the document. Please see Appendix 1 for the complete document, as well as Attachment 1-A for an organizational chart.

6.3 – Preventive Activities

Preventive activities include such items as floodplain management regulations, beachfront management regulations, stormwater management regulations, building-related codes, fire prevention codes, wetlands protection regulations, water quality regulations, stream-dumping regulations, coastal erosion regulations, and the preservation of open space. Public information activities are discussed in Appendix 1 that is specifically designated to this topic. The Preventative and Property Protection Subcommittee of the *Hazard Mitigation and Public Information Plan Committee* collaborate to make recommendations for future projects.

The project prioritization factors applicable to this type of activity in the order of importance per the 2014-15 questionnaire survey results are as follows:

1. Project technical feasibility.
2. Jurisdiction/agency in agreement with/support project.
3. Use of structure.
4. Property affected by project is a repetitive (flood) loss property.
5. Environmental considerations.
6. Property owners are in agreement with/support project.
7. Historic nature of property.

Ongoing projects within the Charleston County area that would be classified as preventive activities, the type of organization(s) performing the function, and funding mechanisms for these activities are provided in Table 6.1 below.

Table 6-1

On-Going Preventative Activities in Charleston County		
Activity	Type of Organization	Funding Mechanism
Floodplain Management Regulations	Local jurisdictions, SC Dept. of Natural Resources, US ACOE	General Fund
Fire Protection Regulations	Local jurisdictions, State Fire Marshal	General Fund Insurance Reserve Fund
Wetlands Protection Regulations	U.S. Army Corps of Engineers, S. C. DHEC Office of Coastal & Resource Management	General Fund
Other Management Regulations (e.g. Building Code Enforcement Assistance, flood mapping / delineation, Environmental Review, hazards research)	S.C. Dept. of Insurance, S. C. Dept. of Natural Resources, S. C. Sea Grant Consortium, US ACOE	General Fund Grant Funding Donations
Preservation of Open Space	Charleston County Parks & Recreation Commission, Local Jurisdictions, wetlands banks	General Fund Bond Funding
Stormwater Management Regulations	S. C. DHEC Office of Coastal and Resource Mgmt., Local Jurisdictions, US ACOE	General Fund
Wind Building Regulations	Local Jurisdictions	General Fund
Coastal Erosion Regulations	S. C. DHEC Office of Coastal and Resource Mgmt., Local Jurisdictions, US ACOE	General Fund
Earthquake Building Regulations	Local Jurisdictions	General Fund
Beachfront Management Regulations	SC DHEC Office of Coastal and Resource Mgmt.	General Fund
Water Quality Regulations	SC DHEC, U. S. Army Corps of Engineers, S.C. Dept. of Natural Resources	General Fund
Stream Dumping Regulations	Local Jurisdictions	General Fund

Additional preventive activities which may be considered by the jurisdictions in the Charleston County area include but are not limited to, the following:

- Considering areas subject to repetitive flooding for acquisition for parks and other permanent open space.
- Revising floodplain management ordinances to include a two (2) foot freeboard in areas without other restrictions that make the requirement for an extra foot of elevation impractical (e.g. historic buildings, areas with zoning ordinances with height limitations, etc.).
- Adopting voluntary standards for single-family residence construction that exceed minimal building code requirements for wind and seismic design.
- Adopting stream-dumping ordinances.
- Modernizing flood insurance rate maps.
- Restricting newly located manufactured housing from Velocity (“V”) flood zones.
- Developing maps to indicate areas where radon protection would be recommended.

- Sponsoring educational programs for design professionals, contractors, building code officials, insurance agents, etc. on regulations and codes.
- Developing a monitoring program for known repetitively flooded properties to verify that substantial improvements are not being performed without proper permitting in an effort to avoid elevating the structures.
- Encouraging a standardized system to collect data on flood events throughout the Region for future flood studies.
- Participating in a “Drainage Awareness Campaign” to educate citizens regarding effects of dumping foreign materials into drainage ways.
- Encouraging development reviewers to consider provisions for “no adverse impact” when development is proposed within floodplain areas.
- Encouraging young people to learn more about hazard prevention through engineering solutions by sponsoring awards at the Lowcountry Science Fair.

6.4 – Property Protection

Property protection includes but is not limited to such items as educating or assisting citizens regarding retrofitting existing structures to be more resistant to hazards (e.g. hurricane, flood, earthquake, tornado, wildfire, hazardous material incidents, and/or terrorism), elevating existing structures so that the finished floor/lowest horizontal structural member is at or above the base flood elevation or freeboard elevation, demolishing structures below the base flood elevation which cannot be cost effectively elevated or retrofitted, relocating structures in areas subject to repetitive flooding to areas not within the special flood hazard area, educating citizens regarding hazard safe interior rooms for tornado shelters, educating property owners regarding glazing protection in the event of a hurricane, providing information regarding hazard insurance to citizens, and insuring public owned facilities against hazards.

The project prioritization factors applicable to this type of activity per the survey in the order of importance are as follows:

1. Project technical feasibility.
2. Jurisdiction/agency in agreement with/support project.
3. Use of structure.
4. Property affected by project is a repetitive (flood) loss property
5. Environmental considerations.
6. Nature of structure.
7. Property owners are in agreement with/support project.
8. Ability to recover expenditures.
9. Historic nature of property.
10. Location of project.
11. FEMA cost benefit analysis used to rank projects.
12. Ability of property owners to afford mitigation measure (lower income first)

Ongoing projects within the Charleston County area which would be classified as property protection activities, the type of organization(s) performing the function, and funding mechanisms for these activities are provided in Table 6.2 (the order of the activity in the table corresponds to the prioritization of these activities from most important to least important per the average of the questionnaire responses).

Table 6-2

On-Going Property Protection Activities in Charleston County		
Activity	Type of Organization	Funding Mechanism
Providing information re: flood insurance to citizens	Local Jurisdictions, SC DNR, FEMA, Sea Grant Consortium, US ACOE	Grant Funding General Fund Donations
Designing new publicly owned buildings to exceed minimal hazard resistance design criteria	Local Jurisdictions, State Engineer, SC DOT, US ACOE	Bond Funding Grant Funding General Fund
Purchase flood insurance for publicly owned buildings	Local Jurisdictions, State Engineer	General Fund
Elevating/Retrofitting repetitively damaged property	Local Jurisdictions, S. C. Sea Grant Consortium, SC DNR, FEMA, US ACOE, SC DOT	Grant Funding General Fund Donations
Retrofitting existing publicly owned structures to meet minimal hazard resistance design criteria	Local Jurisdictions, State Engineer, SC DOT, US ACOE	Bond Funding Grant Funding General Funding Donations
Purchase earthquake insurance for publicly owned buildings	Local Jurisdictions, State Engineer	General Fund
Demolition of repetitively damaged properties (flood)	Local Jurisdictions, SC DNR, FEMA, SC DOT, SC DHEC OCRM	Grant Funding General Fund
Purchase wind insurance for publicly owned buildings	Local Jurisdictions, State Engineer	General Fund
Provide information re: earthquake insurance to citizens	Local Jurisdictions, FEMA	Grant Funding General Fund
Acquisition/Relocation of repetitively damaged property	SC DNR, FEMA, US ACOE, SC DOT, SC DHEC OCRM	Grant Funding General Fund

The Committee determined that there should be some consideration of the nature of the flooding problem in the entire neighborhood in addition to a structure-by-structure approach in determining projects to be undertaken. It was discussed that there may be certain situations where, for example, a drainage improvement project may be the most cost effective mechanism of addressing a neighborhood flooding problem where multiple structures are flooding (with or without flood insurance claims), and others where retrofitting/elevating/demolishing one structure with repetitive flooding may be the most effective mechanism for addressing the problem. A broad based neighborhood approach is recommended for project selection in this regard.

Activities the jurisdictions in the Charleston County area may want to consider implementing in addition to those ongoing projects for property protection include but are not limited to the following. The Preventative and Property Protection Subcommittee of the *Hazard Mitigation and Public Information Plan Committee* collaborate to make recommendations for future projects.

- Encouraging lenders to provide low interest rate loans for retrofitting structures for hazard resistance.
- Encouraging local building material/hazard resistant product suppliers to donate or provide supplies at a reduced cost for retrofitting existing structures for hazard resistance.

- Encouraging local volunteer agencies/contractors/design professionals to donate or provide services at a reduced cost for retrofitting existing structures for hazard resistance.
- Educating citizens regarding hazard safe interior room construction.
- Establishing a volunteer network to assist elderly/infirm property owners with installing glazing protection when a hurricane warning is issued.
- Supporting projects designed to enhance the distribution of information regarding hazard mitigation/preparation to the citizens (e.g. development of displays for information distribution at public events/facilities, Hazard Awareness Week, etc.)
- Utilizing available software for conducting vulnerability analyses to various types of natural or man-made hazards (e.g. HAZUS, CAMEO, Consequences Assessment Tool set, etc.)
- Develop a voluntary set of specifications that exceed minimal code to encourage builders and property owners to construct or retrofit their homes in a more hazard resistant manner.
- Develop educational materials to educate residents about hazard resistant construction techniques and protecting property from hazard-related damages.
- Retrofitting existing critical facilities for enhanced hazard-resistance.
- Supporting demonstration projects where residents may learn how to protect their homes from hazard events.
- Developing programs where eligible residents receive assistance in repairing/renovating their homes for enhanced hazard resistance.
- Developing a detailed inventory of the most vulnerable and most critical structures to the types of hazard events experienced in the community for archival records in the event of a loss due to a hazard event.

6.5 – Natural and Beneficial Functions of Floodplains/Resource Preservation

Floodplains in the Charleston County area may contain wetland areas or primary ocean front dunes, which serve important functions. Specifically, wetlands may moderate flooding, enhance water quality, enhance ground water recharge, and often serve as habitats for wildlife. Primary ocean front dunes serve as a buffer against minor wave height fluctuations and against beach erosion. Activities geared towards the protection of natural and beneficial functions of floodplains include but are not limited to wetlands protection through permitting processes, dune protection through permitting processes, building set-back lines for wetlands and/or the ocean, beach re-nourishment, tree protection ordinances, erosion-control requirements for commercial construction, and installation of environmentally sensitive wastewater treatment facilities. Although historic structures are not generally thought of as performing a function beneficial to floodplains, the Charleston area has a long history of considering these structures as beneficial resources to the community. Therefore, the preservation and rehabilitation of these structures for improved resistance to natural hazard strikes could be considered an activity with benefit for the other types of hazards facing this area.

The project prioritization factors applicable to this type of activity in the order of importance are as follows:

1. Project technical feasibility.
2. Jurisdiction/agency in agreement with/support project.
3. Environmental considerations.
4. Property owners are in agreement with/support project.
5. Ability to recover expenditures.
6. Historic nature of property.
7. Location of project.
8. FEMA cost benefit analysis used to rank projects.
9. Ability of property owners to afford mitigation measure (lower income first)

Ongoing projects within the Charleston County area which would be classified as natural and beneficial function protection activities, the type of organization(s) performing the function, and funding mechanisms for these activities are provided in Table 6.3.

Table 6-3

On-Going Floodplains/Resource Preservation Activities in Charleston County		
Activity	Type of Organization	Funding Mechanism
Beach Renourishment	Local Jurisdictions, FEMA	Grant Funding General Fund
Permitting of wastewater treatment facilities	SC DHEC Env. Health	General Fund
Erosion Control	Local Jurisdictions, SC DHEC OCRM, contractors	General Fund Contractor Expense
Permitting for wetland disturbance	SC DHEC OCRM, US ACOE	General Fund
Tree protection/landscaping ordinances	Local Jurisdictions, State Engineer, SC DOT, US ACOE	General Fund
Dune protection	Local Jurisdictions, SC DHEC OCRM	General Fund
Designation of wildlife preservation areas	US DOL, SC DNR	General Fund
Preservation/retrofitting of Historic sites/structures for hazard resistance	Local Jurisdictions, SC Dept. of Archives, US DOI	General Fund Bond Funding Grant Funding Donations
Reviewing/Preparing Environmental Impact Statement (SPA at Daniel Island)	US ACOE	General Fund
National Water Quality Assessment Program	USGS, US ACOE	General Fund
Bioremediation assessment	USGS, Naval Facilities Engineering Command, US ACOE	General Fund
Biological and Ecological studies	USGS, US Fish & Wildlife Service, US ACOE	General Fund
Preservation of open space as parks	Local Jurisdictions, SC Dept. of Archives, US ACOE	Bond Funding General Fund Donations

Activities the jurisdictions in the Charleston County area may want to consider implementing in addition to those ongoing projects for natural and beneficial function protection include but are not limited to the following:

- Educating citizens regarding hazard resistant landscaping and coastal and endangered species.
- Participating in a “Garden Spot for Kids” program.
- Considering purchasing COBRA zone properties for parks.
- Developing programs to encourage young people to take an interest in preserving natural and historic resources.
- Creating new beachfront dunes through “Build-A-Dune” projects.
- Encouraging wetlands preservation through educating the public about wetlands buffer zones or regulating these buffer zones through development ordinances.
- Encouraging citizens to preserve natural and historic resources at appropriate existing public venues and parks.
- Encouraging wildfire-prone local communities to become “Firewise communities”, to the extent feasible.

6.6 – Emergency Services

Emergency services include but are not limited to posting hazard event activities such as damage assessment, search and rescue, treatment of injuries, traffic control, crime control, firefighting, hazardous material cleanup/control, debris removal, road clearing, distribution of emergency supplies, and disposition of debris. Emergency services also include the provision of emergency shelters, emergency mass transportation, evacuation procedures, and emergency warning.

The project prioritization factors applicable to this type of activity per the survey in the order of importance are as follows:

1. Project technical feasibility.
2. Jurisdiction/agency in agreement with/support project.
3. Use of structure.
4. Property affected by project is a repetitive (flood) loss property
5. Environmental considerations.
6. Nature of structure.
7. Property owners are in agreement with/support project.
8. Historic nature of property.
9. Location of project.
10. FEMA cost benefit analysis used to rank projects.

Ongoing projects within the Charleston County area which would be classified as emergency services activities, the type of organization(s) performing the function, and funding mechanisms for these activities are provided in Table 6.4.

Table 6-4

On-Going Emergency Services Activities in Charleston County		
Activity	Type of Organization	Funding Mechanism
Emergency Health Care Services Provision	Local Jurisdictions, Hospitals, Ambulance companies, American Red Cross	General Fund Insurance Direct payment for services Donations
Emergency Warning (Emergency Broadcast System)	Local jurisdictions, media, NOAA NWS, US ACOE	General Fund
Distribution of Emergency Supplies	Local Jurisdictions, American Red Cross, FEMA, US ACOE	General Fund Donations Grant Funding
Evacuation Shelters	American Red Cross, Local Jurisdictions, US ACOE	General Fund Donations
Fire suppression	Local Jurisdictions	General Fund Insurance Reserve Fund
Hazardous Material cleanup/control	Local Jurisdictions, Transporters/storage location operators of hazardous materials	General Fund Enterprise Fund Bond Funding
Crime Control	Local Jurisdictions, SLED, US FBI	General Fund
Debris removal/disposition	Local Jurisdictions, FEMA	General Fund Grant Funding Enterprise Fund
Coordination of Volunteer services (post-event)	Local Jurisdictions, American Red Cross, Salvation Army	General Fund Donations
Hurricane Surge Mapping	US ACOE, USGS	General Fund
Flood forecasting	NOAA NWS, US ACOE	General Fund
Gathering and providing hydrologic data	USGS, State Hydrologist, US ACOE	General Fund
Sandbagging for flooding	Local Jurisdictions	General Fund
Maritime firefighting program	Local jurisdictions, SPA, maritime industry	General Fund Enterprise Fund Donations
Hazardous material training	Local Jurisdictions	General Fund Grant Funding
Terrorist response/preparation training	Local Jurisdictions	General Fund Grant Funding
Staffing Emergency Operation Centers	Local Jurisdictions, American Red Cross, Salvation Army, media providers, US ACOE	General Fund Bond Funding

The Emergency Services Subcommittee of the *Hazard Mitigation and Public Information Plan Committee* collaborate to make recommendations for future projects. Activities the jurisdictions in the Charleston County area may want to consider implementing in addition to those ongoing projects for emergency services include but are not limited to the following:

- Retrofitting existing critical facilities for hazard resistance.
- Identifying evacuation shelters for areas currently not within reasonably close proximity to a shelter for humans and pets/domestic animals.
- Making provisions for emergency warning during normal sleep hours (particularly for hazards with little warning such as tornadoes).
- Making provisions for transportation to emergency shelters for those in need of transportation.

- Constructing new critical facilities to the extent practical in such a manner as to exceed minimal standards for hazard resistance and to be located in areas that are the least prone to damage by hazard events (e.g. not in the special flood hazard area if possible and still meet the service needs for the facility).
- Obtaining information regarding/ assisting with the preparation of emergency plans for places of large assembly (e.g. Aquarium, Coliseum, Athletic stadiums, etc.) and tourist activity centers.
- Adopting the Terrorism Annex to the Emergency Operations Plan.
- Educating medical providers on emergency service topics such as decontamination procedures.
- Providing resources to enable emergency shelters to be opened quickly in the event of a hazard with little or no warning.
- Providing assistance to the marine assistance pact and the anti-terrorism task force.
- Making applications to nationally recognized programs that promote emergency preparedness, such as the “Storm Ready” program of the National Weather Service.
- Providing updated weather radios to schools for early warning of pending hazard events.
- Promoting hazard awareness through media campaigns using weather radios as give-away items.

6.7 – Structural Projects

Structural projects include, but are not limited to, drainage improvement projects, stream channel modification/dredging, dam construction, and infrastructure construction/modification/repair. Since Geographic Information Systems (GIS) are potentially valuable tools for use in structural projects, GIS related projects are included within this section of the Plan.

The project prioritization factors applicable to this type of activity per the survey in the order of importance are as follows:

1. Project technical feasibility.
2. Jurisdiction/agency in agreement with/support project.
3. Use of structure.
4. Property affected by project is a repetitive (flood) loss property
5. Environmental considerations.
6. Nature of structure.
7. Property owners are in agreement with/support project.
8. Ability to recover expenditures.
9. Historic nature of property.
10. Location of project.
11. FEMA cost benefit analysis used to rank projects.
12. Ability of property owners to afford mitigation measure (lower income first)

Ongoing projects within the Charleston County area which would be classified as structural project activities, the type of organization(s) performing the function, and funding mechanisms for these activities are provided in Table 6.5.

Table 6-5

On-Going Structural Project Activities in Charleston County		
Activity	Type of Organization	Funding Mechanism
Drainage Improvement Projects (See list provided in Attachment 6-C to this section)	Local Jurisdictions, US ACOE	Grant Funding Enterprise Funding General Fund Bond Funding
Drainage studies (See list provided in Attachment 6-C to this section)	Local Jurisdictions, US ACOE	General Fund Grant Funding Enterprise Funding
Drainage System Maintenance	Local Jurisdictions, SC DOT	General Fund Enterprise Fund
Installation of dry fire hydrants in rural areas	Local Jurisdictions	General Fund
GIS Mapping	Local Jurisdictions, US ACOE, NOAA Coastal Resources, BCD COG, SC DNR, USGS, FEMA	General Fund Grant Funding
Establishing elevation reference marks	US ACOE, FEMA	General Fund Grant Funding
Inspecting elevation reference marks	Local Jurisdictions	General Fund
Channel dredging	Local Jurisdictions, SPA, US ACOE	General Fund Grant Funding Bond Funding
Road/bridge construction/repair	Local Jurisdictions, SC DOT, US ACOE	General Fund Grant Funding Bond Funding
Utility right-of-way permitting/construction	Local Jurisdictions, SC DOT, utility service providers, US ACOE	General Fund Utility use collections Bond Funding
Coastal Erosion Study	USGS, SC DHEC OCRM, S. C. Sea Grant Consortium, US ACOE	General Fund Grant Funding
Topographic Mapping	USGS, US ACOE	General Fund
Hydrologic Data Collection	USGS, State Hydrologist, US ACOE	General Fund
Stormwater Master Planning	Local Jurisdictions	Enterprise Funds

Activities the jurisdictions in the Charleston County area may want to consider implementing in addition to those ongoing structural projects include but are not limited to the following

- Updating or developing a master drainage, storm water or watershed plan.
- Implementing drainage improvement projects consistent with results of the drainage studies.
- Implementing a Drainage Awareness Campaign program.
- Developing a system for recording flood damages as a result of inadequate drainage in a consistent manner across jurisdictions.

- Developing a schedule for placing existing above ground utilities underground where feasible, particularly along evacuation routes, major arteries, and highly congested areas.
- Developing a schedule to repair/replace existing roads/bridges, which based upon vulnerability analyses and inspection results are least likely to withstand hazard events.
- Developing a system for the sharing of GIS maps and support data amongst the jurisdictions to minimize duplication of effort.
- Installing signs indicating anticipated flood elevation levels over major roadways in the event of a hurricane or severe flood event.
- Educating residents on proper generator usage.
- Educating residents on procedures to follow to underground their utilities going to their individual properties.
- Implementing a storm water section to address water quality and NPDES requirements and to address water quantity issues to reduce flooding potential.

6.8 – Public Information Plan Activities

Public Information Activities have expanded substantially by becoming a part of the Hazard Mitigation Plan. The former Public Information Committee of Project Impact has been merged and is now an integral part of the *Hazard Mitigation and Public Information Plan Committee*. As a result, the PIP has become the roadmap for all community information systems of all Project Impact programs.

In addition to the individual Committee’s requirements, the requirements of Section 6.2 Public Information Plan are met when appropriate. A list of current outreach projects, flood response preparation projects and coverage improvement plan project requirements are found in the Public Information Plan, which is Appendix 1).

Ongoing projects within the Charleston County area, which would be classified as public information activities, the type of organization(s) performing the function, and funding mechanisms for these activities are provided in Table 6.6.

Table 6-6

On-Going Public Information Activities in Charleston County		
Activity	Type of Organization	Funding Mechanism
Mailing hazard brochures to all residents	Local Jurisdictions, FEMA, SC DNR, US ACOE	General Fund Grant Funding
Providing literature to citizens at offices/places of business	Local Jurisdictions, FEMA, SC DNR, US ACOE, USGS, American Red Cross, S. C. Sea Grant Consortium, DHEC OCRM, media providers	General Fund Grant Funding Donations
Television Advertisements and County-wide summer billboards	FEMA, media providers, Corporate sponsors	General Fund Grant Funding Donations
Participating in Hazard Awareness Weeks	Local Jurisdictions, American Red Cross, Corporate sponsors, US ACOE; National Weather Service	General Fund
Newspaper advertisements	Local Jurisdictions, FEMA, American Red Cross, SC DOT, DHEC OCRM	General Fund
Providing speakers for schools/groups	Local Jurisdictions, US ACOE, SC DNR, DHEC OCRM, FEMA, American Red Cross, SC DOT, S.C. Sea Grant Consortium, USGS; National Weather Service	General Fund Grant Funding
Mailing hazard brochures to floodplain residents	Local Jurisdictions	General Fund
Participating in hazard-related/product expos	Local Jurisdictions, American Red Cross, media providers, National Weather Service	General Fund Grant Funding
Providing courses for school children re: hazard preparedness	FEMA, Earthquake Education Center, State Fire Marshal, SC EPD, Local Jurisdictions,	General Fund
Providing hazard-related information on internet web pages	Local Jurisdictions, FEMA, NOAA NWS, SC DNR, US ACOE, USGS, American Red Cross, SC DOT, Sea Grant Consortium, media providers	General Fund
Providing post-disaster educational services, such as but not limited to, literature distribution, media announcements, speaking to groups of residents, etc.	American Red Cross, Local Jurisdictions, FEMA, ACOE, SC DOT, media providers	General Fund Grant Funding

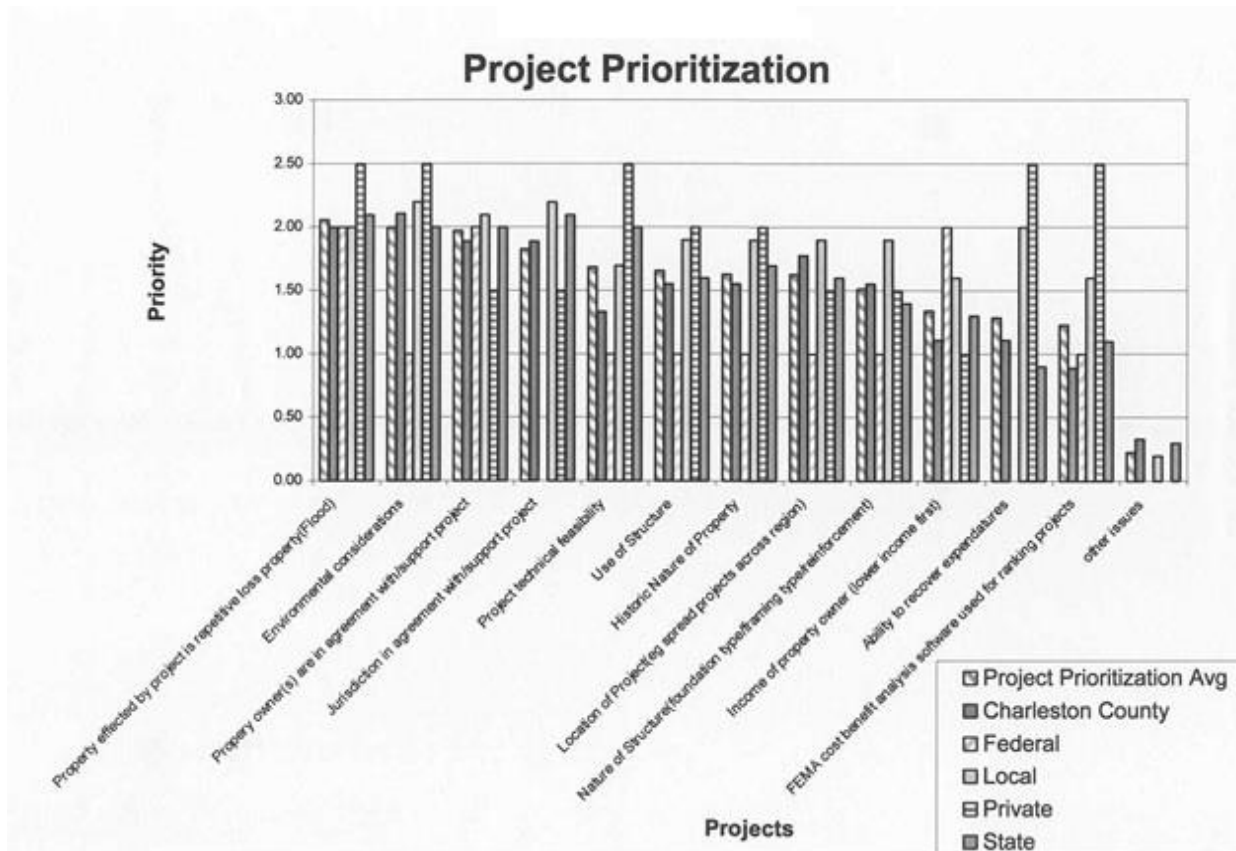
In addition the activities the jurisdictions in the Charleston County area may want to consider implementing in addition to those ongoing public information projects include but are not limited to the following:

- Participating in a study of the residents of the Charleston County area regarding their knowledge level of hazards facing this area.
- Participating in “Project Impact” public information activities to the extent feasible.
- Participating in contractor hazard resistant building techniques workshops.
- Participating in a children’s hazard awareness program.
- Participating in the development of a mobile hazard-related educational display.
- Participating in hazard mitigation techniques demonstration projects.
- Establishing an information sharing resource centrally located so that all the jurisdictions have access to hazard-related information when needed.
- Encouraging local restaurants and/or movie cinemas to participate in public education campaigns targeted for these establishments.

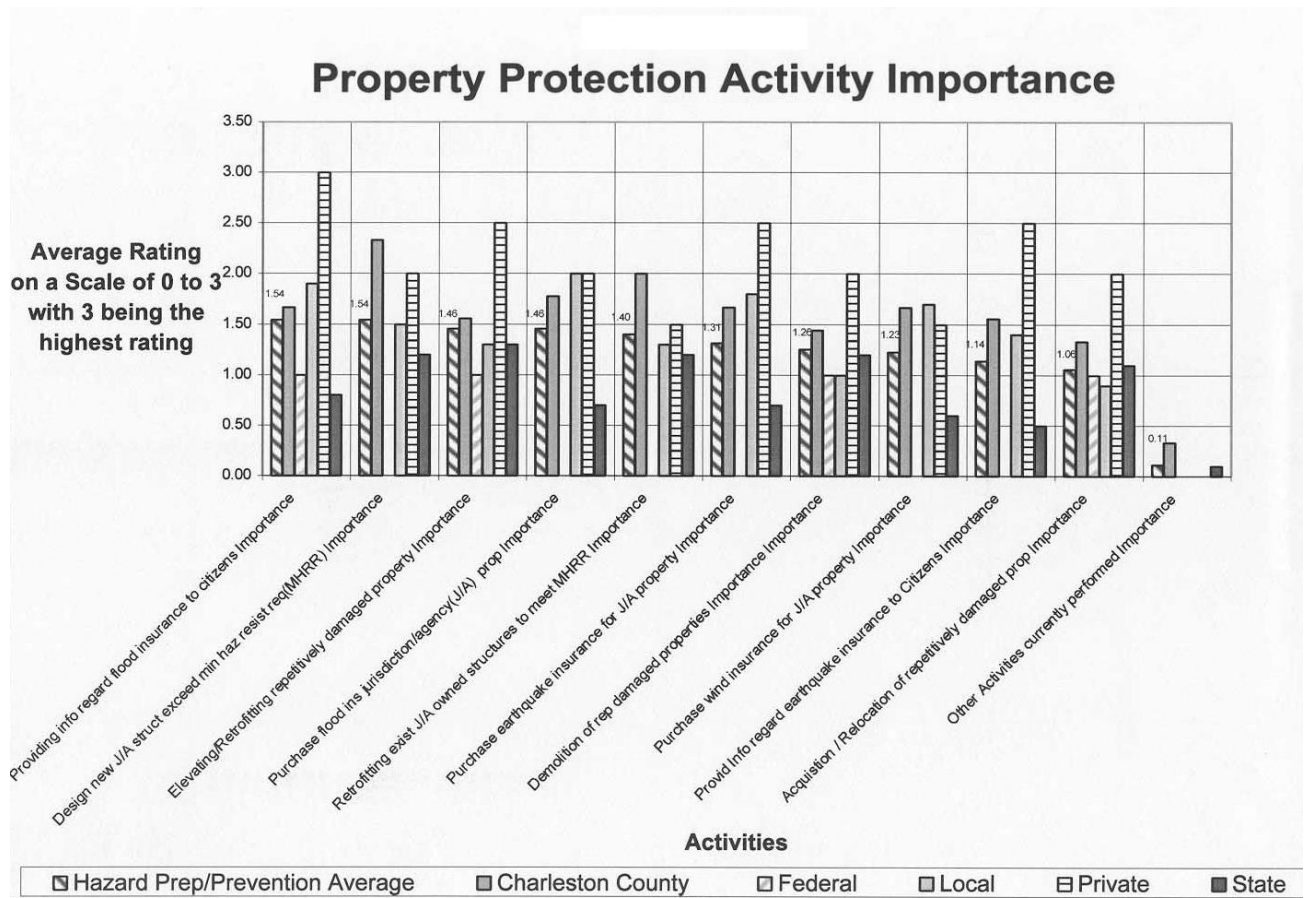
- Participating in hazards expos and other events designed to educate citizens about hazard preparation and protection.
- Assisting with the development and/or distribution of printed materials to residents or visitors on hazard-related topics.
- Participating in the speaker's bureau and/or asking speakers to present hazard-related topics at local functions or events.
- Encouraging young people to learn more about hazard preparations through activities and programs aimed at this audience.
- Working with media outlets to provide hazard-related information to local citizens.
- Working with media outlets to provide hazard-related information to local citizens.
- Distributing an "Electronic Bulletin Board" of public education events and other activities to Committee members and supporters.

Jurisdictions are encouraged to select projects they intend to participate in for their respective action plans to include with this plan.

Attachment 6-A: Chart of Project Prioritization Factors Based Upon Questionnaire Responses



Attachment 6-B: Chart of Property Protection Project Prioritization Based Upon Questionnaire Responses



Attachment 6-C: Drainage Improvement Projects

Listed in the tables below are some of the drainage improvement and drainage study projects undertaken in Charleston County. For a complete list of projects contact the jurisdiction.

Current Studies			
Study	Description	Jurisdiction	Status
Stormwater Management Program	Charleston County has developed and is in the implementation phase of a stormwater management program to address stormwater quantity and quality concerns throughout the community. The county has entered into intergovernmental agreements with the City of Isle of Palms, Town of Sullivan’s Island, City of Folly Beach, Town of James Island and Town of Lincolnville for the stormwater management program development and implementation. Drainage improvements identified through the stormwater management program and/or the stormwater master planning efforts are considered as projects under this plan as if listed individually herein	Charleston County, Isle of Palms, Sullivan’s Island, Folly Beach, James Island and Lincolnville	Ongoing
Isle of Palms Drainage Study	A comprehensive drainage study of the entire island emphasizing problem areas and outfall capacity is being conducted.	Charleston County, Isle of Palms	The City requested proposals in 2018 to begin design and permitting for this project
St. Andrews Canal Flood Control Study	Initial reconnaissance phase activities are being performed for this study to identify flooding and drainage problems in the watershed and to support development of hydrologic and hydraulic models of the existing flood conditions.	Charleston County/U.S. Army Core of Engineers	Ongoing

Snowden/Longpoint Road	A survey of existing conditions and flooding conditions will be performed to determine the design of a future drainage improvement project. This scenic highway suffers from a lack of maintenance and a substandard drainage system. Coordination of efforts will involve the Town, Charleston County, and the S. C. Department of Transportation.	Charleston County/Town of Mount Pleasant/SC DOT	Coordination ongoing with SCDOT about possible solutions. DOT Completed roadside ditch work in 2016
Signal Point	Charleston County has surveyed this two mile drainage system and has now contracted with an engineering firm to study and provide recommendations for areas to improve drainage.	Charleston County/ City of Charleston/ SCDOT	Study in progress
Calhoun West Preliminary Engineering Report for Flood Reduction	This study will provide conceptual engineering services for the Calhoun West Drainage Basin, an approximately 600 acre basin bounded by King, Bee, Murray, and Lockwood Boulevards which has been a historically flood-prone area. Initial analysis indicates that a deep tunnel/pumped system will be needed to address flooding during all tide cycles.	City of Charleston	Study in progress
DuPont/Wappoo Watershed Master Plan	This study will provide a basin - wide model to determine impacts of development on the existing system and suggest possible improvements.	City of Charleston/ Charleston County	Final draft under review
Church Creek Flood Reduction Study	A second opinion study of the Church Creek Drainage Basin.	City of Charleston	Stormwater design standards completed 2018
Westwood - St. Teresa Drive	This study was undertaken to determine if improvements can be made along St. Teresa and Moore Drives and Morton Avenue to alleviate frequent flooding of the streets and yards in the neighborhood.	City of Charleston	Completed

Ashley Hall Manor Drainage Study	The City is performing a study to eliminate frequent flooding in the neighborhood. Streets such as Downing, Salisbury, and Birthright experience frequent severe flooding. The study will address if a new outfall may help alleviate the frequency and duration of this flooding.	City of Charleston	Completed
Barberry Woods Drainage Study	The City, in conjunction with the Barberry Woods HOA, is commissioning a drainage study to examine the area northeast of Maybank Highway (from Trophy Lakes to River Road). This area includes several flood-prone developments. With the possibility of future development occurring in the basin, a study is required to correct the existing drainage deficiencies and provide guidance for stormwater management in the future development.	City of Charleston	Study in progress
Low Battery Seawall Study	During the study and concept design phase of the repair of the Low Battery, the City initiated a Sea Level Rise Strategy. This strategy mandates that capital projects with a design life of 50 years or greater shall be designed for 2.5' of sea level rise. The City's Department of Public Service and Design Center are working together to incorporate the increased height in the design of the sea wall. This improvement should provide increased protection for the properties along the southern Peninsula from flooding.	City of Charleston	Final design under review
Filbin Creek Drainage Study	Areas adjacent to Filbin Creek encountered flooding during Hurricane Matthew. It is proposed that a Drainage Study of the affected reaches of Filbin Creek be initiated. The study and analysis of Filbin Creek from Virginia Avenue to Ferndale will focus on	City of North Charleston	Underway

	<p>identifying primary factors causing flooding in the Cameron Terrace and Ferndale neighborhoods adjacent to Filbin Creek. The study will identify and evaluate conceptual improvements that may have the potential to alleviate flooding in these areas.</p>		
<p>Pepperhill Drainage Study</p>	<p>A drainage study of the drainage basins affecting the Pepperhill neighborhood, including the McChune Branch, is proposed to identify factors and potential improvements to alleviate flooding conditions experienced in Pepperhill and surrounding areas. Partial FEMA funding.</p>	<p>City of North Charleston</p>	<p>Pending FEMA funding release</p>
<p>Asset Management Program (CMP)/ CIP Stormwater studies</p>	<p>Other studies as may be developed, prioritized, scheduled or conducted as identified through the Town's asset management (CMP)/ CIP program during annual reviews.</p>	<p>Town of Mount Pleasant</p>	<p>Ongoing CIP and CMP programs</p>
<p>Indigo Cut- Snee Farm Study</p>	<p>A study will be performed in this flood-prone area. The entrance road to a major subdivision floods during rain events. In addition, several homes have repeatedly received water damage. Drainage improvements are being evaluated for a portion of this basin as a part of the Whipple Road widening project included basin modifications. Other opportunities are being evaluated as a part of the Town's Asset Management Program.</p>	<p>Town of Mount Pleasant</p>	<p>Project in CIP (unfunded), submitted initial request to State for SRF funding</p>
<p>Hobcaw Point Study</p>	<p>A survey of existing conditions and flooding conditions will be performed to determine the design of a future drainage improvement project. This older neighborhood suffers from a lack of or substandard drainage. Repetitive loss homes are within the project area.</p>	<p>Town of Mount Pleasant</p>	<p>Unfunded</p>

The Groves Study	A survey of existing conditions and flooding conditions will be performed to determine the design of a future drainage improvement project. This older neighborhood suffers from substandard drainage systems.	Town of Mount Pleasant	Unfunded
Old Village- Business District Study	A survey of existing conditions and flooding conditions will be performed to determine the design of a future drainage improvement project. This older neighborhood suffers frequent flooding due to substandard drainage.	Town of Mount Pleasant	Unfunded
Shemwood I Study	A survey of existing conditions and flooding conditions will be performed to determine the design of a future drainage improvement project. This older neighborhood suffers from a lack of or substandard drainage. Repetitive loss homes are within the project area.	Town of Mount Pleasant	Unfunded
Hidden Lake Studies	Two studies are being evaluated. One will involve two drainage studies – one for water quantity and one for water quality. The Water Quantity study will evaluate the current basin conditions against the original basin model to predict flood conditions and any potential impacts from upstream development. The second study for Water Quality impacts will be undertaken to determine the effect, if any of upstream commercial development and residential activities on the neighborhood’s lake system.	Town of Mount Pleasant	Study conducted for upstream development project. Upstream pond improvements are being installed by developer

<p>Infrastructure Assessment and Drainage Canal Study</p>	<p>A sampling of representative public drainage systems will continue to identify and prioritize areas where the drainage system was experiencing pipe failures, erosion, siltation, and other structural problems. This survey would be used to identify and perform systems repairs, replacements, and drainage channel rehabilitation projects. Following surveys have been completed; the Shemwood II, Sloan Park Canal, Brecon Road, Mill Tract North, Pine Hollow, Whipple Road canal. Scheduled for 17-19 are Shirmer Ave, Erckman Drive, Venning Road, Creekside/ Outback systems - other surveys are identified/ prioritized though the Town's Comprehensive Maintenance Program (CMP).</p>	<p>Town of Mount Pleasant</p>	<p>Funded for 2017-2019 in Town's CMP</p>
<p>Old Mount Pleasant Study</p>	<p>A survey of existing conditions and flooding conditions will be performed to determine the design of a future drainage improvement project. This older neighborhood suffers frequent flooding due to substandard drainage.</p>	<p>Town of Mount Pleasant/ SCDOT</p>	<p>Phase I evaluation underway</p>
<p>Shem Creek Watershed Study</p>	<p>High level study of priority watershed to identify possible pollution sources and framework for future mitigation efforts to include a watershed management plan for water quality.</p>	<p>Town of Mount Pleasant</p>	<p>Phase II plan development funded for 18-19</p>
<p>Master Drainage and Floodplain Management Plan</p>	<p>This comprehensive plan identified all stormwater drainage facilities for most areas within the City at the time of its completion. The plan includes an inventory and hydraulic analysis of existing drainage facilities with recommended improvement projects based on those findings. The City continues to use the plan as a valuable guide in prioritizing</p>	<p>City of Charleston</p>	<p>To begin 2019</p>

	and implementing current and future drainage improvement projects throughout the City.		
Island Wide Drainage Study	This study is being conducted by 3rd party consultants to look at existing infrastructure, problem areas, and will make recommendations and a priority list for City Council to target moving forward.	City of Folly Beach	In Progress
Completed Studies			
Study	Description	Jurisdiction	Status
St. Paul's Area Drainage Study	This project involves a drainage study for the St. Paul's community. The project is being funded by the Charleston County Transportation Sales Tax Program.	Charleston County	
Legareville Drainage Study	This project involved drainage improvements for this Legareville community on Johns Island. The funding was provided by the Charleston County Transportation Sales Tax Program	Charleston County	Completed
Peninsula Seawall Study	A study to investigate the condition and construction of the seawall along Murray Boulevard and E. Battery (known as "The Battery") and to make recommendations for the method of repair and/or construction has been completed. The city has entered into a contract for engineering services to prepare bid documents for repairing two sections of the high seawall from its northern end on E.	City of Charleston	

	<p>Battery through the transition section located at the intersection of Murray Boulevard and E. Battery. Additional funds must be acquired to repair the remaining section, which extends along Murray Boulevard from E. Battery to Tradd Street.</p>		
Ashley Villas Drainage Study	<p>Drainage Study of the Ashley Villas neighborhood to identify possible solutions to historically recurring back yard and some structure flooding.</p>	City of North Charleston	
Waterview Circle Drainage Study	<p>Drainage Study of the outfalls at Waterview Circle in Evanston Estate to evaluate potential to improve street flooding and garage flooding.</p>	City of North Charleston	
Oak Bluff on Crossroads Drive Drainage Study	<p>The City of North Charleston commissioned a study of the flooding problems at Oak Bluff on Crossroads Drive and related drainage problems near Northwoods Mall during 2005 (Wise, 2005, October 7).</p>	City of North Charleston	
Accabee Drainage Study	<p>The City of North Charleston commissioned a study of the flooding problems in the Accabee subdivision where the drainage system overflows during heavy rains.</p>	City of North Charleston	
Jacksonville/Carner Drainage Improvement	<p>The City of North Charleston initiated a drainage study of the intersection of Jacksonville Road and Carner Avenue. This study sought to identify solutions to recurring street flooding in this area. The study and design of improvements has been completed. While easement acquisition was underway, the removal of shipping containers from adjacent property allowed the City to locate and clean the old drainage facilities and the intersection is now draining. Construction no longer necessary.</p>	City of North Charleston	

Indigo Cut- Snee Farm Study	A study will be performed in this flood-prone area. The entrance road to a major subdivision floods during rain events. In addition, several homes have repeatedly received water damage. Drainage improvements are being evaluated for a portion of this basin as a part of the Whipple Road widening project included basin modifications. Other opportunities are being evaluated as a part of the Town's Asset Management Program.	Town of Mount Pleasant	Study/ PER completed
Old Mount Pleasant Study	A survey of existing conditions and flooding conditions will be performed to determine the design of a future drainage improvement project. This older neighborhood suffers frequent flooding due to substandard drainage.	Town of Mount Pleasant/ SCDOT	Study Completed
Shem Creek Watershed Study	High level study of priority watershed to identify possible pollution sources and framework for future mitigation efforts to include a watershed management plan for water quality.	Town of Mount Pleasant	Phase I study completed
Hidden Lake Studies	Two studies are being evaluated. One will involve two drainage studies – one for water quantity and one for water quality. The Water Quantity study will evaluate the current basin conditions against the original basin model to predict flood conditions and any potential impacts from upstream development. The second study for Water Quality impacts will be undertaken to determine the effect, if any of upstream commercial development and residential activities on the neighborhood's lake system.	Town of Mount Pleasant	System evaluation/ study completed by developer - Upstream modifications completed by developer

Current Projects			
Project	Description	Jurisdiction	Status
Station 18 and 19.	Install a wet well and pumps to discharge to rear of island to alleviate severe flooding. Project includes new force main to discharge on rear of island	Sullivan's Island	Designs are under review by town staff
Station 28.5	Discharge pipe found to be 8 inch clay pipe. Design and install larger RCP to drain Stations 27 to 28.5.	Sullivan's Island	Currently under design
Morrison Court Drainage Project	Replace the current 36" CMP with a 60" concrete pipe with a smooth interior wall. Funded through FY 18 Transportation Sales Tax Annual Allocation Program (TST).	McClellanville	Currently in design phase. Working on DHEC permitting and easement acquisition.
Pinckney Street Culvert Replacement	Replacement of roadway crossline pipe along Pinckney Street. Funded through the FY 17 Transportation Sales Tax Annual Allocation Program.	McClellanville	Design
Ashley Avenue Drainage	Ashley Avenue E from 2nd to 5th Street. Funded through the FY 15 Transportation Sales Tax Annual Allocation Program.	Folly Beach	Design
Scotia Street Drainage	Roadside drainage improvements. Funded through the FY 16 Transportation Sales Tax Annual Allocation Program (CTC).	McClellanville	Working on right of entry access onto CCSD property.
Seabrook Island Road Drainage	Roadside drainage improvements. Funded in FY 17 by the County Transportation Committee.	Seabrook Island	Town of Seabrook managing.
45 th - 52 nd Avenue Drainage Improvement Project	This is the second phase of a large scale drainage project to help eliminate the most severe drainage problems within the City.	Charleston County/City of Isle of Palms	The construction of the project is underway and will be completed

			before the end of 2018.
Accabee Drainage Improvements Phase II	Phase II of drainage improvements identified in the Accabee Drainage Study	Charleston County/City of North Charleston	This project is in easement acquisition.
East Dolphin Channel Improvements	The drainage channel adjacent to East Dolphin Street experiences significant recurring erosion on the banks, threatening the fences and back yards of homes on Spaniel Drive and Jockey Court. The channel is approximately 10 feet deep with steep banks. The proposed project will install approximately 125 LF of 8' x 4' box culvert, approximately 880 LF of keystone retaining wall system on the East side of the channel, and a terraced, landscaped slope on the west side of the channel.	Charleston County/City of North Charleston	Complete (check with NC on dates)
Union Heights Drainage Improvements Phase III	Phase III of ongoing drainage improvements in the Union Heights area recommended in the Union Heights Drainage Study prepared by the USACOE. Funding for Phase III is from the Charleston County Transportation Sales Tax Program.	Charleston County/City of North Charleston	Easement acquisition is underway.
Snee Farm- Farm Quarter Outfall Channel Reconstruction and Stabilization	This project involves surveying existing flow conditions and sediment impacts to this outfall canal that serves a large portion of the Snee Farm subdivision. Canal reconstruction was previously conducted in 2000, however the system has significant erosion and sediment impacts. Engineering study is funded for FY 09/10 which will	Charleston County/Town of Mount Pleasant	Design Phase with Charleston County, working on permitting with ACoE.

	include measures to install more permanent bank and channel stabilization techniques. Project is in design phase with construction currently partially funded by Charleston County and Mount Pleasant.		
Snowden Community Drainage Study and Improvements	This community experiences flooding due to inadequate drainage. This project consists of an evaluation of the existing systems and implementation of improvements.	Charleston County/Town of Mount Pleasant	
Gulf Drive Drainage Improvement Project	Charleston County has completed a preliminary investigation of the drainage of this area. The County is coordinating with the Town of Mt. Pleasant regarding cost sharing and using the Town's easements.	Charleston County/Town of Mount Pleasant	Staff is reviewing alternate flow routes.
Country Manor Drive-Waters Edge	This project involves the piping of a swale easement to eliminate standing water, flooding of yards, and to improve drainage conditions for an adjacent area of Unincorporated Charleston County.	Charleston County/Town of Mount Pleasant	Staff is reviewing alternate flow routes.
Simmons Hill Community Drainage Improvement Project	The community is experiencing flooding due to inadequate public drainage systems. This project consists of evaluation of the existing systems and implementation of improvements.	Charleston County/Town of Awendaw	Preliminary survey work for this project is underway.
Parkers Ferry / Penny Creek Drainage	Improvements to outfall. Funding from Charleston County Transportation Sales Tax Annual Allocation program and managed by CC Public Works Department.	Charleston County	Right of way acquisition.
New Drainage Improvement Projects	All drainage projects, which are identified by or are a result of damages incurred from any natural disaster and/or hazard events of the type described within the <i>Charleston Regional Hazard Mitigation Plan</i> .	Charleston County	
Air Harbor Subdivision Drainage Project	Design improvements and funding mechanisms for this	Charleston County	

	project are related to the St. Andres Canal project.		
McClellanville Area Drainage Project	Drainage in the McClellanville area is being evaluated to determine potential ways to reduce the frequency of flooding in this community. Easements acquired by the USDA Soil Conservation Service (SCS) have been cleared by the County. Various small basin improvements are being tied into the canal system.	Charleston County	
Gapway Canal	The scope for engineering design and construction need to be developed. Drainage easement needs to be acquired for a major portion of the canal.	Charleston County	A preliminary review of the existing drainage system is being conducted.
Phillip's Community Drainage Improvement Project	The community is experiencing flooding due to inadequate public drainage systems. This project consists of evaluation of the existing systems and implementation of improvements. The funding is being provided by the Charleston County Transportation Sales Tax Program.	Charleston County	Completing Preliminary Plans.
Buck Hall Community Watershed Improvement Project	The community is experiencing flooding due to inadequate public drainage systems. This project consists of evaluation of the existing systems and implementation of improvements.	Charleston County	Initial field surveys have been completed and easement requirements are being conducted.
Red Top Community Watershed Improvement Project	This community experiences flooding due to inadequate drainage. This project consists of an evaluation of the existing systems and implementation of improvements.	Charleston County	
Hoot Owl Watershed Improvements	This community experiences flooding due to inadequate drainage. This project consists of an evaluation of the existing	Charleston County	

	systems and implementation of improvements.		
Station 18.5 and 19 drainage pipe replacement.	Project includes replacement of collapsed pipes between middle street and outfalls in this area.	Charleston County/ Sullivan's Island	In planning stage and funding has been applied for
Brickyard Drainage Improvement Phase I	The private consultant hired by the City of North Charleston has completed a comprehensive drainage study of this drainage basin. Charleston County will perform the construction work. This project will involve the installation of larger drainage pipes, retention ponds, and the cleaning and widening of ditches throughout these three neighborhoods to address problems of standing water in streets and yards that has been going on for 30-40 years. Property acquisition for easements is needed.	Charleston County/City of North Charleston	Three regional retention ponds have been constructed. Further projects are under evaluation for feasible alternatives due to minimal space available.
Manor Road Drainage Project	This project involves drainage improvements for this street in the Town of Hollywood. The funding is being provided by the Charleston County Transportation Sales Tax Program and managed by CC Transportation Development Department.	Charleston County/Town of Hollywood	Award of contract for construction going to County Council. Requesting additional funds for construction.
John's Island Canal North of Maybank Highway Watershed Improvements Project	This area experiences flooding due to inadequate drainage. This project consists of an evaluation of the existing system and implementation of improvements.	Charleston County	
Tiger Swamp Community Watershed Improvements	This community experiences flooding due to inadequate drainage. This project consists of an evaluation of the existing system and implementation of improvements. Charleston County is looking at efforts to begin the designation of this watershed as a Special Protection Area as per the	Charleston County	

	Charleston County Stormwater Program Permitting Standards and Procedures Manual. Coordination efforts will be needed with the City of Charleston.		
Hut/Abram Road Design	This project involves road design for Johns Island. The funding is being provided by the Charleston County Transportation Sales Tax Program.	Charleston County	Easement plans are underway.
Wilson Cemetery Canal	Surveying activities have been completed. Canal design, environmental permitting, drainage easement identification and acquisition and construction must be completed. The existing drainage system is currently maintained by County government.	Charleston County/Town of Awendaw	
Alert Road / N. Carolina Road Drainage Canal	Improvements to canal and easement dedication. Funding from Charleston County Transportation Sales Tax Annual Allocation FY 15 program and managed by CC Transportation Development Department.	Charleston County/Town of McClellanville	Design scope and fee being negotiated with engineering consultant.
Hanahan Canal	Canal improvements managed by Charleston County Public Works. Funding from Charleston County Transportation Sales Tax Annual Allocation FY 15 program.	Charleston County	
Market Street Drainage Project	The Market Street Drainage Improvements project is divided into three phases. Construction contract for Phase I was awarded in September 2006 and completed in September 2007. Phase I consisted of connecting the surface drainage on Concord Street to the existing pump station, upgrading the pump station controls, and installing an additional pump. Phase II, the construction of tunnels & shafts and an emergency outfall,	City of Charleston	Phase III to be completed by 2024.

	<p>was completed in August 2014. The design for Phase III (surface collection system) should be complete late 2017 with construction starting early 2018. This project will reduce flooding in the Market and adjacent areas.</p>		
Spring/ Fishburne Drainage Project	<p>Engineering design is complete for this project, which will alleviate the flooding in the combined Spring and Fishburne Drainage Basins, including most of the Crosstown. Combined, the drainage basins are the largest on the Peninsula of Charleston and the drainage project is the largest that the City has undertaken to date with an estimated cost of \$154 million. The first phase was completed in April 2013. Currently, Phases 2 & 3 are underway with completion expected in 3rd quarter 2017 and 2nd quarter 2019, respectively. Phase 4, wetwell & outfall, is expected to begin in 2018 and be completed in 2020, with Phase 5, the pump station, to commence directly thereafter.</p>	City of Charleston	<p>Phases 1 & 2 complete. Phase 3 to be completed 2020. Phase 4 to be completed 2022. Phase 5 to be completed 2024.</p>
Forest Acres Drainage Project	<p>This project includes the Forest Acres drainage basin and a portion of the 5th Avenue drainage basins. Design is almost complete on Phase 1 and Phase 2A of the improvements. The recommended improvements include removing the existing pump station, constructing a combination of dual box culvert and open channels, and combining the outfalls from the Forest Acres and 5th Avenue drainage basins.</p>	City of Charleston	<p>Phase 2A to be completed by 2021. Phase 2B to be completed by 2023.</p>
Carol Street/Charleston Municipal Golf Course/Canal Street Drainage Project	<p>The drainage system is currently maintained by local governments. A portion of this project was completed in 2002. The City of Charleston will</p>	City of Charleston/Town of James Island	

	complete the Golf Course portion of this project.		
Central Park/Wambaw Watershed Master Plan	Includes Fleming Road, Howle Avenue, Stefan Drive, Marlborough. This project will require drainage design, surveying, construction plans, drainage easement identification and acquisition, environmental permitting and construction activities. Fleming Road and Howle Avenue are state maintained roads. Drainage system and outfall capacity needs to be increased.	City of Charleston/Town of James Island/ SC DOT	In progress
Grimball Road/ Hazard Land Watership Improvements Project	The preliminary drainage basin study has been completed and drainage easement needs identified. The County realigned drainage ditches at the Elementary School located at Grimball Road.	Town of James Island	Additional drainage easements need to be acquired and funding identified.
Yorktown Drainage/ Bishop Gadsden Pipe Installation	The installation of an arch drainage culvert and improvements to road crossings associated with this project has been completed. A Hazard Mitigation Grant Program application for this project was denied. The Bishop Gadsden pipe installation phase has been completed for this project. The remainder of the project needs funding and additional easement acquisition.	Town of James Island	
Isle of Palms City-wide Drainage Improvements	Continue with efforts to implement city-wide drainage improvements as outlined by studies done by E. M. Seabrook.	City of Isle of Palms	
Isle of Palms City-wide Drainage Improvements	The City has conceptual designs and is working on final designs to improve the outfalls of the three worst performing drainage basins on the island. Ultimately the project will involve sealing the tidal water from entering into the upland portions of the drainage system, while allowing	City of Isle of Palms	Working on final design

	stormwater to escape. The outfalls are located along Waterway Boulevard at 30th Avenue, 36th Avenue and 41st Avenue.		
24 th , 29 th and Hartnett Boulevard Drainage Improvement Project	This continuing project involves vacuum cleaning of open ditch systems where it is not feasible to maintain the ditches with conventional methods.	City of Isle of Palms	
Northwoods Point Drainage Improvements	This project will involve a redesign and a redirection of stormwater to reduce flooding potential in the Northwoods Point & Northwoods Mall commercial areas.	City of North Charleston	Design Complete, property owner concurrence and easements needed.
Ashley Villas Drainage Improvements Phase II	Phase II of drainage improvements identified in the Ashley Villas Drainage Study.	City of North Charleston	Design Complete, easement acquisition underway.
Forest Hills II CMP Replacement Phase II	Phase II of project to replace deteriorated CMP within the Forest Hills II subdivision	City of North Charleston	Preparing for Bid
Ashley Villas Drainage Improvements Phase III	Phase III of drainage improvements identified in the Ashley Villas Drainage Study. (Final Phase)	City of North Charleston	Design in progress.
Collins Road Culvert Improvements	Project to replace undersized culvert under Collins Road	City of North Charleston	Design and permitting
New Drainage Improvement Projects	All drainage projects, which are identified by or are a result of damages incurred from any natural disaster and/or hazard events of the type described within the <i>Charleston Regional Hazard Mitigation Plan</i> .	Town of Mount Pleasant	Ongoing, East Crossing Spillway replacement is underway from Hurricane Matthew damage.
Brookgreen Phase III Drainage Project	This is the final phase of the Brookgreen Drainage improvements. Phases I and II have been completed. Repetitive loss homes exist within the project area.	Town of Mount Pleasant	Unfunded

Mathis Ferry Road Drainage Improvements	This project involves a drainage study, design, and installation of storm drain pipes in roadside ditches along Mathis Ferry Road. This area has not received ditch maintenance due to heavy traffic. The ditches are obstructed. Flooding of this major roadway is occurring and a health hazard exists due to standing water. The S. C. Department of Transportation has been asked to participate. Cross line pipe replacement was completed in 2007.	Town of Mount Pleasant/SC DOT	Remainder of project is on hold pending acquisition of additional funding.
Implementation of Asset Management Comprehensive Maintenance Program (CMP) and Capital Improvement Program (CIP)	Based upon initial system inspections the Town will begin to schedule replacements or rehabilitation of failing infrastructure, to respond to system failures that occur during large rain events, to conduct drainage studies and improvements where warranted. Program includes ranking and prioritizing critical maintenance and improvement needs over a 5- year window. Funding mechanisms include the Infrastructure Maintenance Program are in place. Other funding opportunities such as grants are reviewed annually. Program is refined as resources become available.	Town of Mount Pleasant	Program is developed and is updated annually based upon needs and study data.
2018-2019 Asset Management Replacement Program and Comprehensive Maintenance Program (CMP)	Projects include Pipe inspections, cleaning and rehabilitation/ replacements for various pipes and other stormwater structures (spillways, inlets, etc. as identified.)	Town of Mount Pleasant	Funded for FY 18-19
Swale Regrading Projects	This project will involve the regarding of several rear yard drainage swales in locations throughout Mount Pleasant. These swales are non-functional and are causing property damage. Systems will need to be identified and added to GIS.	Town of Mount Pleasant	Unfunded/ addressed as needed - may be incorporated into CMP

Old Village - Pitt Street Business District Drainage Improvements	Project includes installation of larger drainage system to collect flood waters in this historic area. Area is flood prone due to undersized pipes- this is phase II of an original SW Program project. Will be conducted along with Water and Sewer improvements.	Town of Mount Pleasant/ Mount Pleasant Waterworks	Design is complete, project awaiting permits/ scheduling
Old Mount Pleasant Drainage Improvements	Project involves drainage improvement projects as selected by Town Council for development in this area of Town will address old and substandard infrastructure. May be completed in smaller phased projects.	Town of Mount Pleasant	In design phase for Royall and Edwards sub-basins
Snee Farm (SRF)	Subdivision wide project to address up to (3) flood prone areas with improvements, replace or rehabilitate failing piped infrastructure and ditch systems, install water quality best management practices. Based upon Indigo Cut/ Snee Farm Study (PER) findings. Project includes priority repairs/ projects only.	Town of Mount Pleasant	Funded and under construction. Anticipated completion date is 2020
Snee Farm- Farm Quarter Outfall Channel Reconstruction and Stabilization	This project involves surveying existing flow conditions and sediment impacts to this outfall canal that serves a large portion of the Snee Farm subdivision. Canal reconstruction was previously conducted in 2000, however the system has significant erosion and sediment impacts. Engineering study is funded for FY 09/10 which will include measures to install more permanent bank and channel stabilization techniques. Project is in design phase with construction currently partially funded by Charleston County and Mount Pleasant.	Town of Mount Pleasant	Design Phase with Charleston County, working on permitting with ACoE and property owners.
Coleman Boulevard Improvements	In conjunction with an area revitalization and transportation project, significant basin changes and hydrology improvements to the area	Town of Mount Pleasant	Under Construction

	drainage system including water quality BMPs		
Bayonne Avenue Drainage Improvement Project	This project will provide drainage infrastructure between stations 26 and 26 2 where no drainage system currently exists. This area routinely floods during heavy rainstorms.	Town of Sullivan's Island	The engineering design for the project is complete, and permitting processes have begun.
Sullivan's Island Drainage Improvements	This project involves the implementation of the phased drainage improvements for the island. Funding sources are being pursued.	Town of Sullivan's Island	
Station 18 and 18.5 Drainage	This project includes engineering and implementation of drainage improvements and possible revitalization of pump and wetwell at station 18.	Sullivan's Island	Engineering is in progress.
West 9th Street Extension Drainage	Improvements to alleviate flooding at high tide. Funding from the Charleston County Transportation Committee (CTC) program and managed by CC Transportation Development Department.	Charleston County/SCDOT/ City of Folly Beach	Permitting with SCDOT.
Entire Sullivan's Island	Complete study of all drainage infrastructure and areas without infrastructure to develop a plan to improve all drainage on Sullivan's island.	FEMA/Town of Sullivan's Island	Grant has been applied for.
Septima Clark Expressway	Improve drainage and reduce tidal flooding with the installation of deep tunnels, access shafts, and outfalls.	City of Charleston/SCDOT	Phases 1 & 2 complete. Phase 3 to be completed 2020. Phase 4 to be completed 2022. Phase 5 to be completed 2024.
James Island Watershed Study	Includes the entire island. Purpose is to identify basins on James Island and prioritize the basins that require drainage improvements.	City of Charleston/Charleston County, Town of James Island	Final report delivered

9th West Drainage Improvement	Raising of road bed and installation of culverts and cross pipes from Ashley Avenue West along 9th Street West	City of Folly Beach	Beginning in fall 2019
Installation of Tide Valve at 5th East and East Indian Avenue	Installation of tide valve by Charleston County Public Works at newly installed culvert and cross pipe installed earlier this year by SCDOT	City of Folly Beach	Aug-19
2nd East to 6th East Drainage improvements design.	Engineering and final plans for drainage improvements from 2nd East to 6th Street East by Charleston County Transportation with CTC funding.	City of Folly Beach	Ongoing to be completed end of 2019
Completed Projects			
Project	Description	Jurisdiction	Status
Isaac German Canal Drainage Basin Project	The study to determine drainage in the eastern Rifle Range Road area has been completed. A joint County of Charleston/Town of Mount Pleasant project improved the downstream end of Rifle Range Road (approximately 2,040 acres of watershed). Construction of a major roadway crossing improvement (Porcher Bluff Road) has been completed. Coordination efforts will be needed with the Town of Mount Pleasant. County is looking at efforts to begin the designation of this watershed as a Special Protection Area as per the Charleston County Stormwater Program Permitting Standards and Procedures Manual.	Charleston County/Town of Mount Pleasant	Complete

Middle Street Drainage	<p>This project involves drainage improvements for a Sullivan’s Island neighborhood near Station 24th Street. The funding is being provided by the Charleston County Transportation Sales Tax Program and managed by CC Transportation Development Department.</p> <p>Seven drainage basins have been identified by a consultant for improvement. Currently, two of the seven phases of the improvement have been constructed. The remaining five phases are pending funding.</p>	Charleston County/Sullivan’s Island	Complete
Pinckney Street Drainage Repairs	<p>Improvements to drainage on town parcel. Funding from Charleston County Transportation Sales Tax Annual Allocation FY 15 program and managed by CC Transportation Development Department.</p>	Charleston County/Town of McClellanville	Completed
Osceola Ave Drainage Project	<p>This project involves drainage improvements for this street on Sullivan’s Island. The funding is being provided by the Charleston County Transportation Sales Tax Program and managed by CC Transportation Development Department.</p>	Charleston County/Town of Sullivan's Island	Complete
Thompson Ave Drainage Project	<p>This project involves drainage improvements for this street on Sullivan’s Island. The funding is being provided by the Charleston County Transportation Sales Tax Program and managed by CC Transportation Development Department.</p>	Charleston County/Town of Sullivan's Island	Complete
Accabee Drainage Improvements Phase I	<p>Phase I of drainage improvements recommended in the Accabee Drainage Study. Funding from City and Charleston County Transportation Sales Tax Program. Easement acquisition has been completed</p>	Charleston County/City of North Charleston	Complete.

Angel Oak Elementary Drainage	Addition of storm drainage infrastructure at the entrance to the school to alleviate standing water. Funding from the Charleston County Transportation Committee (CTC) program and managed by CC Transportation Development Department.	SCDOT/Charleston County	Completed
Joy Avenue Drainage	Construction of this project was completed in 2007. The improvements are being monitored.	Charleston County	Completed
Legareville Road Watershed Improvement Project	This project consisted of evaluating the existing systems and implementing improvement for an area where flooding occurred due to inadequate drainage systems. A feasibility study has been completed and outlines three alternatives addressing the local flooding problem. This project has been completed.	Charleston County	Completed
Lauden Street	This project involved drainage improvements for an Isle of Palms neighborhood. The funding was provided by the Charleston County Transportation Sales Tax Program. This project has been completed.	Charleston County	Completed
Sparrow Drive	This project involved drainage improvements for an Isle of Palms neighborhood. The funding was provided by the Charleston County Transportation Sales Tax Program.	Charleston County	Completed
Middle Street Drainage	This project involved drainage improvements for a Sullivan's Island neighborhood. The funding was provided by the Charleston County Transportation Sales Tax Program. Coordination with SC DOT is complete and the project coordination is underway with the Town of Sullivan's Island.	Charleston County	Completed

Lincoln High School Area	This project involved drainage improvements for the Lincoln High School area in McClellanville. The funding was provided by the Charleston County Transportation Sales Tax Program. Permitting and easement acquisition is complete and construction is underway.	Charleston County	Completed
3rd Street East at East Huron Avenue	This project involved drainage improvements for this Folly Beach neighborhood. The funding was provided by the Charleston County Transportation Sales Tax Program.	Charleston County	Completed
4th Street West at West Ashley Avenue	This project involved drainage improvements for this Folly Beach neighborhood. The funding was provided by the Charleston County Transportation Sales Tax Program.	Charleston County	Completed
6th Street East	This project involved drainage improvements for this Folly Beach neighborhood. The funding was provided by the Charleston County Transportation Sales Tax Program.	Charleston County	Completed
East Erie at 10th Street Drainage Improvements	This project involved drainage improvements for this Folly Beach neighborhood. The funding was provided by the Charleston County Transportation Sales Tax Program. Construction is underway.	Charleston County	Completed
Parish Place Ditch Improvements	This project sought to eliminate a hazardous section of ditch located near an elementary school as well as eliminate ongoing erosion problems. A section of the ditch was piped.	Charleston County/Town of Mount Pleasant	Completed
Clubhouse Ditch- Hidden Cove	This project involved increasing the size of a detention pond, regarding an existing ditch, and adding additional pipes to a street crossing to allow the	Charleston County/Town of Mount Pleasant	Completed

	<p>drainage system to handle water from a 10-year storm event. Several properties are flooded during rain events. This was a joint project between Charleston County Public Works and the Town.</p>		
Porcher Bluff Road	<p>This project involved drainage improvements for this Mt. Pleasant neighborhood. The funding was provided by the Charleston County Transportation Sales Tax Program.</p>	Charleston County (Transportation Sales Tax)	Completed
Hamlin Drainage Improvements	<p>This project consisted of re-routing drainage lines to reduce localized flooding. The easements have been acquired and the construction work is complete.</p>	Charleston County/S.C. DOT	Completed
Cowpens Canal Drainage Project	<p>Road cross pipes have been upgraded. The County received negative comments from environmental agencies during the permit process.</p>	Charleston County	Completed
27th Avenue Ditch System Project	<p>This project involved the repair of the ditch system on 27th Avenue and Hartnett Avenue.</p>	Charleston County/City of Isle of Palms	Completed
Isle of Palms Marina and Fire Station 2 Stormwater Collection Boxes	<p>For this project, the county placed two stormwater collection boxes at the Isle of Palms Marina at the terminus of 41st Avenue and the newly constructed Fire Station 2 at #44 Forty-First Avenue.</p>	Charleston County/City of Isle of Palms	Completed
Vestry Drive Drainage Project	<p>Improvements to the piping and ditch system have been completed. The City and County of Charleston worked together to fund this project. The improvements are being monitored.</p>	Charleston County/City of Charleston	Completed
Memminger Hall Subdivision	<p>This project involved drainage improvements for this West Ashley neighborhood. The funding was provided by the Charleston County Transportation Sales Tax Program.</p>	Charleston County Transportation Sales Tax	Completed

Sauldam Road Drainage	This project involved drainage improvements for a St. Paul's neighborhood. The funding was provided by the Charleston County Transportation Sales Tax Program.	Charleston County	Completed
Scotia, Baker, and Morrison Drainage	This project involved drainage improvements for this McClellanville neighborhood. The funding was provided by the Charleston County Transportation Sales Tax Program.	Charleston County	Completed
East Ashley at 2nd Street Drainage Improvements	This project involved drainage improvements for this Folly Beach neighborhood. The funding was provided by the Charleston County Transportation Sales Tax Program.	Charleston County	Completed
West Huron Avenue Drainage Improvements	This project involved drainage improvements for this Folly Beach neighborhood. The funding was provided by the Charleston County Transportation Sales Tax Program.	Charleston County	Completed
Bees Ferry Road Drainage Improvement	The project included multiple drainage improvements, road widening, and other improvements to the entire 4.5 mile length of Bees Ferry Road from Savannah Highway (U.S. 17) to Ashley River Road (S.C. 61). The project was requested by the City of Charleston and was funded by the Charleston County Transportation Sales Tax Program. Partial funding for the project was approved by voters in the second Transportation Sales Tax bond referendum.	Charleston County	Completed
Accabee Drainage Improvements Phase I	Phase I of drainage improvements recommended in the Accabee Drainage Study. Funding from City and Charleston County Transportation Sales Tax	Charleston County/City of North Charleston	Completed

	Program. Easement acquisition has been completed		
East Dolphin Channel Improvements	The drainage channel adjacent to East Dolphin Street experiences significant recurring erosion on the banks, threatening the fences and back yards of homes on Spaniel Drive and Jockey Court. The channel is approximately 10 feet deep with steep banks. The proposed project will install approximately 125 LF of 8' x 4' box culvert, approximately 880 LF of keystone retaining wall system on the East side of the channel, and a terraced, landscaped slope on the west side of the channel.	Charleston County/City of North Charleston	Completed
Monterey Drive Drainage Project	This project involves drainage improvements for this City of North Charleston street. The funding is being provided by the Charleston County Transportation Sales Tax Program and managed by CC Transportation Development Department.	Charleston County/City of North Charleston	Completed
Brookdale Canal Drainage Improvements	Project to pipe section of existing canal in the Brookdale section of Forest Hills 2 with significant recurring erosion issues.	Charleston County/City of North Charleston	Completed
Town Creek Drive Drainage Improvement Project	The City of Charleston completed drainage improvements designed by B.P. Barber to install catch basins and pipe to prevent significant overland flow from the right-of-way through private property to a marsh behind the property. Minor damage would occur to the garage of the residence. Project was completed in 2011.	City of Charleston	Completed
Rebellion Road	Installation of 4 Checkmates to prevent tidal flooding and installation of pipe lining (CIPP)	City of Charleston	Completed

	to preserve the existing CMP outfalls.		
Barre and Canal Streets	Installation of 2 inlets and piping.	City of Charleston	Completed
White Chapel	Replacement of collapsed CMP drainage system.	City of Charleston	Completed
Pipe repair: Rutledge and Ashley at Colonial Lake	The existing clay pipe in both streets was cleaned, inspected, and lined (CIPP) as part of the renovation of Colonial Lake. The work occurred from Beaufain to Broad Streets.	City of Charleston	Completed
Replacement/installation of check valves	Existing Tideflex valves were replaced at Colonial Street, and the outfalls at Rutledge Avenue and Limehouse Street installed with Checkmate valves to prevent tidal intrusion during high tides. New check valves were installed at the Water Street outfall and on William Ackerman Lane.	City of Charleston	Completed
Wagener Terrace pipe lining	Failing clay storm drain was repaired and/or lined to extend the service life of the system. The depth of the system made a CIPP repair the only viable alternative.	City of Charleston	Completed
902 Preston Drive	Installation of 2 inlets and berms to reduce flow of water from ROW onto private property.	City of Charleston	Completed
Greenleaf	Rerouting of collapsed drainage pipe currently located under a building.	City of Charleston	Completed
Peach Blossom Lane	This project is for the connection of an isolated portion of the existing drainage system that has no outfall to connect to the existing system to discharge to an available outfall of Beresford Creek.	City of Charleston	Completed

18 Formosa Drive	Installation of sag (vertical curve) in road to allow water to drain from one side to the other to alleviate flooding in front of residence.	City of Charleston	Completed
12 Water Street	Installation of new catch basin to capture water collecting along curb.	City of Charleston	Completed
Burns Lane	Installation of 376 LF of 18-in. RCP to replace failed brick arch in Burns Lane in conjunction with new C of C coliseum.	City of Charleston	Completed
Bridgepointe Drainage Improvement Project	The City of Charleston completed the Bridgepointe Drainage Improvement Project to alleviate flooding problems at the Bridgepointe Townhomes in the Church Creek Drainage Basin. Approximately 350 linear feet of 12'x4' concrete box was installed to improve stormwater conveyance from the detention ponds adjacent to the townhomes.	City of Charleston	Completed
Calhoun/ Concord Street Deep Tunnel Connection	This project connected Calhoun Street east of the railroad track at Washington and Concord Street from Charlotte Street to Laurens Street to the Concord Street Stormwater Pump Station that was completed in 2000. This project alleviated flooding in these areas, and was a component of Division I of the Market Street Drainage Improvements, construction of which was completed September 2007.	City of Charleston	Completed
Byrnes Down Drainage Project	The City of Charleston completed the drainage improvements designed by B.P. Barber and Assoc, Inc. as detailed in the <i>Storm Drainage Study of the Byrnes Downs Drainage Basin</i> , dated January 2001. Construction contract was awarded to Chandler Construction in April 2006. Substantial completion was achieved in February 2007 with	City of Charleston	Completed

	full project close-out in May 2007.		
Church Creek Drainage Improvement Project	The City of Charleston completed the drainage improvements recommended by the Church Creek Watershed Master Drainage Plan. The project consisted of constructing approximately 2,650 linear feet of channel and installing approximately 1,850 linear feet of reinforced concrete box. The project should alleviate some persistent, serious flooding in the Shadowmoss and Hickory Hill neighborhoods and was complete December 2007.	City of Charleston	Completed
MUSC Pump Station Improvements	The pump station serving the areas immediately adjacent to the new hospitals on the west side of the peninsula was recently upgraded as part of the hospital construction undertaken by MUSC.	City of Charleston/MUSC	Completed
Town Creek Drive Drainage Improvement Project	The City of Charleston completed drainage improvements designed by B.P. Barber to install catch basins and pipe to prevent significant overland flow from the right-of-way through private property to a marsh behind the property. Minor damage would occur to the garage of the residence. Project was completed in 2011.	City of Charleston	Completed
Rebellion Road	Installation of 4 Checkmates to prevent tidal flooding and installation of pipe lining (CIPP) to preserve the existing CMP outfalls.	City of Charleston	Completed
Barre and Canal Streets	Installation of 2 inlets and piping.	City of Charleston	Completed

White Chapel	Replacement of collapsed CMP drainage system.	City of Charleston	Completed
Pipe repair: Rutledge and Ashley at Colonial Lake	The existing clay pipe in both streets was cleaned, inspected, and lined (CIPP) as part of the renovation of Colonial Lake. The work occurred from Beaufain to Broad Streets.	City of Charleston	Completed
Replacement/installation of check valves	Existing Tideflex valves were replaced at Colonial Street, and the outfalls at Rutledge Avenue and Limehouse Street installed with Checkmate valves to prevent tidal intrusion during high tides. New check valves were installed at the Water Street outfall and on William Ackerman Lane.	City of Charleston	Completed
Otranto Villas Drainage Project	This project was intended to relieve flooding of several repetitive loss properties. A Flood Mitigation Assistance grant was received for this project.	City of North Charleston/City of Hanahan, Berkeley County	Completed
College Heights Drainage Improvements Phase I	This project consisted of enlarging culverts and ditch sections and creating detention between Otranto Road and Highway 78. The flood potential for Auburn Drive, which has two repetitive flood loss properties, has been relieved as a result of this project.	City of North Charleston	Completed
Evanston Estates Drainage Improvement Project	This project involved the installation of piping along Renee Street to improve drainage in this area that holds water.	City of North Charleston	Completed
Union Height Drainage Improvements – Phase II	Phase II near the intersection of Spruill and Arbitus Avenues. This project is funded under the Community Development Block Grant (CDBG) program. Future	City of North Charleston	Completed

	phases of this project will continue as funding is available.		
Hilda Street Drainage Improvements	The City has contracted for drainage pipes to be installed on Hilda Street to tie into a new drainage system being installed for the Bonds Ave School. This will alleviate standing water in the roadway at this location.	City of North Charleston	Completed
South Rhett Drainage Improvements	This project will pipe and improve a roadside ditch along South Rhett Avenue that has been subject to erosion along the edge of the pavement.	City of North Charleston	Completed
Crossroads Drive Drainage Improvements	Improvements to the drainage system along Crossroads Drive that were recommended in the drainage study were designed and constructed.	City of North Charleston	Completed
Industrial Avenue Regional Detention Pond	Regional detention pond recommended in the Brickyard Creek Drainage Basin Study. The City completed acquisition of property for construction of this detention pond.	City of North Charleston	Completed
Deerwood Drive Drainage Improvements	The section of Deerwood Drive generally located between Tyler Street and the Fire Station experiences recurring flooding conditions. This is a low point in the road, however, there is no discernible outfall for the drainage that collects here. This project will construct a drainage outfall to the Salamander Channel.	City of North Charleston	Completed
Pepperdam-Industry Intersection Drainage Improvements	The intersection of Pepperdam Avenue and Industry Drive experiences recurring flooding conditions which render the intersection impassable during significant rain events. This project will install a new piped drainage system to create an alternate outfall location for this intersection.	City of North Charleston	Completed

Northwoods Boulevard CMP Evaluation	The existing Stormwater pipe along Northwoods Blvd. consists of Corrugated Metal Pipe which is exhibiting signs of deterioration and creating recurring sinkholes along Northwoods Blvd. The City is proposing a pipe rehabilitation project. The initial step of the project will be investigation and evaluation of the existing pipe conditions to determine the most effective method of rehabilitation or replacement.	City of North Charleston	Evaluation and Pipe Rehabilitation Completed.
Parkside Drive Drainage Improvements Phase II	Additional drainage improvements on Parkside Drive between Maxwell Street and Iroquois Street.	City of North Charleston	Completed
Jacksonville/Carner Drainage Improvement	Drainage improvements coordinated with redevelopment of property downstream of the Jacksonville/Carner intersection. Improved drainage infrastructure installed.	City of North Charleston	Completed
Constellation Drive CMP Rehabilitation	Relining (concrete spincasting) of failing CMP under Dorchester Road and Constellation Dive.	City of North Charleston	Completed
Morrison Street Drainage Project	This project involves draining water from a low lying area East of Morrison Street to the West side of Morrison Street, and then empties into the marsh.	Town of McClellanville	Completed
Rambler Lane Crossing - Hickory / Rosemead	This project calls for the upgrade of a crossline pipe. The crossline is a choke point for debris during storm events which contributes to flooding of the upstream ditches and yards. Project will require utility relocation, a road cut to install a larger diameter pipe, and downstream bank stabilization.	Town of Mount Pleasant	Completed
Rifle Range Road / Hidden Lakes Outfall Crossing Stabilization	This project installing a headwall where a major ditch channel flows through a piped system under a major town arterial roadway. During Hurricane Gaston water from the upper basin overtopped the	Town of Mount Pleasant	Completed

	<p>roadway and began to undercut the roadways as water tried to channel around the pipe structures. At this time, the piped section has minimum erosion protection. The Town plans to install a concrete headwall to better armor this system and protect the road from failure during a major event. Headwall was installed and is functional.</p>		
<p>Snee Farms Wetlands Restoration and Channel Improvements</p>	<p>This project involves restoring a portion of the headwaters of Boone Hall Creek, which is now a golf course ditch system, to a larger wetlands channel. Project will provide additional water storage during rain events to help reduce flooding of upstream properties (some repetitive loss properties are in this area) and will help improve water quality by filtering run-off pollutants through the new wetlands channel. Due to funding and permitting problems, only a portion of this project was completed in 2007. This project was expanded to include the restoration of a subdivision ditch and outfall channels and possible restoration of a pond outfall near Westos Way. Westos Way pond spillway was reconstructed in 2009.</p>	<p>Town of Mount Pleasant</p>	<p>Completed</p>
<p>Whitehall Terrace</p>	<p>This project is a multiphase project to pipe open drainage ditch system and re-rout systems to reduce flooding occurrences in several interior lots of this neighborhood. This project will also provide a safer neighborhood environment by piping the open systems and installing a sidewalk system. Phase I survey and design are complete. A portion of Phase I was completed in 2006. Phase II was completed in 2007.</p>	<p>Town of Mount Pleasant</p>	<p>Completed</p>

	Phase III is underway and scheduled for completion in 2008. Design of Phase IV is complete, funding is being sought and project is scheduled for 2009. Construction of Phase IV was completed in September 2009.		
Laurel Hill Outfall	A drainage improvement project involving the construction of a new outfall canal to redirect stormwater flows from the Ivy Hall/ Carol Oaks area between Gregory Ferry Road and Highway 17 that currently drain into a wetlands that has no outfall.	Town of Mount Pleasant	Completed
Scott Creek / Goblet Canal Piping Project	This project involved a partnership with a private entity to pipe an upper portion of a large canal system. The canal had experienced heavy erosion due to upstream flows and has grown to hazardous proportions with steep slopes and a deep channel. Because of utilities and home locations in the area, channel stabilization was not feasible	Town of Mount Pleasant	Completed
Waterford Outfall Improvements	This project involved the drainage easement acquisition and the installation of larger diameter outfall pipes for this sub basin. A repetitive loss property exists within the project area.	Town of Mount Pleasant	Completed
Snee Farm Project	The existing lake system was retrofitted with three (3) new bridges, existing culverts were replaced and the pond outfall was reconstructed. These improvements relieved frequent flooding in this 800 plus acre subdivision	Town of Mount Pleasant	Completed
Morrison Street Project	This was a project of adding drainage to prevent frequent flooding to a low to moderate income community which had	Town of Mount Pleasant	Completed

	frequently flooded in the streets, houses, and yards.		
Greenhill Drainage Improvement Project	This project was part of a community development block grant to improve drainage in this low to middle income neighborhood. This project included piping of existing open roadside swales and replacement of culverts, significantly improving the drainage in this neighborhood.	Town of Mount Pleasant	Completed
Dovre Drainage Project	This three-part project consisted of adding underground piping, installing a stormwater management pond, and improving an outfall.	Town of Mount Pleasant	Completed
William Street Project	This project to remedy tidal flooding in this area is complete. Several repetitive loss homes are in this area. This project consisted of replacing failed flap gates and some system modifications.	Town of Mount Pleasant	Completed
Outfall Repairs-Charleston National Subdivision	This project consisted of repairing damages to an outfall pipe for this neighborhood. The pipe was damaged and not functioning, thereby reducing the amount of stormwater that could be released from the drainage system. This project also included coordinating contacts and emergency operations with the neighborhood association.	Town of Mount Pleasant	Completed
Sullivan's Island Curb and Gutter Drainage Line Improvement Project	This project involved the replacement of a malfunctioning drainage system along Middle Street with an adequate system to transport storm water to outfalls, and the subsequent replacement of the curb and guttering system currently deteriorating due to the crushed drainpipe beneath it.	Town of Sullivan's Island	Completed

Edwards Park Phase III	<p>Hazard Mitigation Grant Program from Hurricane Floyd was sought to fund this project. The HMGP grant was denied.</p> <p>This project will involve connecting drainage pipes from three small flood prone basins to the Edwards Park Stormwater Pump Station. Several other small sections of this project remain unfunded as of 2006. The Carr Street portion of this project was completed during 2007. A basin study is funded for FY 10/11 to determine current system operations, capacity, and the limits of adding additional sub-basins to the existing system. Design is complete for upgrades to the Queen Street sub basin. Easements funding are being sought. Freeman Street sub basin is not funded and design needs to be updated.</p>	Charleston County/Town of Mount Pleasant	Completed 2016/ 2017
2013-2014 Asset Management Replacement Program and Capital Improvement Program	Projects include Edwards Park Pump Station rehabilitation, Brickyard Bridge Culvert stabilization, and Laurel Grove Pipe repairs, Belle Hall Hibben Phase 4 pipe repairs, and year 1 of Water Quality Monitoring program projects have been funded for 2013-2014.	Town of Mount Pleasant	Complete
2014-2015 Asset Management Replacement Program and Capital Improvement Program	Projects include Whipple Road Area Subdivision pipe rehabilitation and replacements, Wakendaw/ Mathis Ferry Road area subdivision pipe rehabilitation and repairs, Hickory Shadows/ Rosemead Pipe rehabilitation and repairs, Water Quality Monitoring Program - year 2, Drainage Canal rehabilitation - year 1.	Town of Mount Pleasant	Complete
2015-2016 Asset Management Replacement Program and Capital Improvement Program	Projects include Whipple Road Area Subdivision pipe rehabilitation - and replacements, Wakendaw/ Mathis Ferry Road Phase II area subdivision pipe rehabilitation	Town of Mount Pleasant	Complete

	and repairs, Hickory Shadows/ Rosemead Pipe Phase II rehabilitation and repairs, Water Quality Monitoring Program - year 2, Drainage Canal rehabilitation - year 2.		
2016-2017 Asset Management Replacement Program and Comprehensive Maintenance Program	Projects include Rivertown Phase 3 Section 2, Wando East/ Lakes, Water Quality Monitoring Program - year 3, Drainage Canal rehabilitation survey/ design - Whipple Sports Complex and Mill Tract (North Branch).	Town of Mount Pleasant	Complete
2017-2018 Asset Management Replacement Program and Comprehensive Maintenance Program	Projects include Pipe inspections, cleaning and rehabilitation/ replacements for various pipes though out the Town, Water Quality Monitoring Program - year 4, Drainage Canal rehabilitation - Whipple Sports Complex.	Town of Mount Pleasant	Complete
Drainage Infrastructure Installation Stations 18 ½ and 19	This project consisted of the installation of adequate drainage where none existed and upgrades of inadequate pipe in an area plagued by flooding.	Town of Sullivan's Island	Completed
Change out of Tide Valve at 2nd Street East	Replacement of nonfunctional and outdated whales tale valve for inline tide valve by Charleston County Public Works	City of Folly Beach	Completed
Tide Valve at 310 West	Installation of Flap gate valve at 310 West Hudson out fall to prevent king tide interior island flooding	City of Folly Beach	Completed
Culvert and cross line at 5th East	Installation of new drainage culvert and crossline along East Indian at 5th East	City of Folly Beach	Completed
Culvert and tie in at 6th Street West	Installation of drainage culvert and tie in to existing drainage box at 6th street west by SCDOT	City of Folly Beach	Completed
Crossline cleanout	Cleanout of cross line and outfall at 9th west	City of Folly Beach	Completed
I'On Avenue Drainage	Improvements to drainage along I'On Ave. Funding from Charleston County Transportation Sales Tax Annual Allocation FY 15	Charleston County/Town of Sullivan's Island	Completed

	program and managed by CC Transportation Development Department.		
Pinckney Street Drainage Repairs	Improvements to drainage on town parcel. Funding from Charleston County Transportation Sales Tax Annual Allocation FY 15 program and managed by CC Transportation Development Department.	Charleston County/Town of McClellanville	Completed
Clayton Drive	Installation of an improved outfall to alleviate frequent flooding.	City of Charleston	Completed
Pipe repair and lining: Ashley, Colonial, and Tradd Streets	Partial lining (CIPP) of failing clay pipe in the streets. The storm drain was cleaned and inspected. Where needed, point repairs and/or CIPP lining was used to stabilize the approximately 150-year-old clay pipe.	City of Charleston	Completed
Hut/Abram Road Design	This project involves road design for Johns Island. The funding is being provided by the Charleston County Transportation Sales Tax Program.	Charleston County	Complete
Hanahan Canal	Canal improvements managed by Charleston County Public Works. Funding from Charleston County Transportation Sales Tax Annual Allocation FY 15 program.	Charleston County	Complete
Parkers Ferry / Penny Creek Drainage	Improvements to outfall. Funding from Charleston County Transportation Sales Tax Annual Allocation program and managed by CC Public Works Department.	Charleston County	Complete

Section 7 Adopting Resolution and Jurisdiction-Specific Action Reports

Each government entity that is participating in the Charleston Regional Hazard Mitigation Plan provides an action report on an annual basis for the activities proposed to be undertaken during the coming year for inclusion in this section of the Plan. The time period for the action report is a one-year time period unless otherwise indicated. The action reports include numerous items that collectively address all 14 of the hazards identified as those to which the Region is potentially vulnerable in this plan.

Participating government entities also contribute to action reports regarding the activities proposed for the previous edition of the Plan on an annual basis for inclusion in this section of the Plan. The time period for which the status is provided is indicated on each of these action reports. As is indicated on the action reports, many of the action items are ongoing from year-to-year so are on the action reports for the government entity every year. Updates to activities that have potential for different results each year are provided on the status reports.

As was previously discussed in this plan, the Special Purpose Governments have concurrent jurisdictional boundaries with municipalities and/or the County government. The Special Purpose Governments also have statutorily identified responsibilities that they may perform. For example, special purpose districts that are water and/or sewer commissions are permitted to offer water and sewer services only in their service areas. Similarly, fire district commissions are permitted to offer only fire protection services in their service areas, and park and recreation commissions are limited to offering park/recreation-related services. However, the activities being performed by the municipalities and the County governments, as applicable, are also being provided to the areas services by special purpose district governments due to the concurrent jurisdiction of these government entities and special purpose district governments. Consequently, any activity listed on Charleston County's action plan is similarly provided for the service areas of the special purpose district governments with concurrent jurisdiction with the County (all of fire district commissions, the Charleston County and St. Andrews Parish Park and Recreation Commissions, the North Charleston District and Sewer District Commissions and parts of the Charleston Water System, the James Island and St. Andrews public service districts, and the Charleston County School District). Similarly, the Cooper River Park and Recreation Commission shares concurrent jurisdictions with the City of North Charleston (as does the North Charleston District and the North Charleston Sewer District Commissions and parts of the Charleston Water System). The Mt. Pleasant Water Commission and the Charleston County School District also have concurrent jurisdiction with the Town of Mt. Pleasant. The Charleston Water System (partially), the College of Charleston and the Charleston County School District also share jurisdictional boundaries with the City of Charleston. Table 7-1 shows those plans that include multiple jurisdictions and where to find the plans for each jurisdiction or Special Purpose Government. While each of these government entities has their own action plan in this section, the action plans for the jurisdictions with which they share jurisdictional boundaries also apply to their service areas. Taken together, these action plans address all 14 types of hazards to which the government entities in the Region are potentially vulnerable as discussed in this plan. The action plans and status reports for each of the signatory governments follow in this section.

For each action and each goal addressed, natural hazards will refer to all hazards addressed throughout the entirety of this plan and the aforementioned goals.
 The resolutions for adoption for each jurisdiction will be updated once the plan has been formally adopted for the 2019 annual report.

Table 7-1: Multijurisdictional Plans

Multijurisdictional Plans	Jurisdictions Included	Additional Plan Section
Unincorporated Charleston County	Town of Awendaw	7.2
	Town of Hollywood	7.5
	Town of Lincolnville	7.9
	Town of McClellanville	7.10
	Town of Megget	7.11
	Town of Ravenel	7.14
	Town of Rockville	7.15
	Town of Seabrook Island	7.16
	Town of James Island	7.70
	St. Johns Fire District	7.30
	St. Paul's Fire District	7.31
	Charleston County Parks and Rec	7.18
	St. Andrews Parish Parks and Rec	7.28
	North Charleston District	7.25
	North Charleston Sewer District	7.26
	Charleston Water System	7.20
	James Island Public Service District	7.23
St. Andrews Public Service District	7.29	
City of North Charleston	North Charleston District	7.25
	North Charleston Sewer District	7.26
	Cooper River Park and Playground Commission	7.22
	Charleston Water System	7.20
Town of Mount Pleasant	Mt. Pleasant Water Works Commission	7.24
	Charleston County School District	7.19
City of Charleston	Charleston Water System	7.20
	College of Charleston	7.21
	Charleston County School District	7.19

*Multijurisdictional plans incorporate smaller jurisdictions and special purpose district governments whose boundaries sometimes overlap with larger jurisdictions. This overlap accounts for some of the smaller jurisdictional plans being incorporated into more than one multijurisdictional plan (i.e. Charleston Water System, North Charleston District and Sewer District and Charleston County School District)

7.1 – Unincorporated Charleston County

Resolution for Adoption

A RESOLUTION FOR THE ADOPTION OF THE REVISED CHARLESTON REGIONAL HAZARD MITIGATION PLAN BY CHARLESTON COUNTY COUNCIL

Resolution No. 17-23

WHEREAS the County of Charleston has experienced the effects of natural and man-made hazard events; and

WHEREAS the Charleston Regional Hazard Mitigation and Public Information Plan Committee has prepared a recommended *Charleston Regional Hazard Mitigation Plan*; and

WHEREAS the recommended *Charleston Regional Hazard Mitigation Plan* has been widely circulated for review by residents / business organizations / professional organizations of the unincorporated and incorporated areas of Charleston County, state, federal, regional and local government agencies and has been supported by those reviewers; and

WHEREAS the County of Charleston originally adopted the *Charleston Regional Hazard Mitigation Plan* in 1999 and readopted it in 2004, 2008, and 2013 and is required to adopt the amended version of this plan on a five-year cycle for the County to remain eligible for certain Federal programs in which Charleston County participates, and

NOW THEREFORE be it resolved that

1. The *Charleston Regional Hazard Mitigation Plan* is hereby adopted as an official plan of the County of Charleston, and
2. The Charleston Regional Hazard Mitigation and Public Information Plan Committee is recognized as a continuing entity charged with reviewing, maintaining in accordance with Community Rating System, Flood Mitigation Assistance, Disaster Mitigation Act and Program for Public Information requirements, and periodically reporting on the progress towards and revisions to the plan to the Charleston County Council.

Effective this 19th Day of September, 2017

Action Report for Unincorporated Charleston County

**Unincorporated Charleston County, SC fully services the following jurisdictions and therefore all have the same action report. Additions and individualized projects for this plan will be shown under the applicable jurisdiction: Town of Awendaw, Town of Hollywood, Town of James Island, Town of Lincolnville, Town of McClellanville, Town of Meggett, Town of Ravenel, Town of Rockville, and Town of Seabrook Island.*

Following are the proposed projects to be undertaken / continued in Unincorporated Charleston County for hazard mitigation during May 2019 - April 2020 and their status from May 2018-April 2019.

(Abbreviations for "Type" are as follows: "PA" is Preventive Activities, "PP" is Property Protection Activities, "NB" is Natural and Beneficial Functions/Resource Preservation Activities, "ES" is Emergency Services Activities, "SP" is Structural Projects Activities, and "PI" is Public Information Activities, "GIS" is Geographic Information Systems Activities.)

The following terminology is used to update the current status of each proposed project, as suggested by FEMA: "New", "Ongoing", "Continuous Process", "Deleted", and "Completed".

Hazard Mitigation Goals and Objectives	
Goal 1: Mitigate natural hazard damage	
Objective 1.1	Minimize future flood damage
Objective 1.2	Minimize future earthquake damage
Objective 1.3	Minimize future hurricane damage
Objective 1.4	Minimize future wildfire damage
Objective 1.5	Minimize future tornado-related loss of life
Objective 1.6	Reduce existing flood damage
Goal 2: Increase public preparedness and protection	
Objective 2.1	Protect the lives of our citizens from natural and man-made hazards
Objective 2.2	Educating citizens regarding steps to take to reduce vulnerabilities
Objective 2.3	Promote long-term prosperity
Goal 3: Improve infrastructure	
Objective 3.1	Improve hazard resistance of infrastructure
Objective 3.2	Reduce vulnerability of our infrastructure to natural and man-made hazards
Goal 4: Increase environmental well being	
Objective 4.1	Preserve environmental resources
Objective 4.2	Improve water quality
Objective 4.3	Preserve open space
Objective 4.4	Encourage recreational activities

Based upon the responses to the latest survey questionnaire, the following are the goals for this plan (listed in the order of importance):

1. Reduce potential flood damage
2. Improve storm drainage
3. Minimize future flood occurrence
4. Minimize future hurricane damage
5. Improve hazard resistance of infrastructure
6. Minimize future earthquake damage
7. Protect environmental resources/preserve open and green space
8. Minimize future terrorist incidents
9. Improve water quality
10. Preserve historic building inventory
11. Higher regulatory standard
12. Minimize future hazardous material incidents

Charleston County Hazard Mitigation Actions					
Mitigation Action and Description	Type	Funding Source	Goals and Objectives	Status	Milestones Achieved and Future Plans
	Priority	Responsible Agency		Implementation Schedule	
Continue enforcement of the International Series Building-related and Fire codes and the floodplain management regulations (including the two-foot freeboard, cumulative substantial improvement clause, and/or other provisions deemed necessary to enhance Community Rating System credits) to maintain participation in the National Flood Insurance Program and the Community Rating System.	PA	General Fund	1.1, 1.2, 1.3, 2.1	Ongoing	Unincorporated Charleston County has maintained a Class 4 Rating System (CRS). Upon the next CRS visit, the County plans to improve their rating to a Class 2 or 3.
	1	Building Inspection Services		Continuous Process	
Continue to expand the Community Wildfire Protection Plan (CWPP) to include all Fire Departments / Districts in the County. Support the CWPP by increasing public awareness with the purpose of improving the protection of all structures.	PA, PI	General Fund	1.4, 2.1, 2.2, 3.1, 3.2	Ongoing	Charleston County Consolidatd-911 has streamlined response and the department is accredited by the Commission on Accreditation for Law Enforcement Agencies, Inc. The Natural Hazard Awareness Expo 2018 was geared towards promoting the awareness of all natural hazards that occur in Charleston. The Expo reached about 1000 people.
	1	Building Inspection Services, Project Impact, County-wide Fire Departments and Districts		Continuous Process	

Promote Standards for existing homes to be retrofitted to exceed minimal codes.	PP, PI	General Fund	1.2, 1.3, 1.6, 2.2, 4.1	Ongoing	Reworked and published new brochures to push this message in 2016. Brochures are available at all expos and handed out at County permitting office.
	1	Building Inspection Services		Continuous Process	Worked with Department of Insurance and SC Safe Home program to promote retrofiting. Developed grant-funded community fair for the public to educate on retrofiting practices.
Promote Standards for existing homes to be retrofitted to exceed minimal codes.	PP, PI	General Fund	1.5, 2.2	Ongoing	Education project through use of brochures and information given to citizens. Ongoing on a regular basis as part of established departmental process.
	2	Building Inspection Services		Continuous Process	The Natural Hazard Awareness Expo 2018 was geared towards promoting the awareness of all natural hazards that occur in Charleston. The Expo reached about 1000 people.
Provide hazard related information to all residents through local telephone book. Continue providing information to citizens regarding hazard safe interior rooms (PPI).	PI	General Fund	1.1, 1.3, 2.1, 2.2, 4.2	Ongoing	Servicing local phonebooks and updated yearly for new publications.
	2	Building Inspection Services		Continuous Process	
Continue to provide coordination of County stormwater management through development and implementation of a comprehensive program. Enhance efforts at improving water quality through environmental educational activities.	PA, PI	General Fund Enterprise Fund Grant Funding (FEMA)	1.1, 1.6, 2.2, 3.1, 3.2, 4.2	Ongoing	Charleston County has completed the Stormwater Comprehensive Plan for the 72,000-acre Mead Westvaco site known as East Edisto for development that is now in progress.
		1		Planning Public Works Building Inspection Services Project Impact	In place/In process

Continue implementing the stormwater master plan for Charleston County and the applicable regulations.	PA	Enterprise Fund Grant Funding (FMA)	1.1, 1.3, 2.1	Ongoing	The Stormwater Master Plan was completed in 2012, enforcement is continuing. The county now has current and preliminary digital NFIP Flood Insurance Rate Maps implemented in GIS system. Ongoing on a regular basis as part of established departmental process.
	2	Public Works Building Inspection Services Planning		In place	
Implement new standard requiring reverse grade to move stormwater runoff back towards the property and away from waterways.	PA	General Fund	4.2	New	Planning Stage in Ordinance Assessing the best avenues to implement these standards / regulations.
	2	Public Works Building Inspection Services		In Process	
Continue enforcement of zoning regulations, including, the low density zoning provisions of the Zoning and Land Development Regulations (ZLDR).	PA	General Fund	1.1, 1.2, 1.3, 2.1, 2.3, 4.1, 4.3, 4.4	Existing	The Zoning and Planning Department updated the Comp. Plan in 2015 encouraging the preservation of the rural area, preserving open space, and requiring vegetated buffers along the OCRM Critical Line. Plan will be updated and adopted again in 2018.
	1	Planning		Continuous Process	
Conduct or co-sponsor training workshops regarding the International Building-related, flood, and Fire Prevention Codes and Regulations, and on sustainable construction/landscaping practices, when there is interest in these workshops (PPI).	PA, PI	General Fund Self-supporting through workshop revenues	1.1, 1.2, 1.3, 2.2, 3.1, 4.1	Ongoing	Building Inspection Services participated in 43 meetings, expos, or events between May 2017- April 2018. Director Carl Simmons who spoke at a total of 10 events from SC DOI meetings to FEMA flood map sessions, and Jim Houser speaks regularly at Trident Home Builders meetings (12 events in the past year). The department regular meets with individual citizens, homeowners, contractors, and other local governments.
	1	Building Inspection Services		Continuous Process	

Continue providing information to citizens regarding propane tank anchoring, hazard safe interior rooms, boat anchoring and maintenance, generator safety, riparian buffer zones, hazard resistant landscaping, and artifact protection, among other issues (PPI).	PA, PP, PI, NB	General Fund Grant Funding (HMGP)	1.1, 1.2, 1.3, 2.2, 4.1	Ongoing	Project Impact attended 6 expos through July 2019 where information was distributed to attendees.
	2	Building Inspection Services Project Impact Community Partners		Continuous Process	
Continue enforcing regulations requiring new manufactured homes brought into Charleston County to be constructed to wind zone 2 requirements as required per State law.	PA	General Fund	1.1, 3.2	Ongoing	Enforcement has been maintained including regulations to 2' freeboard. Ongoing on a regular basis as part of established department processes.
	1	Building Inspection Services		Continuous Process	
Continue prohibiting new manufactured homes to be installed in "V" flood zones and requiring manufactured homes installed in "A" flood zones to be on permanent foundations.	PA	General Fund	1.1, 1.2, 1.3, 2.1	Ongoing	Continue to prohibit manufactured homes in VE Zones and require engineered foundations in AE Zones. A change in regulation to 2' freeboard.
	1	Building Inspection Services		Continuous Process	
Continue demolishing structures posing a threat to public safety, considering location within the special flood hazard area as a prioritization factor.	PP	Grant Funding (FMA)	1.1, 1.2, 2.3, 3.2, 4.4	Ongoing	There have been 0 substandard structures demolished through Building Inspection Services since February 2019 in Unincorporated Charleston County and jurisdictions that are fully serviced by the Department.
	3	Building Inspection Services		Continuous Process	
Seek funding for retrofitting demolishing, or relocating repetitively flooded properties, if suitable candidates should be identified. Utilize Charleston County Repetitive Loss Area Analysis for identifying suitable candidates.	PP	Grant Funding (FMA)	1.2, 1.3, 1.6, 3.1, 3.2, 4.1	Existing	As of 2019, there are 2 suitable candidate that met the eligibility requirements and grants have been awarded.
	1	Building Inspection Services		In process	
Continue distributing a brochure on protecting boats from damages during hurricanes to interested citizens through expos, offices, marinas, and boat dealers (PPI).	PP, PI	Grant Funding (HMGP)	1.3, 2.2, 3.1, 4.4	Ongoing	Project Impact attended 6 expos since July 2018 where information was distributed to attendees. Brochure has recently been updated with new information.

	3	Building Inspection Services Project Impact		Continuous Process	
Continue distributing a brochure on protecting and preserving historic artifacts to interested citizens through expos, government offices, etc. (PPI).	PP, PI	Grant Funding	1.1, 2.2, 3.2	Ongoing	Project Impact attended 6 expos since July 2018 where information was distributed to attendees. Brochure has recently been updated with new information.
	2	Building Inspection Services Project Impact		Continuous Process	
Seek funding for retrofitting critical facilities or infrastructure to enhanced hazard resistance in accordance with this County of Charleston Facilities Master Plan Update "Building Utilization and Needs Survey" or other applicable plans as funding sources become available.	PP	Grand Funding (FMA, structural) and Hazard Mitigation Funds	1.2, 1.3, 1.6, 2.3, 3.2	Ongoing	Two grants to Charleston County were awarded for educational programs however no structural components were included in these grants. Grants are being closed out now. Roper St. Francis in partnership with Charleston County received a structural grant to upgrade emergency systems. Grants are in progress. Pending the approval of Hazards Mitigation Funds, County EMD plans to add generator transfer switches to One 180 Place, Lowcountry Food Bank and Coastal Pre-Release Center as well as hurricane shutters to the Coastal Pre-Release Center.
	1	Building Inspection Services and County EMD		In process	
Continue enforcement of the tree protection/landscaping ordinance	NB	General Fund	2.3, 4.1, 4.2, 4.3	Ongoing	All road improvement projects are enhanced with landscape plantings for roads and constructed under the half-percent (1.2%) sales tax. The county continues to administer and enforce its tree protection and preservation ordinance and landscaping ordinance which include grand tree protection and landscape buffer requirements.
	2	Planning		Continuous Process	

Continue maintaining permanent open space as parks and restricted use areas.	NB	General Fund Special Revenue Fund	1.1, 2.3, 4.1, 4.4	Ongoing	139,848 acres are deeded privately or publicly to remain as open space and an estimated 89,000 of that total is in special flood hazard area.
	2	Parks and Recreation Commission Building Inspection Services		Continuous Process	
Continue encouraging the Greenbelt Advisory Board to acquire green space in special flood hazard area, to the extent feasible	NB	Special Revenue Fund	1.1, 2.3, 4.1, 4.2, 4.4	Ongoing	Since its inception, the Greenbelt program has protected 21,170 acres of land in Charleston County.
	2	Building Inspection Services Parks and Recreation Commission		Continuous Process	
Continue participating in “Build-A-Dune” projects as funding permits, and assist other jurisdictions in participating in this initiative upon request. Implement and participate in the Charleston County Beachfront Management Plan to enhance and preserve our coastlines.	NB	Grant Funding (PDM, FMA, HMGP)	1.1, 1.3, 1.6, 2.2, 3.1, 4.1	Depending on Funding / Ongoing	No grant funding was secured for “Build-A-Dune” projects during this time period. The County’s Beachfront Management Plan adopted in 2014 focuses on current conditions, regulations, strategies for preservation and other relevant information and is being maintained as required.
	2	Building Inspection Services Public Works Project Impact		Depending on Funding / Continuous Process	
Continue to distribute literature on riparian buffer zones and hazard resistant landscaping to citizens through government offices and at expos (PPI)	NB, PI	Partner Donations Grant Funding (HMGP)	1.1, 1.3, 2.2, 3.1, 4.1, 4.2, 4.3, 4.4	Ongoing	Project Impact attended 6 expos since July 2018 where information was distributed to attendees. Brochure has recently been updated with new information. The Natural Hazard Awareness Expo 2018 was geared towards promoting the awareness of all natural hazards that occur in Charleston. The Expo reached about 1000 people.
	2	Building Inspection Services Project Impact		Continuous Process	

Develop and implement projects to reduce air and water pollution in Charleston County under the Project Impact partnership. Promote conservation of energy resources.	NB	Grant Funding (HMGP)	4.1, 4.2	Completed	Project Impact attended 6 expos since July 2018 where information was distributed to attendees. Brochure has recently been updated with new information.
	1	Building Inspection Services Project Impact		Completed	The Natural Hazard Awareness Expo 2018 was geared towards promoting the awareness of all natural hazards that occur in Charleston. The Expo reached about 1000 people.
Encourage cooperation between county departments, other government entities, interested businesses, and citizens regarding recommended sustainable practices to protect environmental quality.	NB	Grant Funding (PDM) General Fund	2.3, 4.1, 4.2	Ongoing	All Community Development departments are now using the same web-based software program with extensive transparency for the public.
	2	Building Inspection Services Project Impact Other County Departments as applicable		Continuous Process	
Continue hazardous material training (PPI)	ES, PI	Enterprise Fund Grant Funding	2.1, 3.1, 3.2, 4.1	Ongoing	Emergency Management conducted training sessions on topics including Clandestine Labs, Site Safety Officer, and Rae Systems Portable Tech. In addition, Individuals were sent to specialized training at nationwide core competence centers. Emergency Management conducted training sessions on topics including Clandestine Labs/Site Safety Officer, Rae Systems Portable Technician, IAFF 80-HR Hazardous Materials Technician Course, Surface Transportation Emergency Preparedness and Incident Command. In addition, individuals were sent to

	2	Hazardous Materials Coordinator		Continuous Process	specialized training at nationwide core competence centers including the Nevada National Security Site Center for Radiological/Nuclear Training.
Continue Terrorist Response Training (PPI)	ES	General Fund	2.1, 2.3, 3.1, 4.1	Ongoing	Training occurs on a continual basis, at least annually. For the 2017-18 period, TRT included Active Shooter training conducted by FBI, SLED, DHEC and other agencies.
	1	Hazardous Materials Coordinator		Continuous Process	Training occurs on a continual basis, at least annually. For the 2016-2017 period, Terrorist Response Training included Weapons of Mass Destruction Refresher training conducted by the FBI, SLED, DHEC and other agencies on January 10, 2017 and Preparedness for Suicide Bombing Incidents conducted on Feb. 23-34, 2017.
Continue coordinating Emergency Operations Center activities related to a hazard event, including holding drills for EOC personnel and maintain the Charleston Count Continuity of Operations Plan (COOP).	ES	General Fund	2.1, 2.2,	Ongoing	The EOC regularly holds training sessions for area responders, officials and staff.
	1	Emergency Management		Continuous Process	The Charleston County Emergency Operations Center successfully activated for and effectively coordinated responses to two real world incidents – including Hurricane Irma in 2017 and the ice storm January 2018. Additionally, EOC conducted full scale drill on 6/6/18, to practice and improve practices for an earthquake event.
Continue responding to hazard emergencies.	ES	General Fund Enterprise Fund	2.1, 2.2, 2.3, 3.2, 4.1	Ongoing	Charleston County Consolidated Dispatch recorded 67 fuel spills, 363 Gas Leaks/Odors, 15 Hazmat Incidences, and 573 Outside fires since May 1, 2018.

	1	EMS Fire Departments Sheriff Department Hazmat Coordinator Emergency Management		Continuous Process	
Continue to require improved construction practices for new County-owned critical facilities that are sensitive to flood zone (e.g. avoiding “A” and “V” flood zones where feasible) and seismic considerations.	ES	General Fund Bond Fund	1.1, 1.2, 1.3, 2.1, 3.2	Ongoing	The New Charleston County Emergency (EOC) is located inland outside the SFHA and is fully operational.
	1	Facilities Management		Continuous Process	
Continue working to attain resources and to provide training for maritime firefighting through the Maritime Incident Response Team (MIRT).	ES	Grant Funding (HMGP)	2.1, 2.3, 3.1	Ongoing	Quarterly training sessions on marine firefighting are held at this time and on a regular basis as part of establish departmental processes.
	1	Hazardous Materials Coordinator		Continuous Process	
Maintain the national Weather Service “Storm Ready” and “Tsunami Ready” Community designations.	ES, PI	General Fund	1.1, 1.3, 1.5, 1.6, 2.1, 2.2	Completed	Charleston County has been recertified as a “Storm Ready” and “Tsunami ready” Community. This designation is valid through 2019.
	1	Emergency Management		Completed	
Continue coordinating the Anti-Terrorism Task Force (COBRA) of specially trained police, fire, and EMS personnel to respond to terrorist acts (PPI).	ES	Grant Funding (HMGP)	2.1, 2.2, 2.3, 3.1, 4.1	Ongoing	<p>In addition to conducting various training sessions, the WMD regional Response Team responded to real world assistance calls for suspicious white powder in mailboxes on Sullivan’s Island in 2018 and a possible fentanyl bust in the City of Charleston June 2017 and Lincolnville June 2018. It also conducted a full scale alert and exercise on Feb. 23 2018, with assistance from SLED, DOE, and other agencies.</p> <p>In addition to conducting various training sessions, the WMD Regional Response Team (COBRA) Team responded to a real world assistance call for suspicious powder at the Berkeley County Court House Emergency Management on Jan. 23, 2017. It also conducted a full scale alert and exercise on Feb. 22, 2017, with assistance from SLED, the</p>

	1	Hazardous Materials Coordinator		Continuous Process	Department of Energy and other agencies.
Continue sponsoring the Community Emergency Response Training (CERT) program (PPI).	ES, PI	Grant Funding (LEMPG)	2.1, 2.2	Ongoing	As of June 8, 2018, there are 594 CERT members and 51 teen CERT members active on the roster across Charleston County. Classes were conducted at the Charleston County Volunteer Rescue Squad in the fall of 2017 in order to better prepare the citizens of Charleston County for potential incidents.
	2	Emergency Management		Continuous Process	
Maintain a web-based Emergency Operations Center Capability.	ES	General Fund	2.1, 2.3, 4.1	New	The CEOC successfully upgraded its software to Palmetto which is more robust and has more mapping capabilities than previous software. Palmetto is also used across the state leading to increased coordination and real time interaction in a crisis. To also include detailed info from 5-year update?
	1	Emergency Management		Continuous Process	
Continue the drainage maintenance and canal cleaning program.	SP	General Fund	1.1, 1.6, 2.1, 2.3, 3.1	Ongoing	Continue to survey drainage features and compile a GIS database to improve tracking efficiency. Program goal to reduce mean time between recurring maintenance activities. The Town of Ravenel constructed a new sewer line (TMS 187-00-00-080), which connects to an existing one (TMS 186-00-00-103), improving drainage in the area.
	1	Public Works		Continuous Process	
Continue utility right of way permitting, considering emergency vehicle access and flood zone related issues in permitting decisions.	SP	General Fund	1.1, 1.6, 2.1, 2.3, 3.1	Ongoing	Continue the encroachment permitting process to manage encroachments in ROW and drainage easements to maintain and improve emergency vehicle access and flood zone issues. Continue to require that when new ROW is permitted/added deeded drainage easements are required as part of the permit/approval process.

	1	Public Works		Continuous Process	
Continue the elevation reference mark inspection program.	SP	General Fund	1.1	Existing	Benchmarks are annually inventoried and updated and/or recovered. By tilting high accuracy GPS the National Geodetic Survey has accepted Stability B benchmarks.
	1	Public Works		Continuous Process	
Continue to provide design, permitting, and construction services for the drainage improvement projects.	SP	Grant Funding General Fund	1.1, 1.6, 2.1, 2.3, 3.1	Existing	There were 13 completed projects providing drainage improvements paving of dirt roads and sidewalks and 235 paved roads were resurfaced or applied a preservation application to provide better vehicle travel conditions from May 1, 2016 to April 30, 2017. Other projects are ongoing on a regular basis as part of establish departmental process.
	1	Public Works Assistant Admin for Transp. & Public Works (Transp. Sales Tax)		Continuous Process	
Continue the road/repair construction program considering needs during evacuation and soil liquefaction potential in prioritization decisions.	SP	General Fund Grant Funding (FMA/PDM) Enterprise Funding	1.1, 1.2, 1.6, 2.1, 2.3, 3.1	Completed	There were 13 completed projects providing drainage improvements paving of dirt roads and sidewalks and 235 paved roads were resurfaced or applied a preservation application to provide better vehicle travel conditions from May 1, 2016 to April 30, 2017. Other projects are ongoing on a regular basis as part of establish departmental process. In the Town of James Island, the Harbor View Road Bridge and causeway at James Island Creek are a main focus for repair. The bridges at Folly Road and Ellis Creek and Riverland Drive at New Town Cut have been rebuilt in the past year. Buxton Bridge over James Island Creek and the causeway will be the focus of future projects.
	1	Public Works Assistant Admin for Transp. & Public Works (Transp. Sales Tax)		Continuous Process	

Design/elevate roadways being constructed or reworked through the sales tax program to minimize flooding potential to the extent feasible. Identify those roads susceptible to flooding.	SP	Enterprise Funding	1.1, 1.2, 1.6, 2.1, 2.3, 3.1	Ongoing	The Main, Hollings, Holmes, and Sallie Manigault Rds. Improvement projects were completed through the end of 2016 period. Trexler Ave, Victory Ln., and Jewel St., projects were completed during the 2016-17 period. Improvements included elevating the road, improving the capacity of the drainage system (culverts) reducing potential flooding. These Improvements were funded through the County wide half-cent sales tax program.
	1	Assistant Admin. For Transp. & Public Works (Transp. Sales Tax)		Ongoing	The Structural Project Impact Subcommittee is focusing on improving flood and emergency routes.
Continue to distribute a generator safety brochure to interested generator retail outlets, utility companies and the general public (PPI).	SP	Partner Donations General Fund	1.3, 2.1, 2.2, 3.1	Ongoing	Project Impact attended 6 expos since July 2018 where information was distributed to attendees. Brochure has recently been updated with new information.
	2	Building Inspection Services Project Impact		Continuous Process	The Natural Hazard Awareness Expo 2018 was geared towards promoting the awareness of all natural hazards that occur in Charleston. The Expo reached about 1000 people.
Continue to provide information about the USGS stream gauge program to the public (PPI)	SP	Partner Donations Grant Funding	1.1, 1.3, 2.1, 2.2, 4.2	New	Working on possible new avenues for disseminating new information such as brochures, expo presentations and continuing the partnership with USGS.
	2	Building Inspection Services Project Impact		Continuous Process	
Continue providing hazard-related literature/information to citizens at County offices (PPI)	PI	General Fund	1.1, 1.2, 1.3, 1.4, 1.6, 2.1, 2.2	Existing	Printed materials (brochures, pamphlets, etc.) are always displayed and made available for public use.

	2	Building Inspection Services Project Impact		Continuous Process	Printed media are also updated on a regular basis.
Mail an outreach project to floodplain residents to those property owners whose property is located in special flood hazard areas (PPI)	PI	General Fund		Completed	In preparation for the upcoming grant funded community fair, mailing and advertisements were sent out to property owners in the area and invite them to this hazard related event to educate themselves on their flood risk.
	1	Building Inspection Services Project Impact	1.1, 1.3, 2.1, 2.2, 4.2	Completed	
Continue providing speakers to civic groups regarding hazard related activities and environmental quality topics (PPI).	PI	General Fund	2.1, 2.3, 4.2	Ongoing	Building Inspection Services participated in 47 meetings, expos, or events since May 2018.
	1	Building Inspection Services Project Impact		Continuous Process	
Continue programs aimed towards providing resources to local schools and civic groups to enhance their ability to educate students regarding hazard events and hazard event preparation. Provide educational programs to schools on hazards or environmental quality as opportunities arise (PPI).	PI	Grant Funding (HMGP) Project Impact Resources	1.1, 2.1, 2.2, 3.2, 4.2	Ongoing	Project Impact has awarded mini-grant to teachers and other educators to fund special lessons in hazard mitigation annually since 2010. Worked with Kaleidoscope Summer Camp program to give out 100s of activity books this year. Multiple brochures and children's activity books are also handed out to

	1	Project Impact		Continuous Process	students of all ages on a regular basis at expos and in offices. Ongoing on a regular basis as part of established departmental process.
Continue participating in hazard-related/product or environmental protection-related expos or public events (PPI).	PI	General Fund	2.1, 2.2, 3.2, 4.2	Ongoing	<p>Building Inspection Services participated in 47 meetings, expos, or events between May 2017-2018.</p> <p>The Natural Hazard Awareness Expo 2018 was geared towards promoting the awareness of all natural hazards that occur in Charleston. The Expo reached about 1000 people.</p>
	2	Building Inspection Services Project Impact		Continuous Process	
Maintain the flood zone frequently asked questions page on the Charleston County web site to provide information on protecting against flood hazards to the public (PPI)	PI	General Fund	2.2	Existing	<p>Respond to, and update on a regular basis. In addition, a flood hotline has been set up for inquires during the preliminary map review process. This phone line is active and monitored.</p> <p>A newspaper advertisement was also published in March 2017 for citizens to mail in inquiries for a staff member to return with a phone call.</p>
	2	Building Inspection Services		Continuous Process	
Maintain the Project Impact internet page on the Charleston website to relay information on Project Impact events and methods to reduce hazard-related losses to the public (PPI).	PI	General Fund	2.2	Ongoing	The internet page is monitored constantly and updated with new information and/or brochures as they become available.
	2	Building Inspection Services		Continuous Process	

Maintain a web page with information on environmental resources protection/air and water quality pollution reduction strategies. Promote carpooling, public transportation and bicycle paths.	PI	Grant Funding	2.2, 4.1, 4.2	Ongoing	Facebook and Twitter sites are maintained and updated.
	1	Building Inspection Services Public Information		Continuous Process	Television programming produced is available for view on "YouTube".
Continue educational efforts and initiatives promoting energy conservation. Promote LEED construction practices.	PI	Grant Funding (HMGP) General Fund	2.2, 4.1	Ongoing	Project Impact attended 6 expos since May 2018. Three mini-grants to area schools also supported energy conservation and hazard mitigation.
	2	Building Inspection Services		Continuous Process	
Continue participating in the annual maintenance and approval of Hazard Mitigation Plan / Program for Public Information Committee efforts to achieve maximum public outreach.	PI, PA, PP, NB, ES, SP	General Fund	2.2	Ongoing	During this period, the County has held 2 public meetings and maintained correspondence with jurisdictions about the importance of the Plan.
	1	Building Inspection Services Project Impact		Continuous Process	
Maintain the Web and Facebook Pages for Project Impact (PPI)	PI	General Fund	2.2, 4.1, 4.2	Ongoing	Respond to, and update on a regular basis.
	1	Building Inspection Services Project Impact Public Information		Continuous Process	Ongoing on a regular basis as part of established departmental process.

Continue inter-departmental efforts to share geographic digital information and property specific construction-related information.	GIS	General Fund Grant Funding (HMGP)	2.1	Ongoing	Continue compiling updated Topo and Storm Drainage System Expansion information. This system is maintained constantly and updated whenever new data is available.
	2	GIS Building Inspection Services Planning at Stormwater Emergency Management		Continuous Process	
Digitize elevation certificates and make them accessible to the public.	PI	Project Impact Fund General Fund	1.1	Ongoing	Completed archive and continues as new elevation certificates are received. Ongoing on a regular basis as part of establish departmental process.
	2	Building Inspection Services		Continuous Process	
Prepare flood insurance assessment table and address the community's insurance coverage gaps and other concerns.	PI, PP	General Fund	1.1, 1.3, 2.1	Ongoing	Completed assessment for 2019 PIP, will continue to assess for yearly Hazard Mitigation Plan update or as new information becomes available, whichever is sooner. The Natural Hazard Awareness Expo 2018 was geared towards promoting the awareness of all natural hazards that occur in Charleston. The Expo reached about 1000 people. Attendees were able to find their property on the new FEMA flood maps in order to address flood insurance concerns.
	1	Building Inspection Services		Continuing Process	
Continue to conduct studies on BFEs, floodways, and other pertinent flood concerns.	PA, PP	Grant Funding (FMA)	1.1, 1.6, 2.1	Existing	Active process – concurrent with drainage improvement plans and studies being conducted in reference to new Federal Emergency Management Agency maps.
	1	Planning Building Inspection Services		Continuous Process	

Maintain the beachfront management plan that preserves our shorelines.	NB	General Fund	1.1, 2.1	New	Beachfront management plan is required by state law; regulations will be implemented with the next ordinance amendment later in 2018 and approved by County Council.
	1	Building Inspection Services		Continuous Process	The approved Natural Benefits Project Impact Subcommittee has focused on developing a living shorelines project alongside non-profit organizations.

Additional Recommended Projects may be added to this project list as the Project Impact/Disaster Resistant Communities committees consider other projects and recommend these projects for implementation.

7.2 - Town of Awendaw

Resolution for Adoption

A RESOLUTION FOR THE ADOPTION OF THE REVISED CHARLESTON REGIONAL HAZARD MITIGATION PLAN BY TOWN OF AWENDAW

Resolution No. 2017-1

WHEREAS the County of Charleston has experienced the effects of natural and man-made hazard events; and

WHEREAS the Charleston County Council approved the formation Charleston Regional Hazard Mitigation Plan Committee that has prepared a recommended *Charleston Regional Hazard Mitigation Plan*; and

WHEREAS the recommended *Charleston Regional Hazard Mitigation Plan* has been widely circulated for review by residents / business organizations / professional organizations of the unincorporated and incorporated areas of Charleston County, state, federal, regional and local government agencies and has been supported by those reviewers; and

WHEREAS the Town of Awendaw has adopted the *Charleston Regional Hazard Mitigation Plan*, most recently readopted it in 2013, and is required to adopt the amended version of this plan on a five-year cycle for the Town to remain eligible for certain Federal programs in which Charleston County participates; and

NOW THEREFORE be it resolved that

1. The *Charleston Regional Hazard Mitigation Plan* is hereby adopted as an official plan of the Town of Awendaw, and
2. The Charleston Regional Hazard Mitigation Plan Committee is recognized as a continuing entity charged with reviewing, maintaining the *Charleston Regional Hazard Mitigation Plan* in accordance with Community Rating System, Flood Mitigation Assistance, Disaster Mitigation Act and Public Information Plan requirements, and periodically reporting on the progress towards and revisions to the plan to the Board of Trustees.

Effective this 3 Day of August 2017

Megae
Clerk: 

Action Report for the Town of Awendaw, SC

This jurisdiction is fully serviced by Charleston County. Please refer to Section 7.1 for the full action plan. Below are the proposed projects additional to the action plan of Charleston County.

(Abbreviations for "Type" are as follows: "PA" is Preventive Activities, "PP" is Property Protection Activities, "NB" is Natural and Beneficial Functions/Resource Preservation Activities, "ES" is Emergency Services Activities, "SP" is Structural Projects Activities, and "PI" is Public Information Activities, "GIS" is Geographic Information Systems Activities.)

The following terminology is used to update the current status of each proposed project, as suggested by FEMA: "New", "Ongoing", "Continuous Process", "Deleted", and "Completed".

Hazard Mitigation Goals and Objectives	
Goal 1: Mitigate natural hazard damage	
Objective 1.1	Minimize future flood damage
Objective 1.2	Minimize future earthquake damage
Objective 1.3	Minimize future hurricane damage
Objective 1.4	Minimize future wildfire damage
Objective 1.5	Minimize future tornado-related loss of life
Objective 1.6	Reduce existing flood damage
Goal 2: Increase public preparedness and protection	
Objective 2.1	Protect the lives of our citizens from natural and man-made hazards
Objective 2.2	Educating citizens regarding steps to take to reduce vulnerabilities
Objective 2.3	Promote long-term prosperity
Goal 3: Improve infrastructure	
Objective 3.1	Improve hazard resistance of infrastructure
Objective 3.2	Reduce vulnerability of our infrastructure to natural and man-made hazards
Goal 4: Increase environmental well being	
Objective 4.1	Preserve environmental resources
Objective 4.2	Improve water quality
Objective 4.3	Preserve open space
Objective 4.4	Encourage recreational activities

Additional Recommended Projects may be added to this project list as the Project Impact/Disaster Resistant Communities committees consider other projects and recommend these projects for implementation

Town of Awendaw Hazard Mitigation Action Report					
Mitigation Action and Description	Type	Funding Source	Goals and Objectives	Status	Milestones Achieved and Future Plans
	Priority	Responsible Agency		Implementation Schedule	
Continue enforcement of zoning regulations, including, low density zoning and encourage cluster development to preserve open space	PA	General Fund	1.1, 1.2, 1.3, 2.1, 2.3, 4.1, 4.3, 4.4	Existing	The Planning Department updated the Comprehensive Plan in 2017 encouraging the preservation of the rural areas and open space. Also, several Planned Developments have been approved which preserve open space.
	1	Planning		Ongoing	
Continue implementing the stormwater master plan for Charleston County and the applicable regulations	PA	Enterprise Fund Grant Funding (FMA)	1.1, 1.3, 2.1	Ongoing	The Stormwater Master Plan was completed in 2012, enforcement is continuing. The county now has current and preliminary digital NFIP Flood Insurance Rate Maps implemented in GIS system. Ongoing on a regular basis as part of established departmental process. Through the development approval process, the Town of Awendaw requires Low Impact Design per the Low Impact Development in Coastal SC: A Planning and Design Guide.
	2	Public Works Building Inspection Services Town Planning		In place	
Continue encouraging the Greenbelt Advisory Board to acquire green space in special flood hazard area, to the extent feasible	NB	Special Revenue Fund	1.1, 2.3, 4.1, 4.2, 4.4	Ongoing	Since its inception, the Greenbelt program has protected 21,170 acres of land in Charleston County including the 300 acre Town of Awendaw Park site, a passive park including a 50 acre lake.
	2	Building Inspection Services Parks and Recreation Commission		Continuous Process	

Continue the drainage maintenance and canal cleaning program and obtain easements on existing drainage ways when the opportunity arises.	SP	General Fund	1.1, 1.6, 2.1, 2.3, 3.1	Ongoing	Continue to survey drainage features and compile a GIS database to improve tracking efficiency. Program goal to reduce mean time between recurring maintenance activities
	1	Public Works Planning		Continuous Process	Per the Town's priority list, SCDOT is working one week each quarter to improve drainage ditches along roads in Awendaw (NEW) Town of Awendaw encourages and requires where possible, drainage easement dedication to the county for undedicated drainage easements. (NEW)
Continue providing hazard-related literature/information to citizens at County offices and Awendaw Town Hall (PPI)	PI	General Fund	1.1, 1.2, 1.3, 1.4, 1.6, 2.1, 2.2	Existing	Printed materials (brochures, pamphlets, etc.) are always displayed and made available for public use.
	2	Building Inspection Services Project Impact		Continuous Process	Printed media are also updated on a regular basis.
Continue working with scouts on the Project Impact scout patch program	NB	Grant Funding (HMGP) General Fund	1.2, 2.2, 3.2 (establishing cooperative relationships between the public, private and non-profit sectors to enhance preparedness for all hazard events)	NEW Ongoing	NEW: Working with local boy scout troop on Awendaw East Coast Greenway Phase 1 to determine areas where they can help improve drainage.
	2	Building Inspection Services, Planning Project Impact		Continuous Process	
Design/elevate roadways being constructed or reworked through the ½ cent sales tax program to minimize flooding potential to the extent feasible. Identify those roads susceptible to flooding.	SP	Special Revenue Fund	1.1, 1.2, 1.6, 2.1, 2.3, 3.1	NEW Ongoing	These projects include paving and improving drainage: Martin George Road, phase 1 paved, swales; Maxville Road phase 1 paved, swales; Porcher School Road extension platted, to be paved Fall 2019; Thompson Hill Road phase 1 to be completed by end of 2019.
	1	Assistant Administrator for Transportation & Public Works (Transportation Sales Tax)		NEW Ongoing	

Promote environmental pollution reduction strategies through Public Service Announcements; pilot projects; and meetings with government, neighborhood, civic, and professional groups.	PI	General Fund	2.2 (establishing cooperative relationships between the public, private and non-profit sectors to enhance preparedness for all hazard events)	NEW Ongoing	Seek opportunities to work with developers to implement Low Impact Development projects (bio-swales etc.) Town will include periodical related articles in the quarterly newsletter and website.
	1	Town Planning and Building Inspection Services Project Impact		NEW Continuous Process	
Seek funding for retrofitting critical facilities or infrastructure to enhanced hazard resistance in accordance with this County of Charleston Facilities Master Plan Update "Building Utilization and Needs Survey" or other applicable plans as funding sources become available. This includes seeking funding to upgrade Awendaw Town Hall and for generators for Town Hall and the water system pump.	PP	Grant Funding (FMA, Structural)	2.2 (establishing cooperative relationships between the public, private and non-profit sectors to enhance preparedness for all hazard events)	NEW Ongoing	Two grants to Charleston County were awarded for educational programs however no structural components were included in these grants. Grants are being closed out now. Roper St. Francis in partnership with Charleston County received a structural grant to upgrade emergency systems. Seek grants for Town Hall improvements.
	1	Building Inspection Services and Town Admin.		NEW Continuous Process	
Help prevent wildfires.	PA/PI	Planning		NEW Ongoing	Working with Awendaw Fire Department, educate developers and the public about the risk of debris burning. Publish article in Town newsletter and inform developers that burning permits not recommended.
	2				
Mail an outreach project brochure to floodplain residents to those property owners whose property is located in special flood hazard areas (PPI)	PI	General Fund		Completed	Brochure was mailed to 462 residents of the Town of Awendaw in January 2019.

7.3 - City of Charleston

Resolution for Adoption



A RESOLUTION FOR THE ADOPTION OF THE REVISED
CHARLESTON REGIONAL HAZARD MITIGATION PLAN BY
CHARLESTON CITY COUNCIL

Resolution no.
2018-004

WHEREAS the City of Charleston has experienced the effects of natural and man-made hazard events; and

WHEREAS the Charleston Regional Hazard Mitigation and Public Information Plan Committee has prepared a recommended *Charleston Regional Hazard Mitigation Plan*; and

WHEREAS the recommended *Charleston Regional Hazard Mitigation Plan* has been widely circulated for review by residents / business organizations / professional organizations of the unincorporated and incorporated areas of Charleston County, state, federal, regional and local government agencies and has been supported by those reviewers; and


WHEREAS the City of Charleston originally adopted the *Charleston Regional Hazard Mitigation Plan* in 1999 and readopted it in 2004, 2008 and 2013 and it is required to adopt the amended version of this plan on a five-year cycle for the County to remain eligible for certain Federal programs in which the City of Charleston participates, and

NOW THEREFORE be it resolved that

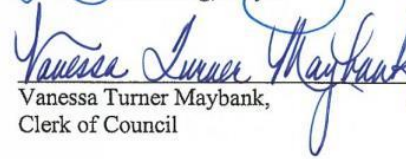
1. The *Charleston Regional Hazard Mitigation Plan* is hereby adopted as an official plan of the City of Charleston, and
2. The Charleston Regional Hazard Mitigation and Public Information Plan Committee is recognized as a continuing entity charged with reviewing, maintaining in accordance with Community Rating System, Flood Mitigation Assistance, disaster Mitigation Act and Program for Public

Information requirements, and periodically reporting on the progress towards and revisions to the plan to the City Council of Charleston.

Effective this 23rd Day of January, 2018



John J. Tecklenburg, Mayor



Vanessa Turner Maybank,
Clerk of Council

Action Report for the City of Charleston, SC

Following are the proposed projects to be undertaken / continued in the City of Charleston for hazard mitigation during May 2018 - April 2019 and their status from

May 2017 - April 2018.

<i>City of Charleston Hazard Mitigation Actions</i>					
<i>Mitigation Action and Description</i>	<i>Type</i>	<i>Funding Source</i>	<i>Goals and Objectives</i>	<i>Status</i>	<i>Milestones Achieved</i>
	<i>Priority</i>	<i>Responsible Agency</i>		<i>Implementation Schedule</i>	
Continue to maintain completed FEMA Elevation Certificates on all buildings constructed in the SFHA	PA, PI	General Fund	1.1	Ongoing	The City of Charleston elevation certificates SFHA and has begun these elevation certifi public a
	1	Building Inspections		Continuous process	
Continue Stormwater Utility Program	PA, PP, PI	General Fund, self-funding	1.1, 1.6, 2.2, 3.1, 3.2, 4.2	Ongoing	The City of Charleston c Stormwater Ut
	1	Public Service		Continuous process	
Continue enforcement of building-related, flood, and fire prevention codes and regulations	PA, PP	General Fund	1.1, 1.2, 1.3, 2.1	Ongoing	The City of Charleston codes and regulations th structures. The City additional and amen improve buildin
	1	Building Inspections, Engineering		Continuous process	
Continue to provide coordination of City stormwater management regulations	PA, PP	General Fund	1.1, 1.6, 2.2, 3.1, 3.2, 4.2	Ongoing	The City of Charleston c local stormwater mana The City is also consid amended regulations to manage
	1	Public Service		Continuous process	
Continue stormwater management as guided by the "Master Drainage and Floodplain Management Plan"	PA, PP	General Fund	1.1, 1.6, 2.2, 3.1, 3.2, 4.2	Ongoing	The City of Charles implement the object Drainage and Floodplai
	1	Public Service		Continuous process	
Continue enforcement of zoning ordinances	PA, PP, NB	General Fund	1.1, 1.2, 1.3, 2.1, 2.3, 4.1, 4.3, 4.4	Ongoing	The City of Charleston local zoning ordinanc considering additio regulations to improve
	1	Planning, Preservation & Sustainability		Continuous process	
Continue to ensure that projects are approved by State's Office of Ocean & Coastal Resource Management	PA, NB	General Fund	1.1, 1.6, 4.1, 4.2	Ongoing	The City of Charleston any necessary approvals the City providing p issuing p
	1	Public Service		Continuous process	

Provide information to citizens regarding hazard-safe interior rooms	PP, PI	General Fund	1.5, 2.2	Ongoing	The City of Charleston resources to citizens to interior
	2	Building Inspections		Continuous process	
Demolish structures posing a threat to public safety, considering location within the SFHA as a prioritization factor	PP, NB	Grant funding (FMA, HMGP)	1.1, 1.3, 1.6, 2.3, 3.2, 4.4	Ongoing	The City of Charleston funds to acquire and damaged in the 2015 flood been demolished to submitted grant applications further acquisitions
	2	Public Service		In process	
Seek funding for retrofitting, demolishing, or relocating repetitively flooded properties	PP, NB	Grant funding (FMA, HMGP)	1.1, 1.3, 1.6, 2.3, 3.2, 4.4	Ongoing	The City of Charleston funding and grant opportunities demolition, elevation properties that have experienced flood loss
	2	Public Service		Continuous process	
Continue enforcement of tree protection and landscaping ordinances	NB	General Fund	2.3, 4.1, 4.3, 4.4	Ongoing	The City of Charleston continues tree protection ordinances considering additional ordinances to improve requirements
	2	Planning, Preservation & Sustainability		Continuous process	
Continue planning, developing, and maintaining open space and parks in flood prone areas	NB, PA	General Fund	1.1, 2.3, 4.1, 4.3, 4.4	Ongoing	The City of Charleston continues the location of open space areas to provide natural prevent damage
	2	Parks; Planning, Preservation & Sustainability		Continuous process	
Continue hazardous materials training	ES	Enterprise Fund	2.1, 3.1, 4.1	Ongoing	The City of Charleston hazardous materials training staff
	1	Fire, Police, Public Service		Continuous process	
Continue terrorist response training	ES	General Fund	2.1, 2.3, 3.1	Ongoing	The City of Charleston terrorist response training staff
	1	Police		Continuous process	
Continue coordinating Emergency Operations Center activities for hazard events	ES	General Fund	2.1, 2.2, 2.3	Ongoing	The City of Charleston the Municipal Emergency and coordinate inter Emergency Operations
	1	Emergency Management		Continuous process	

Continue membership in the Emergency Council, which sponsors the Charleston County Emergency Plan	ES	General Fund	2.1, 2.2, 2.3	Ongoing	The City of Charleston participate in the Emergency Council
	1	Mayor		Continuous process	
Continue responding to hazard emergencies	ES	General Fund, Enterprise Fund	2.1, 2.2, 2.3	Ongoing	The City of Charleston coordinate a coordinated response to emergencies
	1	Emergency Management, Police, Fire		Continuous	
Continue ongoing City drainage projects and studies	SP, PA, PP	General Fund, grant funding (FMA, PDM), Stormwater fees	1.1, 1.6, 2.1, 2.3, 3.1, 4.2	Ongoing	The City of Charleston continue current drainage projects. The City is also considering projects for flood prevention and flood prevention
	2	Public Service		Continuous process	
Seek funding for proposed City drainage projects and studies (if the FEMA cost-benefit analysis is favorable)	SP, PA, PP	Grant funding (FMA, PDM), Stormwater fees	1.1, 1.6, 2.1, 2.3, 3.1, 4.2	Ongoing	The City of Charleston explore opportunities for new projects, including a road drainage improvements project on King and Highway 17
	2	Public Service		Continuous process	
Continue the drainage inspection and maintenance and canal cleaning programs	SP, PA	General Fund, Stormwater fees	1.1, 1.6, 2.1, 2.3, 3.1, 4.2	Ongoing	The City of Charleston inspect and maintain drainage infrastructure
	2	Public Service		Continuous process	
Continue utility right-of-way permitting, considering emergency vehicle access and flood zone issues in permitting decisions	SP	General Fund	1.1, 1.6, 2.1, 2.3, 3.1	Ongoing	The City of Charleston continue permitting for utility projects
	2	Public Service		Continuous process	
Continue the road repair / construction program, considering evacuation needs and soil liquefaction potential in prioritization decisions	SP	General Fund, grant funding (FMA, PDM)	1.1, 1.2, 1.6, 2.1, 2.3, 3.1, 4.2	Ongoing	The City of Charleston continue the repair and construction of roads
	2	Public Service		Continuous process	
Continue the elevation reference mark (ERM) inspection program	SP	General Fund	1.1	Ongoing	The City of Charleston continue the ERM inspection program with Charleston County
	2	Public Service		Continuous	
Continue providing Flood Insurance Rate Map (FIRM) information and continue publicizing this service annually	PI	General Fund	1.1, 1.6, 2.1, 3.2	Ongoing	The City of Charleston provide FIRM information to citizens and an annual flood information water utility
	1	Public Service		Continuous	

Continue providing the Flood Protection Library at the Charleston County Public Library branches	PI	General Fund	1.1, 1.3, 1.6, 2.1, 2.2	Ongoing	The City of Charleston materials for the Flood
	1	Public Service		Continuous process	
Continue outreach to floodplain residents and repetitive loss properties by mailing flood hazard pamphlets annually	PI	General Fund	1.1, 1.3, 1.6, 2.1, 2.2	Ongoing	The City of Charleston annual flood information utility
	1	Public Service		Continuous process	
Continue outreach to all residents by including flood hazard information in the BellSouth telephone book	PI	General Fund	1.1, 1.3, 1.6, 2.1, 2.2	Ongoing	The City of Charleston with Charleston County hazard information in
	1	Charleston County Building Inspection Services		Continuous process	
Continue providing hazard-related literature and information to citizens	PI	General Fund	1.1, 1.2, 1.3, 1.5, 2.1, 2.2	Ongoing	The City of Charleston hazard information to City's website and literature Center. The City also information kiosks
	1	Public Service, Building Inspections, Emergency Management		Continuous process	
Continue participating in hazard-related expos	PI	General Fund	1.1, 1.2, 1.3, 1.5, 2.1, 2.2	Ongoing	The City of Charleston participate in local hazard forums, and c
	1	Building Inspections		Continuous process	
Continue partnership with the 113 Calhoun Street Multi-hazard Residential Retrofit Mitigation and Education Program Planning Project	PI	General Fund	1.1, 1.2, 1.3, 2.1, 2.2, 3.2	Ongoing	The City of Charleston participate in the 113 Calhoun Street Multi-hazard Residential Retrofit Mitigation and Education Program
	1	Building Inspections, Public Service, SC Sea Grant Consortium		Continuous process	
Continue to sponsor and participate in "Hazard Awareness Week" and assist other communities in participating	PI	General Fund	1.1, 1.2, 1.3, 1.5, 2.1, 2.2	Ongoing	The City of Charleston and participate in "Hazard
	1	Building Inspections		Continuous process	
Continue participating in the Project Impact Program for Public Information (PIP) to achieve maximum public outreach	PI	General Fund	2.1, 2.2	Ongoing	The City of Charleston participate in the PIP and initiati

	1	Project Impact committee members		Continuous process
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(Abbreviations for “Type” are as follows: “PA” is Preventive Activities, “PP” is Property Protection Activities, “NB” is Natural and Beneficial Functions/Resource Preservation Activities, “ES” is Emergency Services Activities, “SP” is Structural Projects Activities, and “PI” is Public Information Activities, “GIS” is Geographic Information Systems Activities.)

(The following terminology is used to update the current status of each proposed project, as suggested by FEMA: “New”, “Ongoing”, “Continuous Process”, “Deleted”, and “Completed”.)

Hazard Mitigation Goals and Objectives	
Goal 1: Mitigate natural hazard damage	
Objective 1.1	Minimize future flood damage
Objective 1.2	Minimize future earthquake damage
Objective 1.3	Minimize future hurricane damage
Objective 1.4	Minimize future wildfire damage
Objective 1.5	Minimize future tornado-related loss of life
Objective 1.6	Reduce existing flood damage
Goal 2: Increase public preparedness and protection	
Objective 2.1	Protect the lives of our citizens from natural and man-made hazards
Objective 2.2	Educate citizens regarding steps to take to reduce vulnerabilities
Objective 2.3	Promote long-term economic prosperity
Goal 3: Improve infrastructure	
Objective 3.1	Improve hazard resistance of infrastructure
Objective 3.2	Reduce vulnerability of our infrastructure to natural and man-made hazards
Goal 4: Increase environmental well being	
Objective 4.1	Preserve environmental resources
Objective 4.2	Improve water quality
Objective 4.3	Preserve open space
Objective 4.4	Encourage recreational activities

Based upon the responses to the latest survey questionnaire, the following are the goals for this plan (listed in the order of importance):

1. Reduce potential flood damage
2. Improve storm drainage
3. Minimize future flood occurrence
4. Minimize future hurricane damage
5. Improve hazard resistance of infrastructure
6. Minimize future earthquake damage

7. Protect environmental resources/preserve open and green space
8. Minimize future terrorist incidents
9. Improve water quality
10. Preserve historic building inventory
11. Higher regulatory standard
12. Minimize future hazardous material incidents

City of Charleston Hazard Mitigation Actions					
Mitigation Action and Description	Type	Funding Source	Goals and Objectives	Status	Milestones Achieved and Future Plans
	Priority	Responsible Agency		Implementation Schedule	
Continue to maintain completed FEMA Elevation Certificates on all buildings constructed in the SFHA	PA, PI	General Fund	1.1	Ongoing	The City of Charleston continues to maintain elevation certificates for structures in the SFHA and has begun the process of digitizing these elevation certificates for improved public access.
	1	Building Inspections		Continuous process	
Continue Stormwater Utility Program	PA, PP, PI	General Fund, self-funding	1.1, 1.6, 2.2, 3.1, 3.2, 4.2	Ongoing	The City of Charleston continues to operate its Stormwater Utility Program.
	1	Public Service		Continuous process	
Continue enforcement of building-related, flood, and fire prevention codes and regulations	PA, PP	General Fund	1.1, 1.2, 1.3, 2.1	Ongoing	The City of Charleston continues to enforce codes and regulations that prevent damage to structures. The City is also considering additional and amended regulations to improve building protection.
	1	Building Inspections, Engineering		Continuous process	
Continue to provide coordination of City stormwater management regulations	PA, PP	General Fund	1.1, 1.6, 2.2, 3.1, 3.2, 4.2	Ongoing	The City of Charleston continues to coordinate local stormwater management regulations. The City is also considering additional and amended regulations to improve stormwater management
	1	Public Service		Continuous process	
Continue stormwater management as guided by the "Master Drainage and Floodplain Management Plan"	PA, PP	General Fund	1.1, 1.6, 2.2, 3.1, 3.2, 4.2	Ongoing	The City of Charleston continues to implement the objectives of the "Master Drainage and Floodplain Management Plan".
	1	Public Service		Continuous process	
Continue enforcement of zoning ordinances	PA, PP, NB	General Fund	1.1, 1.2, 1.3, 2.1, 2.3, 4.1, 4.3, 4.4	Ongoing	The City of Charleston continues to enforce local zoning ordinances. The City is also considering additional and amended regulations to improve zoning protections.
	1	Planning, Preservation & Sustainability		Continuous process	

City of Charleston Hazard Mitigation Actions

Mitigation Action and Description	Type	Funding Source	Goals and Objectives	Status	Milestones Achieved and Future Plans
	Priority	Responsible Agency		Implementation Schedule	
Continue to ensure that projects are approved by State's Office of Ocean & Coastal Resource Management	PA, NB	General Fund	1.1, 1.6, 4.1, 4.2	Ongoing	The City of Charleston continues to require any necessary approvals from OCRM prior to the City providing project approvals or issuing permits.
	1	Public Service		Continuous process	
Provide information to citizens regarding hazard-safe interior rooms	PP, PI	General Fund	1.5, 2.2	Ongoing	The City of Charleston continues to provide resources to citizens to improve the safety of interior rooms.
	2	Building Inspections		Continuous process	
Demolish structures posing a threat to public safety, considering location within the SFHA as a prioritization factor	PP, NB	Grant funding (FMA, HMGP)	1.1, 1.3, 1.6, 2.3, 3.2, 4.4	Ongoing	The City of Charleston has received grant funds to begin acquisition and demolition of properties damaged in the 2015 floods. The City has submitted grant applications for further acquisitions and demolitions following Hurricanes Matthew and Irma.
	2	Public Service		In process	
Seek funding for retrofitting, demolishing, or relocating repetitively flooded properties	PP, NB	Grant funding (FMA, HMGP)	1.1, 1.3, 1.6, 2.3, 3.2, 4.4	Ongoing	The City of Charleston continues to seek funding and grant opportunities for structure demolition, elevation, or relocation for properties that have experienced repetitive flood losses.
	2	Public Service		Continuous process	
Continue enforcement of tree protection and landscaping ordinances	NB	General Fund	2.3, 4.1, 4.3, 4.4	Ongoing	The City of Charleston continues to enforce its tree protection ordinances. The City is also considering additional and amended ordinances to improve tree protection requirements.
	2	Planning, Preservation & Sustainability		Continuous process	
Continue planning, developing, and maintaining open space and parks in flood prone areas	NB, PA	General Fund	1.1, 2.3, 4.1, 4.3, 4.4	Ongoing	The City of Charleston continues to encourage the location of open spaces in flood prone areas to provide natural infiltration and prevent damage to buildings.
	2	Parks; Planning, Preservation & Sustainability		Continuous process	
Continue hazardous materials training	ES	Enterprise Fund	2.1, 3.1, 4.1	Ongoing	The City of Charleston continues to provide hazardous materials training to all necessary staff.
	1	Fire, Police, Public Service		Continuous process	

City of Charleston Hazard Mitigation Actions

Mitigation Action and Description	Type	Funding Source	Goals and Objectives	Status	Milestones Achieved and Future Plans
	Priority	Responsible Agency		Implementation Schedule	
Continue terrorist response training	ES	General Fund	2.1, 2.3, 3.1	Ongoing	The City of Charleston continues to provide terrorist response training to all necessary staff.
	1	Police		Continuous process	
Continue coordinating Emergency Operations Center activities for hazard events	ES	General Fund	2.1, 2.2, 2.3	Ongoing	The City of Charleston continues to manage the Municipal Emergency Operations Center and coordinate interaction with other Emergency Operations Centers in the area.
	1	Emergency Management		Continuous process	
Continue membership in the Emergency Council, which sponsors the Charleston County Emergency Plan	ES	General Fund	2.1, 2.2, 2.3	Ongoing	The City of Charleston continues to participate in the Emergency Council.
	1	Mayor		Continuous process	
Continue responding to hazard emergencies	ES	General Fund, Enterprise Fund	2.1, 2.2, 2.3	Ongoing	The City of Charleston continues to provide a coordinated response to emergency events.
	1	Emergency Management, Police, Fire		Continuous	
Continue ongoing City drainage projects and studies	SP, PA, PP	General Fund, grant funding (FMA, PDM), Stormwater fees	1.1, 1.6, 2.1, 2.3, 3.1, 4.2	Ongoing	The City of Charleston continues to manage current drainage projects and studies. The City is also considering additional drainage and flood prevention studies.
	2	Public Service		Continuous process	
Seek funding for proposed City drainage projects and studies (if the FEMA cost-benefit analysis is favorable)	SP, PA, PP	Grant funding (FMA, PDM), Stormwater fees	1.1, 1.6, 2.1, 2.3, 3.1, 4.2	Ongoing	The City of Charleston continues to seek opportunities for new drainage projects and studies and for funding to support those projects.
	2	Public Service		Continuous process	
Continue the drainage inspection and maintenance and canal cleaning programs	SP, PA	General Fund, Stormwater fees	1.1, 1.6, 2.1, 2.3, 3.1, 4.2	Ongoing	The City of Charleston continues to inspect and maintain drainage facilities in the City.
	2	Public Service		Continuous process	
Continue utility right-of-way permitting, considering emergency vehicle access and flood zone issues in permitting decisions	SP	General Fund	1.1, 1.6, 2.1, 2.3, 3.1	Ongoing	The City of Charleston continues to manage permitting for utility rights-of-way.
	2	Public Service		Continuous process	

City of Charleston Hazard Mitigation Actions

Mitigation Action and Description	Type	Funding Source	Goals and Objectives	Status	Milestones Achieved and Future Plans
	Priority	Responsible Agency		Implementation Schedule	
Continue the road repair / construction program, considering evacuation needs and soil liquefaction potential in prioritization decisions	SP	General Fund, grant funding (FMA, PDM)	1.1, 1.2, 1.6, 2.1, 2.3, 3.1, 4.2	Ongoing	The City of Charleston continues to manage the repair and construction of roads.
	2	Public Service		Continuous process	
Continue the elevation reference mark (ERM) inspection program	SP	General Fund	1.1	Ongoing	The City of Charleston continues to manage the ERM inspection program, in coordination with Charleston County Public Works.
	2	Public Service		Continuous	
Continue providing Flood Insurance Rate Map (FIRM) information and continue publicizing this service annually	PI	General Fund	1.1, 1.6, 2.1, 3.2	Ongoing	The City of Charleston continues to provide FIRM information to citizens and distributes an annual flood information pamphlet in water utility bills.
	1	Public Service		Continuous	
Continue providing the Flood Protection Library at the Charleston County Public Library branches	PI	General Fund	1.1, 1.3, 1.6, 2.1, 2.2	Ongoing	The City of Charleston continues to provide materials for the Flood Protection Library.
	1	Public Service		Continuous process	
Continue outreach to floodplain residents and repetitive loss properties by mailing flood hazard pamphlets annually	PI	General Fund	1.1, 1.3, 1.6, 2.1, 2.2	Ongoing	The City of Charleston continues to distribute annual flood information pamphlet in water utility bills.
	1	Public Service		Continuous process	
Continue outreach to all residents by including flood hazard information in the BellSouth telephone book	PI	General Fund	1.1, 1.3, 1.6, 2.1, 2.2	Ongoing	The City of Charleston continues to coordinate with Charleston County to provide flood hazard information in the telephone book.
	1	Charleston County Building Inspection Services		Continuous process	
Continue providing hazard-related literature and information to citizens	PI	General Fund	1.1, 1.2, 1.3, 1.5, 2.1, 2.2	Ongoing	The City of Charleston continues to provide hazard information to citizens through the City's website and literature in the Permit Center. The City also plans to provide information kiosks at City parks.
	1	Public Service, Building Inspections, Emergency Management		Continuous process	
Continue participating in hazard-related expos	PI	General Fund	1.1, 1.2, 1.3, 1.5, 2.1, 2.2	Ongoing	The City of Charleston continues to participate in local hazard-

City of Charleston Hazard Mitigation Actions

Mitigation Action and Description	Type	Funding Source	Goals and Objectives	Status	Milestones Achieved and Future Plans
	Priority	Responsible Agency		Implementation Schedule	
	1	Building Inspections		Continuous process	related expos, forums, and conferences.
Continue partnership with the 113 Calhoun Street Multi-hazard Residential Retrofit Mitigation and Education Program Planning Project	PI	General Fund	1.1, 1.2, 1.3, 2.1, 2.2, 3.2	Ongoing	The City of Charleston continues to participate in the 113 Calhoun Street Multi-hazard Residential Retrofit Mitigation and Education Program Planning Project.
	1	Building Inspections, Public Service, SC Sea Grant Consortium		Continuous process	
Continue to sponsor and participate in "Hazard Awareness Week" and assist other communities in participating	PI	General Fund	1.1, 1.2, 1.3, 1.5, 2.1, 2.2	Ongoing	The City of Charleston continues to sponsor and participate in "Hazard Awareness Week".
	1	Building Inspections		Continuous process	
Continue participating in the Project Impact Program for Public Information (PIP) to achieve maximum public outreach	PI	General Fund	2.1, 2.2	Ongoing	The City of Charleston continues to participate in the PIP and other Project Impact initiatives.
	1	Project Impact committee members		Continuous process	

7.4 - City of Folly Beach

Resolution for Adoption



CITY OF FOLLY BEACH

Introduced by: Mayor Goodwin
Date: December 12, 2017

RESOLUTION 57-17

A RESOLUTION FOR THE ADOPTION OF THE REVISED CHARLESTON REGIONAL HAZARD MITIGATION PLAN BY THE CITY OF FOLLY BEACH.

WHEREAS, The County of Charleston has experienced the effects of natural and man-made hazard events; and

WHEREAS, The Charleston County Council approved the formation of the Charleston Regional Hazard Mitigation Project Committee that has prepared a recommended *Charleston Regional Hazard Mitigation Plan*; and

WHEREAS, The recommended *Charleston Regional Hazard Mitigation Plan* has been widely circulated for review by residents / business organizations / professional organizations of the unincorporated and incorporated areas of Charleston County, state, federal, regional and local government agencies and has been supported by those reviewers; and

WHEREAS, The City of Folly Beach has adopted the *Charleston Regional Hazard Mitigation Plan*, most recently readopted it in 2013, and is required to adopt the amended version of this plan on a five-year cycle for the City to remain eligible for certain Federal programs in which Charleston County participates; and

NOW, THEREFORE, BE IT RESOLVED, that

1. The *Charleston Regional Hazard Mitigation Plan* is hereby adopted as an official plan of the City of Folly Beach; and
2. The Charleston Regional Hazard Mitigation Project Committee is recognized as a continuing entity charged with reviewing, maintaining the *Charleston Regional Hazard Mitigation Plan* in accordance with the Community Rating System, Flood Mitigation Assistance, Disaster Mitigation Act and Public Information Plan requirements, and periodically reporting on the progress towards and revisions to the plan to the governing bodies of the participating municipalities.

RATIFIED this 12th day of December 2017 at Folly Beach, South Carolina, in City Council duly assigned.



Tim Goodwin, Mayor

ATTEST:



Municipal Clerk

Action Report for the City of Folly Beach, SC

Following are the proposed projects to be undertaken in the City of Folly Beach for hazard mitigation during May 2019 - April 2020 and their status from May 2018 - April

2019.

(Abbreviations for “Type” are as follows: “PA” is Preventive Activities, “PP” is Property Protection Activities, “NB” is Natural and Beneficial Functions/Resource Preservation Activities, “ES” is Emergency Services Activities, “SP” is Structural Projects Activities, and “PI” is Public Information Activities, “GIS” is Geographic Information Systems Activities.)

The following terminology is used to update the current status of each proposed project, as suggested by FEMA: “New”, “Ongoing”, “Continuous Process”, “Deleted”, and “Completed”.

Hazard Mitigation Goals and Objectives	
Goal 1: Mitigate natural hazard damage	
Objective 1.1	Minimize future flood damage
Objective 1.2	Minimize future earthquake damage
Objective 1.3	Minimize future hurricane damage
Objective 1.4	Minimize future wildfire damage
Objective 1.5	Minimize future tornado-related loss of life
Objective 1.6	Reduce existing flood damage
Goal 2: Increase public preparedness and protection	
Objective 2.1	Protect the lives of our citizens from natural and man-made hazards
Objective 2.2	Educating citizens regarding steps to take to reduce vulnerabilities
Objective 2.3	Promote long-term prosperity
Goal 3: Improve infrastructure	
Objective 3.1	Improve hazard resistance of infrastructure
Objective 3.2	Reduce vulnerability of our infrastructure to natural and man-made hazards
Goal 4: Increase environmental well being	
Objective 4.1	Preserve environmental resources
Objective 4.2	Improve water quality
Objective 4.3	Preserve open space
Objective 4.4	Encourage recreational activities

Based upon the responses to the latest survey questionnaire, the following are the goals for this plan (listed in the order of importance):

1. Reduce potential flood damage
2. Improve storm drainage
3. Minimize future flood occurrence
4. Minimize future hurricane damage
5. Improve hazard resistance of infrastructure
6. Minimize future earthquake damage
7. Protect environmental resources/preserve open and green space
8. Minimize future terrorist incidents
9. Improve water quality
10. Preserve historic building inventory
11. Higher regulatory standard
12. Minimize future hazardous material incidents

<i>City of Folly Beach Hazard Mitigation Actions</i>					
<i>Mitigation Action and Description</i>	<i>Type</i>	<i>Funding Source</i>	<i>Goals and Objectives</i>	<i>Status</i>	<i>Milestones Achieved and Future Plans</i>
	<i>Priority</i>	<i>Responsible Agency</i>		<i>Implementation Schedule</i>	
Continue enforcement of the International Series Building-related and Fire codes and the floodplain management regulations (including the cumulative substantial improvement clause, and/or other provisions deemed necessary to enhance Community Rating System credits) to maintain participation in the National Flood Insurance Program and the Community Rating System.	PA	General Fund	1.1, 1.2, 1.3, 2.1	Ongoing	City of Folly Beach has achieved a Class 4 Rating System (CRS). Upon the next CRS cycle visit, the City will try to improve the rating to a Class 3.
	1	Building Department		Continuous Process	
Continue to provide coordination of County Storm Water management regulations and City Storm Water infrastructure improvements.	PA	General Fund	1.1, 1.3, 1.6, 3.1, 4.2	Ongoing	City of Folly Beach takes part in quarterly Storm Water Partners meetings with Charleston County and SCDOT to plan, prioritize, and implement storm water projects within the jurisdiction.
	1	Public Works Department		Continuous Process	
Continue to enforce Zoning regulations.	PP, PI	General Fund	1.1,1.2,1.3, 1.6, 4.3, 4.4	Ongoing	Working on revisions to Beach and Dune management plan and Marsh management plan. Worked out Short Term Rental Ordinance changes and sign regulations.
	1	Planning Department		Continuous Process	
Prohibit new manufactured home to be installed in both A and V flood zones.	PA	General Fund	1.1, 1.2, 1.3, 3.2	Ongoing	Ongoing on a regular basis as part of established departmental process.
	1	Zoning Department		Continuous Process	

City of Folly Beach Hazard Mitigation Actions

Mitigation Action and Description	Type	Funding Source	Goals and Objectives	Status	Milestones Achieved and Future Plans
	Priority	Responsible Agency		Implementation Schedule	
Provide hazard related information to all residents through local telephone book, website, mailouts, and brochures	PP	General Fund	1.1, 1.3, 2.1, 2.2, 4.2	Ongoing	Continually updating website and mail outs to residents. Participating with Charleston County for Phone Books.
	1	Building & IT Departments		Continuous Process	
Recognize “International Building Safety Week” to promote safety in the built environment.	PI	General Fund	1.1-1.6, 2.1-2.3	Ongoing	Recognized by resolution in public meeting and Website.
	1	Building Department		Continuous Process	
Continue participating in the Project impact Program for Public Information (PPI) to achieve maximum public outreach.	PI	General Fund	2.1, 2.2, 2.3	Ongoing	Actively participated in all Project Impact meetings and sub-committee meetings to continue project impact effectiveness and outreach.
	1	Building and Zoning committee members		Continuous Process	
Continue enforcement of tree protection/landscaping ordinance.	NB	General Fund	1.1,2.2, 3.2, 4.1, 4.2, 4.3	Ongoing	Improved tree ordinance in 2014 and continuously enforce landscaping standards to help with erosion control and storm water management.
	1	Building and Zoning Departments		In place and continuous process	
Continue maintaining permanent open space as parks.	NB	General Fund	1.1, 2.2, 3.2, 4.1-4.3	Ongoing	1 new passive/pocket park added and improved. Ongoing grant applications.
	1	Zoning, Facilities, and Park and Recreation Board		Continuous Process	
Continue to distribute information on riparian buffer zones and hazard resistant landscaping to citizens through government offices and at expos.	NB	General Fund	1.1, 2.2, 3.2, 4.1, 4.2, 4.3	Ongoing	Participating in Project Impact Committee Expos
	1	Zoning Department		Continuous Process	
Continue Terrorist Response Training.	ES	General Fund	2.1, 2.2	Ongoing	Joint public awareness campaign with Charleston County Emergency Services and Law Enforcement.
	1	FB Public Safety		In Process	
Continue Coordinating Municipal Emergency Operations Center (MEOC) activities in the event of a hazard/disaster.	ES	General Fund	2.1,2.2,2.3	Ongoing	Conducting 3 rd annual MEOC exercise/drill with outside consultant August of 2019.
	1	FB Public Safety		In Process	
Continue responding to hazard emergencies	ES	General Fund	1.1,1.4,2.1, 2.3	Ongoing	Successful response and recovery for both Hurricane

City of Folly Beach Hazard Mitigation Actions

Mitigation Action and Description	Type	Funding Source	Goals and Objectives	Status	Milestones Achieved and Future Plans
	Priority	Responsible Agency		Implementation on Schedule	
	1	FB Public Safety, Public Works, Planning, Code Enforcement, Utilities, and Administration		Continuous Process	Matthew and Irma. Emergency drill and rehearsals for upcoming potential events with outside agencies through Charleston County Emergency Management.
Continue to require construction practices for new City and Private facilities that are sensitive to Flood zone (AE and VE) issues and Seismic issues.	SP	General Fund and FEMA Grant (HMGP)	1.1, 1.2, 1.3, 1.5, 2.1, 3.1	Ongoing	Obtained mitigation grant from FEMA for new Roof at City Hall and Impact Rated Glazing throughout the building. In process now. Previously put new roof on PW Facility. Completed March 2019.
	1	Building Department		Completed	
Evaluate City-owned facilities for hazard resistance and retrofit facilities if needed where feasible.	SP	Gen Fund and FEMA Grant (HMGP)	1.3, 1.5, 3.1, 3.2	Ongoing	Obtained mitigation grant from FEMA for new Roof at City Hall and Impact Rated Glazing throughout the building. In process now. Previously put new roof on PW Facility.
	2	Facilities and Building Department		In process	
Continue Drainage maintenance program.	SP	General Fund	1.1, 1.6, 2.1, 2.2, 3.1, 3.2	Ongoing	Changed out 3 Tide valves and ordering 2 more, opened 4 drainage ditches and installed mini pump station to pump water out of one problematic ditch system. Hired Consulting firm to provide Island Wide Comprehensive drainage study and recommendations for infrastructure improvements.
	1	Public Works, City Council, Administration		Continuous and in process	
Continue Road Repair/Construction Program. Design/elevate roadways being constructed or reworked through the ½ cent sales tax program. Identify those roads susceptible to flooding.	SP	Enterprise Funding	2.1, 1.6, 1.1, 1.3, 3.2	Ongoing	Applying for TST and CTC Grant funded projects. 9 th West Drainage improvement and roadway improvement in process now.
	1	Administration and Public Works		In process	
Island Wide Drainage study/assessment.	PA	General Fund	Determine drainage assets in place and create project goals for future drainage improvement projects	In progress	Kick off meeting, data collection from County Storm Water Office.
	1	COFB/Consultant		Fiscal Year	

City of Folly Beach Hazard Mitigation Actions

Mitigation Action and Description	Type	Funding Source	Goals and Objectives	Status	Milestones Achieved and Future Plans
	Priority	Responsible Agency		Implementation on Schedule	
Engineer & construct redundant water source	ES	Water Fund (Grant, Loan, Bond)	Create backup water source for drinking water and firefighting if our single main is damaged	In progress	Concept Plan & preliminary grant application complete Future plans: Engineering, permitting funding, and construction.
	1	City of Folly Beach		2020	
Participate in training workshops regarding the International Building-related, flood, and Fire Prevention Codes and Regulations if there is interest in these workshops	PA	General Fund/Self-supporting through workshop revenues	2.1-2.3, 4.1	In Progress	New
	1	Building Inspections		Continuous Process	
Continue Participation in the Charleston County Special Inspection Program	PA	General Fund	1.2, 1.3, 2.1	In progress	New
	1	Building/Zoning Department		Continuous Process	
Promote standards for existing homes to be retrofitted to that exceed minimal codes	PP	General Fund	1.2, 1.3, 1.6, 2.2, 4.1	In progress	New
	2	Building/Zoning Department		Continuous Process	
Continue demolishing structures posing a threat to public safety, considering location within the special flood hazard area as a prioritization factor	PP	Grant Funding	1.1, 1.3, 1.6, 2.3, 3.2, 4.4	In progress	New
	3	Building/Zoning Department		Continuous Process	
Continue providing information to citizens regarding hazard safe interior rooms	PP	General Fund	1.5, 2.2	Deleted due to funding	New
	2	Building/Zoning Department		N/A	
Continue utility right of way permitting, considering emergency vehicle access and flood zone related issues in permitting decisions	SP	General Fund	1.1, 1.6, 2.1, 2.3, 3.1	In progress	New
	1	Public Works		Continuous Process	
Mail and outreach project to floodplain residents to those property owners whose property is located in the special flood hazard area	PI	General Fund	1.1, 1.3, 2.1, 2.2, 4.2	In progress	Continuous
	1	Building/Zoning Department		Continuous Process	

Additional Recommended Projects may be added to this project list as the Project Impact/Disaster Resistant Communities committees consider other projects and recommend these projects for implementation.

7.5 - Town of Hollywood

Resolution for Adoption

TOWN OF HOLLYWOOD, SC

**ADOPTION OF THE REVISED
CHARLESTON REGIONAL HAZARD MITIGATION PLAN
Resolution 18-2013-14**

WHEREAS the County of Charleston has experienced the effects of natural and man-made hazard events; and

WHEREAS the Charleston Regional Hazard Mitigation Project Committee has prepared a recommended *Charleston Regional Hazard Mitigation Plan*; and

WHEREAS the recommended *Charleston Regional Hazard Mitigation Plan* has been widely circulated for review by residents / business organizations / professional organizations of the unincorporated and incorporated areas of Charleston County, state, federal, regional and local government agencies and has been supported by those reviewers; and

WHEREAS the Town of Hollywood originally adopted the *Charleston Regional Hazard Mitigation Plan* in 1999 and readopted it in 2004, again in 2008, and is required to adopt the amended version of this plan on a five-year cycle for the Town of Hollywood to remain eligible for certain Federal programs in which Charleston County participates, and

NOW THEREFORE be it resolved that:

1. The *Charleston Regional Hazard Mitigation Plan* is hereby adopted as an official plan of the Town of Hollywood, and
2. The Charleston Regional Hazard Mitigation Project Committee is recognized as a continuing entity charged with reviewing, maintaining in accordance with Community Rating System, Flood Mitigation Assistance, and Disaster Mitigation Act requirements, and periodically reporting on the progress towards and revisions to the plan to the Town of Hollywood. **Effective this 11th Day of December, 2013**

Mayor Jacquelyn S. Heyward

Mayor Pro Tem Herbert Townsend

Councilmember John Dummer, III

Councilmember Ezell G. Middleton

Councilmember Althea Salters

Councilmember Annette Sausser

Councilmember Kenneth L. Smalls Sr.

Attest:

Niema Gantt-Brown, Town Clerk-Treasurer

Action Report for the Town of Hollywood, SC

This jurisdiction is fully serviced by Charleston County. Please refer to Section 7.1 for the full action plan. There are no proposed projects additional to the action plan of Charleston

County.

7.6 - City of Isle of Palms

Resolution for Adoption

**A RESOLUTION FOR THE ADOPTION OF THE REVISED *CHARLESTON REGIONAL HAZARD MITIGATION PLAN* BY
ISLE OF PALMS CITY COUNCIL**

WHEREAS the City of Isle of Palms has experienced the effects of natural and man-made hazard events;
and

WHEREAS the Charleston Regional Hazard Mitigation and Public Information Plan Committee has prepared and recommended *Charleston Regional Hazard Mitigation Plan*; and

WHEREAS the recommended *Charleston Regional Hazard Mitigation Plan* has been widely circulated for review by residents / business organizations/professional organizations of the unincorporated and incorporated areas of Charleston County, state, federal, regional and local government agencies and has been supported by those reviewers; and

WHEREAS the City of Isle of Palms originally adopted the *Charleston Regional Hazard Mitigation Plan* in 1999 and readopted it in 2004, 2008, and 2013 and is required to adopt the amended version of this plan on a five-year cycle for the County and the City of Isle of Palms to remain eligible for certain Federal programs in which Charleston County participates, and

NOW THEREFORE be it resolved that

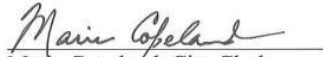
1. The *Charleston Regional Hazard Mitigation Plan* is hereby adopted as an official plan of the City of Isle of Palms, and
2. The Charleston Regional Hazard Mitigation and Public Information Plan Committee is recognized as a continuing entity charged with reviewing, maintaining in accordance with Community Rating System, Flood Mitigation Assistance, Disaster Mitigation Act and Program for Public Information requirements, and periodically reporting on the progress towards and revisions to the plan to the Isle of Palms City Council.

Effective this 28th day of November, 2017.

Attest:



Dick Cronin, Mayor



Marie Copeland, City Clerk



Action Report for the City of Isle of Palms, SC

Following are the proposed projects to be undertaken in the City of Isle of Palms for hazard mitigation during May 2019 - April 2020 and their status from May 2018 - April 2019.

(Abbreviations for "Type" are as follows: "PA" is Preventive Activities, "PP" is Property Protection Activities, "NB" is Natural and Beneficial Functions/Resource Preservation Activities, "ES" is Emergency Services Activities, "SP" is Structural Projects Activities, and "PI" is Public Information Activities, "GIS" is Geographic Information Systems Activities.)

The following terminology is used to update the current status of each proposed project, as suggested by FEMA: "New", "Ongoing", "Continuous Process", "Deleted", and "Completed".

City of Isle of Palms Hazard Mitigation Actions					
Mitigation Action and Description	Type	Funding Source	Goals and Objectives	Status	Milestones Achieved and Future Plans
	Priority	Responsible Agency		Implementation Schedule	
Continue enforcement of Building-related, flood and Fire Prevention Codes and Regulations.	PA	General Fund	Minimize hazard event damage; protect the lives of our citizens from natural and man-made hazards	Ongoing	All construction projects are reviewed for compliance with the codes.
	1	Building, Planning & Zoning		Continuous Process	
Continue to provide coordination of NPDES storm water management regulations	PA	General Fund	Eliminate stormwater pollution and enhance the system's ability to minimize flooding	Ongoing	All construction projects are reviewed for compliance with the NPDES regulations. In 2019, the City increase the stormwater management fee from \$48 to \$72 to accumulate additional funds to use towards stormwater and drainage related projects.
	1	Public Works		Continuous Process	
Continue enforcement of zoning regulations	1	General Fund	Promote a more hazard-resilient community	Ongoing	All construction projects are reviewed for compliance with the zoning regulations.
	PA	Building, Planning & Zoning		Continuous Process	

Continue efforts to monitor the shoreline to preserve a healthy beach with adequate dune fields and vegetation to mitigate storm damage.	1	Beach Preservation Fund	Preservation of a healthy beach to mitigate storm damage Promote a more hazard-resilient community	Ongoing	The City continues to monitor the shoreline and expend resources to preserve a healthy beach. The City included funds in FY20 budget to evaluate the feasibility and need of a future project at Breach Inlet. The City completed the second Beach Renourishment Project on the north end of the island, where approximately 1 million cubic yards of sand were pumped onto the beach, creating a dune sand beach where significant erosion was threatening beachfront properties.
	PP	General Government		Continuous Process	
Provide information to citizens regarding benefits of hazard mitigation measures	2	Grant Funding (FMA)	Promote a more hazard-resilient community	Ongoing	The Building Department regularly advises citizens on mitigating hazards
	PP	Building, Planning & Zoning		Continuous Process	
Seek funding for retrofitting, demolishing or relocating repetitively flooded properties.	3	General Fund	Promote a more hazard-resilient community	Ongoing	The City continues to provide information regarding funding opportunities to flood prone property owners. In 2019, the City obtained a FEMA Flood Mitigation Grant on behalf of a resident who has suffered repetitive loss to elevate his home.
	NB	General Government		Continuous Process	
Continue enforcement of the tree protection/landscaping ordinance.	2	General Fund	Preserve environmental resources; improve hazard resistance	Ongoing	All projects are reviewed for compliance with the tree protection regulations.
	NB	General Government		Continuous Process	
Continue the elevation reference marks inspection program.	NB	General Fund	Promote a more hazard resilient community and minimize hazard event damage	Ongoing	Charleston County continues to inventory the elevations reference marks every year and will continue this effort into the future.
	1	Building, Planning & Zoning		Continuous Process	
Continue hazardous material training.	ES	General Fund	Minimize hazard event damage; protect the	Ongoing	Each year the City trains on hazardous materials and will continue this effort into the future.

	1	All City Departments	lives of our citizens from natural and man-made hazards	Continuous Process	
Continue Active Shooter Training with a goal of 100% of the officers having completed this training.	ES	General Fund	Minimize hazard event damage; protect the lives of our citizens from natural and man-made hazards	Ongoing	Police Department has met their goal 100% of officers having completed the training. The City has a goal of training all employees and elected officials. In 2017, all elected officials and supervisors participated in an active shooter training.
	1	Police Department		Continuous Process	
Continue Training in the National Incident Management System "NIMS" program	ES	General Fund	Minimize hazard event damage; protect the lives of our citizens from natural and man-made hazards	Ongoing	Each year the appropriate City staff members train on the NIMS program and this effort will continue into the future.
	1	All City Departments		Continuous Process	
Continue coordinating Emergency Operations Center activities in the event of a hazard event by participating in drills and offering and encouraging disaster preparedness among citizens.	ES	General Fund	Establish cooperative relationships to enhance response for hazard events	Ongoing	The City participated in the emergency drill conducted on June 7, 2017, to practice and improve upon lessons learned from these tropical weather systems.
	1	All City Departments, County Emergency Preparedness and Dispatch		Continuous Process	
Continue responding to hazard emergencies.	ES	General Fund	Protect the lives of citizens from natural hazards	Ongoing	The City responds to all emergencies.
	1	General Government, Police and Fire Departments		Continuous Process	
Recommend construction practices for new City-owned critical facilities which are sensitive to flood zone (e.g., avoiding "V" flood zones where feasible) and seismic considerations (e.g., avoiding areas subject to liquefaction where feasible).	ES	General Fund/ Bond	Minimize future flood damage; improve hazard resistance of infrastructure	Ongoing	All City projects are reviewed to determine if improvements could be made to minimize damage.
	1	Building, Planning & Zoning		Continuous Process	
Continue to endeavor to construct wind resistant and flood resistant city facilities when replacing older assets.	ES	General Fund & Tourism Funds	Minimize future flood damage; improve hazard	Ongoing	The City will be replacing the roof of the public safety building in the coming year and a higher wind resistant level will be considered.

	1	Building, Planning & Zoning	resistance of infrastructure	Continuous Process	
Continue the drainage maintenance, periodic dredging and canal cleaning program.	SP	General Fund	Minimize future flood damage; preserve environmental resources; improve hazard resistance of infrastructure.	Ongoing	The City has a contract with Eadie's Construction Company for cleaning repairs and maintenance of City's storm drainage system. This contract was recently amended to increase the frequency ditches are cleaned out of vegetation and debris, ditches are renovated and pipes cleaned.
	1	Public Works and General Government		Continuous Process	The City hired Thomas and Hutton for the design, engineering and permitting comprehensive redesign of three of the City's major drainage outfalls.
Continuing beach monitoring to ensure the preservation of dunes and vegetation sufficient to offer storm protection.	NB, PP, SP	Tourism Funds	Protect the lives of citizens from natural hazards, promote and protect the City's long-term economic prosperity	Ongoing	The City continues to monitor the shoreline and expend resources to preserve a healthy beach. The City awarded an emergency contract for emergency berm restoration and for CSE to conduct an emergency survey post Hurricane Irma and supervise the emergency beach berm restoration activities. This action helped protect vulnerable properties from the king tide expected following the hurricane.
	1	General Government		Continuous Process	
Provide critical facilities data, repetitive loss property information, flood data, street data, and parcel data into a GIS system.	SP, NB, PP	General Fund and Grant Funds	Promote a more hazard-resilient community.	Ongoing	The City does not currently maintain a GIS system, but relies on Charleston County, the Council of Governments and other agencies for GIS assistance.
	2	Building, Planning & Zoning		Continuous Process	
Continue utility right-of-way coordination and permitting, considering emergency vehicle access and flood zone related issues in permitting decisions.	SP	General Fund and Tourist Funds	Improve emergency vehicles access to properties.	Ongoing	Police Department regularly identifies hard obstructions on the right of way and notifies property owners to educate them about the encroachment permit process, what is and not permitted and risks associated with these obstructions.
	1	Building, Fire and Public Works Departments		Continuous Process	
Seek funding for the Island-wide drainage projects to include pursuit of available funds from County Transportation Committee and the Transportation Sales Tax.	SP	Capital Projects and Tourist Fund	Promote a more hazard-resilient community.	Ongoing	In 2018, the City used grant funds from CTC and RIA programs to construct phase II of a major drainage project. Phase II Drainage project, which involves the installation of drainage infrastructure on Palm Boulevard between 45th and 52nd Avenues, was completed the summer of 2019.

	1	Public Works		Continuous Process	
Arrange for community meetings to educate citizens related to changes in the flood insurance rates.	PI	General Fund	Educate citizens regarding vulnerability to hazards and steps to reduce vulnerability	Ongoing	Historically, these meetings have occurred when major changes happen with flood insurance.
	2	General Government and Building		Continuous Process	
Mail hazard related information to all residents of the Isle of Palms in a bi-annual mailing.	PI	General Fund	Educate citizens regarding vulnerability to hazards and steps to reduce vulnerability	Ongoing	This continues to happen every year and will continue into the future.
	1	Building, Planning & Zoning		Continuous Process	
Continue providing hazard-related literature/ information to citizens at City offices and posting flags and warnings when potential hazards are threatening or exists.	PI	General Fund	Educate citizens regarding vulnerability to hazards and steps to reduce vulnerability	Ongoing	The City posts emergency preparedness information and resources on the City website and social media accounts. Handouts are always available at City Hall and other City buildings.
	2	General Government and Fire Department		Continuous Process	
Sponsor Hazard Awareness Events and provide website links to Charleston County and Project Impact resources.	PI	General Fund Disaster Recovery Fund	Educate citizens regarding vulnerability to hazards and steps to reduce vulnerability	Ongoing	The City participates in the Project Impact hazard awareness events and continue into the future.
	2	General Government and Fire Department		Continuous Process	
Continue mailing an outreach project to floodplain residents.	PI	General Fund	Educate citizens regarding vulnerability to hazards and steps to reduce vulnerability	Ongoing	This mailing continues to happen every year.
	1	Building, Planning & Zoning		Continuous Process	

Continue providing speakers to civic groups regarding hazard-related activities.	PI	General Fund	Educate citizens regarding vulnerability to hazards and steps to reduce vulnerability	Ongoing	This service will continue to occur as needed and opportunities arise.
	2	General Government		Continuous Process	
Continue education regarding septic tanks, drainage ditches and pervious verses impervious surfaces as they relate to adequate areas for storm water runoff.	PI	General Fund and Grant funds	Educate citizens regarding preservation of environmental resources; improve water quality	Ongoing	In 2018, the City entered into an agreement with the Isle of Palms Water and Sewer Commission to study the feasibility of expanding the sewer system and update the Sewer Master Plan to include island-wide sewer. The sewer master plan was completed in the spring of 2019. The City is coordinating a meeting between City Council and the IOPWSC Commission to discuss next steps towards a sewer expansion implementation project.
	1	General Government, Public Works and Building Departments		Continuous Process	
Post hazard awareness information on City of Isle of Palms and Isle of Palms Marina websites. Communicate information via the City's social media and message boards. Provide disaster information at Police Department "Meet and Greet" neighborhood meetings.	PI	General Fund Accommodations Tax	Educate citizens regarding vulnerability to hazards and steps to reduce vulnerability	Ongoing	The City regularly post emergency preparedness information & resources on the City's website & social media accounts & handouts are always available at City Hall & other City buildings. The Police Department hosts various Community Relations Events throughout the year
	1	General Government, Recreation, Police and Fire Departments		Continuous Process	
Continue participating in hazard-prevention / product expos.	PI	General Fund	Educate citizens regarding vulnerability to hazards and steps to reduce vulnerability	Ongoing	The City participates in the Project Impact hazard awareness events & will continue into the future.
	2	All City Departments		Continuous Process	
Continue to work with other East Cooper municipalities to coordinate pandemic or other hazard response planning efforts.	PI	General Fund	Ensure a coordinated response to hazards	Ongoing	The City has entered into mutual aid & automatic aid agreements with neighboring municipalities for both Police & Fire response. The City has also entered into a statewide mutual agreement for hazard response.
	2	General Government and Fire Department		Continuous Process	
Continue participating in the Project Impact Program for Public Information (PPI) to achieve maximum public outreach.	PI	General Fund	Ensure a coordinated response to hazards and educate citizens	Ongoing	The City is an active participant of the PPI program.

	1	Building Department and Project Impact Committee	regarding vulnerability to hazards	Continuous Process	
Continue Wayfinding Initiative to enable citizens to know most efficient routes to and from destinations thus reducing traffic congestion and enabling better response by emergency vehicles.	ES	Tourism Funds	Educate citizens and protect the lives of citizens from natural and man-made hazards	Ongoing	The City maintains wayfinding signs to ensure proper & maximum visibility. The City recently installed new beach access paths signs in the most utilized beach access paths to consolidate signs & increase messaging.
	2	General Government		Continuous Process	
Continue efforts to identify and acquire property to preserve as green space.	NB	Grant Funds (HMGP)	Promote a more hazard-resilient community	Ongoing	Although it is rare that affordable green space becomes available within the City limits, the City continues to monitor green space opportunities.
	3	General Government		Continuous Process	
Continue adding to the fund balance of the Disaster Recovery Fund to continually increase available fiscal resources to react/ recover in the wake of a disaster.	PA	General Fund	Promote a more hazard-resilient community	Ongoing	City Council continues the practice of allocating funds from the FY18 positive net result to the Disaster Recovery Fund.
	1	General Government and City Council		Continuous Process	
Continue to work with power utility company to make improvements that are more disaster resistant and redundant.	PA	General Fund Nonstandard Service Clause funding	Promote a more hazard-resilient community	Ongoing	The City monitors opportunities to improve the resilience of utilities.
	2	General Government,		Continuous Process	
Review City insurance annually to determine adequate coverage of all assets and update documentation (video) of assets.	PA	General Fund	Promote a more hazard-resilient community	Ongoing	This review happens annually.
	1	All City Departments		Continuous Process	
Recommend adoption of voluntary standards for single family residences to exceed minimal building code requirements for wind and seismic design	PA	General Fund	Minimize future flood damage; minimize future earthquake	Ongoing	The Building Department regularly advises citizens on methods to help mitigating hazards.

	3	Building Department	damage; minimize future hurricane damage; preserve environmental resources; educating citizens regarding vulnerability to hazards and steps to reduce vulnerability	Continuous Process	
Develop a GIS system for hazard-related assessments	PP	General Fund Grant Funding	Minimize future flood damage; minimize future earthquake damage; minimize future hurricane damage; assessing vulnerability to hazards	Ongoing	The City does not currently maintain a GIS system, but relies on Charleston County, the Council of Governments and other agencies for GIS assistance. As time, expense and complexity barriers implementing such systems continues to diminish, the City monitors opportunities to develop an in-house program.
	4	Building/Planning Departments		Continuous Process	
Initiate contracts for the establishment of a network for the sharing of GIS information amongst jurisdictions	SP	General Fund	Minimize future flood damage; minimize future earthquake damage; minimize future hurricane damage; assessing vulnerability to hazards	Ongoing	The City is willing to consider entering into such a network and share information.
	2	Planning Department		Continuous Process	

7.7 - Town of James Island

Resolution for Adoption

RESOLUTION # 2019-08

A RESOLUTION FOR THE ADOPTION OF THE CHARLESTON REGIONAL HAZARD MITIGATION PLAN

WHEREAS, the Town of James Island has experienced the effects of natural and man-made hazard events; and

WHEREAS, the Charleston Regional Hazard Mitigation Project Committee has prepared a recommended Charleston Regional Hazard Mitigation Plan; and

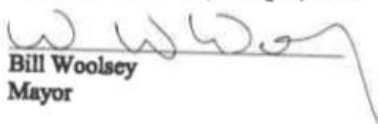
WHEREAS, the recommended Charleston Regional Hazard Mitigation Plan has been widely circulated for review by residents/business organizations/professional organizations of the unincorporated and incorporated areas of Charleston County, state, federal, regional and local government agencies and has been supported by those reviewers; and

WHEREAS, the Town of James Island is required to adopt the amended version of this Plan on a five-year cycle for the County to remain eligible for certain Federal programs in which Charleston County participates;

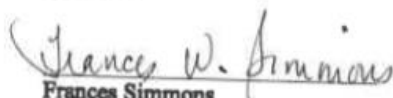
NOW THEREFORE, BE IT RESOLVED THAT:

1. The Charleston Regional Hazard Mitigation Plan is hereby adopted as an official Plan of the Town of James Island and can be found at <http://www.jamesislandsc.us/Data/Sites/1/media/admin-forms/hazard-mitigation-plan.pdf>
2. The Charleston Regional Hazard Mitigation Project Committee is recognized as a continuing entity charged with reviewing, maintaining in accordance with Community Rating System, Flood Mitigation Assistance, and Disaster Mitigation Act requirements, and periodically reporting on the progress towards and revisions to the Plan to the Town of James Island.

Adopted this 25th day of April, 2019


Bill Woolsey
Mayor

ATTEST


Frances Simmons
Town Clerk

Action Report for the Town of James Island, SC

This jurisdiction is fully serviced by Charleston County. Please refer to Section 7.1 for the full action plan. Below are the proposed projects additional to the action plan of Charleston County during May 2019 - April 2020 and their status from May 2018-April 2019.

(Abbreviations for "Type" are as follows: "PA" is Preventive Activities, "PP" is Property Protection Activities, "NB" is Natural and Beneficial Functions/Resource Preservation Activities, "ES" is Emergency Services Activities, "SP" is Structural Projects Activities, and "PI" is Public Information Activities, "GIS" is Geographic Information Systems Activities.)

The following terminology is used to update the current status of each proposed project, as suggested by FEMA: "New", "Ongoing", "Continuous Process", "Deleted", and "Completed".

Hazard Mitigation Goals and Objectives	
Goal 1: Mitigate natural hazard damage	
Objective 1.1	Minimize future flood damage
Objective 1.2	Minimize future earthquake damage
Objective 1.3	Minimize future hurricane damage
Objective 1.4	Minimize future wildfire damage
Objective 1.5	Minimize future tornado-related loss of life
Objective 1.6	Reduce existing flood damage
Goal 2: Increase public preparedness and protection	
Objective 2.1	Protect the lives of our citizens from natural and man-made hazards
Objective 2.2	Educating citizens regarding steps to take to reduce vulnerabilities
Objective 2.3	Promote long-term prosperity
Goal 3: Improve infrastructure	
Objective 3.1	Improve hazard resistance of infrastructure
Objective 3.2	Reduce vulnerability of our infrastructure to natural and man-made hazards
Goal 4: Increase environmental well being	
Objective 4.1	Preserve environmental resources
Objective 4.2	Improve water quality
Objective 4.3	Preserve open space
Objective 4.4	Encourage recreational activities

Based upon the responses to the latest survey questionnaire, the following are the goals for this plan (listed in the order of importance):

1. Reduce potential flood damage
2. Improve storm drainage
3. Minimize future flood occurrence
4. Minimize future hurricane damage
5. Improve hazard resistance of infrastructure
6. Minimize future earthquake damage
7. Protect environmental resources/preserve open and green space
8. Minimize future terrorist incidents
9. Improve water quality
10. Preserve historic building inventory
11. Higher regulatory standard
12. Minimize future hazardous material incidents

<i>Town of James Island Hazard Mitigation Actions</i>					
<i>Mitigation Action and Description</i>	<i>Type</i>	<i>Funding Source</i>	<i>Goals and Objectives</i>	<i>Status</i>	<i>Milestones Achieved and Future Plans</i>
	<i>Priority</i>	<i>Responsible Agency</i>		<i>Implementation Schedule</i>	
Develop and Implement with Charleston County and the Ashley Cooper Stormwater Education Consortium programs to reduce stormwater runoff pollution on James Island.	NB	Stormwater Fund	2.3, 4.1, 4.2, 4.3	Ongoing	The Town through Charleston County Stormwater has dog waste bag dispensers for leashes that we give out.
	2	Town of James Island Public Works		Continuous Process	The Town also partners with Ashley Cooper to have community programs about stormwater management with rain gardens, rain barrels and sponsor Boy Scout Eagle Projects to mark stormwater drains. The Town has dog waste bag dispenser stations at Pinckney

					Park and Dock Street Park.
<p>Continue to provide design, permitting, and construction services for the drainage improvement projects defined in Attachment VI-C.</p> <p>Have On Call stormwater construction services available through pre-selected firms to provide infrastructure improvements on James Island, specifically the Harbor View Rd area at the James Island Connector.</p>	SP	<p>Grant Funding (GMA/HMGP)</p> <p>General Fund</p> <p>Stormwater Funds</p>		Ongoing	<p>The Town is repairing and restoring neighborhood drainage systems to their original design conditions through the use of the original, approved subdivision plans.</p>
	1	<p>Public Works</p> <p>Assistant Administrator for Transportation and Public Works (Transportation and Sales Tax)</p>	1.1, 1.6, 2.1, 2.3, 3.1, 4.2	Continuous Process	<p>The Town is also using our on-call contractors to analyze underground infrastructure through video technology. This is used to evaluate the conditions and prioritize repairs and system upgrades.</p> <p>The Town is also working on James Island Drainage Projects with Charleston County and the City of Charleston as described in Attachment VI-C.</p>
Identify stormwater drainage outfalls where backflow	SP	Stormwater Fund		Ongoing	The Town is repairing

<p>prevention devices would assist in preventing high tides from entering and flooding residential and commercial areas. Implement a program to install check valve devices at these locations.</p>	<p>1</p>	<p>Charleston County Public Works</p> <p>Town of James Island Public Works</p> <p>City of Charleston Stormwater</p> <p>SCDOT</p>	<p>1.1, 1.6, 2.1, 2.3, 3.1, 4.2</p>	<p>Continuous Process</p>	<p>outfalls and installing backflow tidal check valves to prevent inland tidal flooding. We have these installed on Teal Avenue and Relyae Drive and will be installing on more this year on Valley Forge Road and Tennent Street.</p>
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7.8 – Town of Kiawah Island

Resolution for Adoption

A RESOLUTION FOR THE ADOPTION OF THE REVISED CHARLESTON REGIONAL HAZARD MITIGATION PLAN BY CHARLESTON COUNTY COUNCIL

Resolution No. 2019-01

WHEREAS the Town of Kiawah Island has experienced the effects of natural and man-made hazard events; and

WHEREAS the Charleston Regional Hazard Mitigation and Public Information Plan Committee has prepared a recommended *Charleston Regional Hazard Mitigation Plan*; and

WHEREAS the recommended *Charleston Regional Hazard Mitigation Plan* has been widely circulated for review by residents / business organizations / professional organizations of the unincorporated and incorporated areas of Charleston County, state, federal, regional and local government agencies and has been supported by those reviewers; and

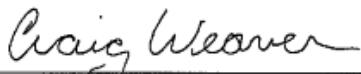
WHEREAS the Town of Kiawah Island originally adopted the *Charleston Regional Hazard Mitigation Plan* in 1999 and readopted it in 2004, 2008, and 2013 and is required to adopt the amended version of this plan on a five-year cycle for the Town to remain eligible for certain Federal programs in which Charleston County and Town participates, and

NOW THEREFORE be it resolved that


The Charleston Regional Hazard Mitigation Plan is hereby adopted in conjunction with the Town of Kiawah Island's Comprehensive Emergency Management Plan as an official plan of the Town of Kiawah Island, and

- 1) The Charleston Regional Hazard Mitigation and Public Information Plan Committee is recognized as a continuing entity charged with reviewing, maintaining in accordance with Community Rating System, Flood Mitigation Assistance, Disaster Mitigation Act and Program for Public Information requirements, and periodically reporting on the progress towards and revisions to the plan to the Town of Kiawah Island's town Council.

WITNESSED this 7th day of May 2019.



Craig Weaver, Mayor
Town of Kiawah Island

ATTEST:


Petra S. Reynolds, Town Clerk

Action Report for the Town of Kiawah Island, SC

The Town of Kiawah Island is located approximately 20 miles south of Charleston. Due to our population and staff size, the Town utilizes Charleston County to perform some of our services including planning, public works, etc. Further, the Kiawah Island Community Association (KICA) is responsible for the maintenance of Kiawah's network of private roads, storm water utilities, etc. behind the gate.

The following are proposed projects to be undertaken or continued by the above-mentioned parties in the Town of Kiawah Island for hazard mitigation during May 2019 - April 2020 and their status from May 2018 - April 2019.

(Abbreviations for "Type" are as follows: "PA" is Preventive Activities, "PP" is Property Protection Activities, "NB" is Natural and Beneficial Functions/Resource Preservation Activities, "ES" is Emergency Services Activities, "SP" is Structural Projects Activities, and "PI" is Public Information Activities, "GIS" is Geographic Information Systems Activities.)

Town of Kiawah Island Hazard Mitigation Actions					
<i>Mitigation Action and Description</i>	<i>Type</i>	<i>Funding Source</i>	<i>Goals and Objectives</i>	<i>Status</i>	<i>Milestones Achieved and Future Plans</i>
	<i>Priority</i>	<i>Responsible Agency</i>		<i>Implementation Schedule</i>	
Continue enforcement of the International series Building-related and Fire codes and the floodplain management (including the one foot freeboard and five year cumulative substantial improvement clause provisions) regulations.	PA	General Fund	1.1, 1.2, 1.3, 2.1	Existing	Action is ongoing as established Town enforcement policies
	1	Kiawah Island Building Inspection Services		In place	
Continue enforcement of the Stream Dumping Ordinance (Sections 8-108 & 15-213 of Municipal Code) for the Town	PA	General Fund	1.1, 2.1	Existing	Action is ongoing as established Town enforcement policies
	1	Public Works, Town Code Enforcement		In place	
Promote use of voluntary standards for single family residences to exceed minimal building code requirements for wind and seismic design	PA	General Fund	1.1, 1.2, 1.3, 2.2, 4.1	Existing	Current Sea-Level Rise Committee conducting island wide study, public report available summer of 2018. To ensure safety measures are established for all residents. Enforcement of current policies remains part of daily objectives.
	2	Kiawah Island Building Inspection Services		Continuous Process	
	PA	General Fund	1.1, 1.2, 1.3, 2.1	Existing	

Continue enforcement of Building related, flood and Fire Prevention Codes and Regulations	1	Kiawah Island Building Inspection Services		In Place	Activity is part of our daily objective activity.
Continue enforcement of storm water management regulations	PA	General Fund	1.1, 2.1	Existing	Stormwater engineering analysis conducted last year to ensure island could sustain 100 year flooding event. Stormwater management is now being reviewed again as part of the analysis for sea-level rise initiative
	1	Administration		In Place	
Continue enforcement of zoning regulations	PA	General Fund	1.1, 1.2, 1.3, 2.1, 2.3, 4.1, 4.3, 4.4	Existing	Daily objective activity conducted during plan review, and or inspection enforcement.
	1	Charleston County Planning Planning Commission		In Place	
Continue to sponsor/support training workshops regarding Building related, flood, and Fire Prevention Codes and Regulations, if there is interest	PA	General Fund	2.2	Existing	Outreach classes for professional designers, contractors happen during policy or code change cycles. Public on an annual basis.
	3	Kiawah Island Building Inspection Services, Administration		Continuous Process	
Participate in Charleston County Hazard Mitigation Planning activities	PA	General Fund	2.2	Existing	Member of Hazard Mitigation Committee. Meet as scheduled by Charleston County.
	2	Administration		Continuous Process	
Continue providing information for data entry for the County GIS system for hazard-related assessments	PP	General Fund	1.5, 2.2	Existing	Updated on annual basis or when needed by recent events. Latest change new OCRM setbacks.
	2	Administration		Continuous Process	

Provide information to citizens regarding hazard safe interior rooms	PP	General Fund	1.5, 2.2	Existing	Our goal is to have residents evacuate. However, we do provide information during our annual outreach Disaster Awareness day.
	3	Administration		Continuous Process	
Continue enforcement of the tree protection & landscaping ordinance (Section 12A-403 of Municipal Code)	NB	General Fund	2.3, 4.1, 4.3	Existing	This is a partnership of continuing enforcement between the Town and Kiawah Island Architectural Review Board
	1	Charleston County Planning		In Place	
Continue maintaining permanent open space as parks	NB	General Fund	1.1, 2.3, 4.1, 4.4,	Existing	Kiawah Island has permanently designated parks, green spaces, and golf courses.
	1	Charleston County Planning, Planning Commission		Continuous Process	
Provide information to citizens regarding establishing and maintaining buffer zones at water's edges	NB	General Fund	1.1, 1.3, 2.2 3.1, 4.1, 4.2, 4.3, 4.4	Existing	<p>OCRM requirements and zoning requirements require given set-backs to prevent construction activity near water's edge.</p> <p>Sea-level Committee analyzing possible solutions to mitigate sea-level rise, vulnerable storm surge areas of the island.</p>
	1	KICA, Administration		Continuous Process	
Work with OCRM to introduce sand fencing in appropriate areas as identified.	NB	General Fund	1.1, 1.3, 2.2, 3.1, 4.1	Existing	<p>Ordinances are enforced that prevents damage to dunes and vegetation. Owners are educated about the importance of having a well-established dune line.</p> <p>Still fencing operations are discouraged, due to natural accretion of our beaches and vegetation regrowth.</p>
	3	Administration		Continuous Process	
Continue to monitor the beach and take appropriate actions to address erosion issues as they arise.	NB	General Fund	1.1, 1.3, 2.3, 4.1, 4.4	Existing	Beach front is monitored daily for violations or conditional changes.
	1	Administration		Continuous Process	
Continue coordinating Municipal Emergency	ES	General Fund	2.1, 2.2, 2.3, 3.2, 4.1	Existing	OPCON levels mirror those of Charleston County. Full

Operations Center activities in the event of a hazard event.	1	Charleston County Emergency Preparedness Administration		Continuous Process	communication is established at OPCON level 3 as we man our MEOC.
Continue responding to hazard emergencies	ES	General Fund	2.1, 2.2, 2.3, 4.1	Existing	Town has a Hazard Mitigation Plan that includes all associations on the island and representatives are part of our MEOC activities. Town also has a damage assessment team and CERT Team.
	1	Administration County & Local Agencies		Continuous Process	
Continue to support and promote the Community Emergency Response Training (CERT) program, if requested	ES	General Fund	2.1, 2.2	Existing	The Town has a CERT Team that receives ongoing training, and provides a variety of services during a storm event.
	3	Administration		In Place	
Continue the drainage maintenance and canal cleaning program	SP	General Fund	1.1, 1.6, 2.1, 2.3	Existing	Activity is conducted as needed and is closely monitored by KICA staff.
	2	KICA		In Place	
Continue utility right of way permitting, considering emergency vehicle access and flood zone related issues in permitting decisions	SP	General Fund	1.1, 1.6, 2.1, 2.3, 3.1	Existing	Included during site plan review, ongoing analysis of existing bridge conditions. Part of the Town's Hazard Mitigation Plan.
	2	Charleston County Public Works Administration		In Place	
Provide input to County on road repair/construction program, considering needs during evacuation and soil liquefaction potential in prioritization decisions	SP	General Fund	1.1, 1.6, 2.1, 2.3, 3.1	Existing	Roadway, bridge information all are owned by the Town and or are private roads.
	2	Administration		Continuous Process	

Mail hazard related information to all residents of Kiawah Island; provide residents with Town Emergency Preparedness Plan and packets	PI	General Fund	1.1, 1.2, 1.6, 2.1, 2.2	Existing	Since most our residents are transient in nature. We send our emergency preparedness information as electronic media to residents and we provide at the annual outreach program and it is available for pick-up daily.
	1	Administration		Continuous Process	
Continue providing hazard-related literature/information to citizens at Town Hall	PI	General Fund	1.1, 1.2, 1.6, 2.1, 2.2	Existing	Since most our residents are transient in nature. We send our emergency preparedness information as electronic media to residents and we provide at the annual outreach program and it is available for pick-up daily.
	1	Administration		Continuous Process	
Sponsor "Hazard Awareness Week"	PI	General Fund	1.1, 1.2, 1.6, 2.1, 2.2	Existing	Annual event
	2	Administration		Continuous Process	
Continue Sponsoring "Disaster Awareness Day" for Town citizens	PI	General Fund	1.1, 1.2, 1.6, 2.1, 2.2	Existing	Annual event with Seabrook Island. This year our event was held on June 14 at Seabrook Island town hall and had over 150 people attend. There were booths set up from different emergency response and local officials handing out information and a Q&A on evacuation and flooding.
	1	Administration		Continuous Process	
Continue utilizing Town newsletter and website for the dissemination of hazard-related literature/information	PI	General Fund	1.1, 1.3, 1.6, 2.1, 2.2	Existing	Activity is completed either annually or during approaching storm event. New web page is being developed to meet FEMA CRS requirements.
	1	Administration		Continuous Process	

Continue contract and promotion of the emergency alert system, CodeRed	PI	General Fund	2.1	Existing	Code Red system is active
	1	Administration		Continuous Process	
Continue participating in the Project Impact Outreach Project Strategy for the Community Rating System. Participate in the Program for Public Information (PPI).	PI	General Fund	2.2	Existing	Representatives from the Town will participate in all outreach programs provided by Charleston County.
	1	Administration		Continuous Process	
Provide information to County concerning critical facilities data, repetitive loss property information, flood data, street data, parcel data, and TIGER data into the GIS system	GIS	General Funding and Grants	1.1, 1.3, 1.6, 2.1, 2.2	Existing	Information is provided as changes take place.
	2	Administration		Continuous process	
Expand Town GIS database to include hazard-related information, e.g., critical facilities, emergency operations centers, repetitive flood properties, etc.	GIS	General Fund	1.1, 1.3, 2.1, 2.2	Existing	Town GIS is up to date. New OCRM set-back is being implemented and should be completed by November 15, 2017.
	3	Administration		Continuous Process	

The Town of Kiawah Island shall, through Project Impact, provide support to the many activities and projects that will benefit the residents of the Town. Additional recommended projects may be added to this project list as other projects are recommended to Charleston County Council and the Town of Kiawah Island. Some Projects that are being undertaken by Charleston County may not necessarily be listed here but may affect the Town of Kiawah Island.

7.9 - Town of Lincolville

Resolution for Adoption

TYRONE E. AIKEN
Mayor
COUNCIL MEMBERS
DOROTHY BAILEY
BARBARA DEASE
ENOCH DICKERSON
CHARLES DUBERRY
JAMES HAMP TON
ANNA R. WILLIAMS-GLEATON
CLERK
LINDA G. RHODES

Town of Lincolville



Established
2-14-1889

141 W. BROAD STREET
P.O. BOX 536
LINCOLNVILLE, SC 29485

PHONE (843) 873-3261
FAX (843) 873-3267

A RESOLUTION FOR THE ADOPTION OF THE REVISED *CHARLESTON REGIONAL HAZARD MITIGATION PLAN* BY THE TOWN OF LINCOLNVILLE, SOUTH CAROLINA

Resolution No. 2008-1001

WHEREAS the Town of Lincolville has experienced the effects of natural and man-made hazard events; and

WHEREAS the Charleston Regional Hazard Mitigation Project Committee has prepared a recommended *Charleston Regional Hazard Mitigation Plan*; and

WHEREAS the recommended *Charleston Regional Hazard Mitigation Plan* has been widely circulated for review by residents/business organizations/professional organizations of the unincorporated and incorporated areas of Charleston County, state, federal, regional and local government agencies and has been supported by those reviewers; and


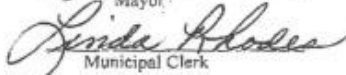
WHEREAS the Town of Lincolville originally adopted the *Charleston Regional Hazard Mitigation Plan* in 1999 and readopted it in 2004, and is required to adopt the amended version of this plan on a five-year cycle for the Town to remain eligible for certain Federal programs in which the Town of Lincolville participates, and

NOW THEREFORE be it resolved that

1. The *Charleston Regional Hazard Mitigation Plan* is hereby adopted as an official plan of the Town of Lincolville, and
2. The Charleston Regional Hazard Mitigation Project Committee is recognized as a continuing entity charged with reviewing, maintaining in accordance with Community Rating System, Flood Mitigation Assistance, and Disaster Mitigation Act requirements, and periodically reporting on the progress towards and revisions to the plan to the Town of Lincolville Council.

Effective this 30th Day of September, 2008

Attest:


Mayor

Municipal Clerk

Action Report for the Town of Lincolville, SC

This jurisdiction is fully serviced by Charleston County. Please refer to Section 7.1 for the full action plan. There are no proposed projects additional to the action plan of Charleston County.

7.10 – Town of McClellanville

Resolution for Adoption

**A RESOLUTION FOR THE ADOPTION OF THE REVISED
CHARLESTON REGIONAL HAZARD MITIGATION PLAN BY
MCCLELLANVILLE TOWN COUNCIL**

Resolution No. 2017-5

WHEREAS the Town of McClellanville has experienced the effects of natural and man-made hazard events; and

WHEREAS the Charleston Regional Hazard Mitigation and Public Information Plan Committee has prepared a recommended *Charleston Regional Hazard Mitigation Plan*; and

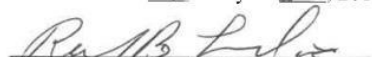
WHEREAS the recommended *Charleston Regional Hazard Mitigation Plan* has been widely circulated for review by residents / business organizations / professional organizations of the unincorporated and incorporated areas of Charleston County, state, federal, regional and local government agencies and has been supported by those reviewers; and

WHEREAS the McClellanville Town Council originally adopted the *Charleston Regional Hazard Mitigation Plan* in 1999 and readopted it in 2004, 2008, and 2013 and is required to adopt the amended version of this plan on a five-year cycle for the County to remain eligible for certain Federal programs in which Charleston County participates, and

NOW THEREFORE be it resolved that

1. The *Charleston Regional Hazard Mitigation Plan* is hereby adopted as an official plan of the Town of McClellanville, and
2. The Charleston Regional Hazard Mitigation and Public Information Plan Committee is recognized as a continuing entity charged with reviewing, maintaining in accordance with Community Rating System, Flood Mitigation Assistance, Disaster Mitigation Act and Program for Public Information requirements, and periodically reporting on the progress towards and revisions to the plan to the McClellanville Town Council.

Effective this 4th Day of Dec, 2017


Rutledge B. Leland, III
Mayor, Town of McClellanville, SC

Action Report for the Town of McClellanville, SC

The Town of McClellanville is fully serviced by Charleston County. Please refer to Section 7.1 for the full action report. Below are the relevant projects to Town of McClellanville additional to the action report of Charleston County.

(Abbreviations for "Type" are as follows: "PA" is Preventive Activities, "PP" is Property Protection Activities, "NB" is Natural and Beneficial Functions/Resource Preservation Activities, "ES" is Emergency Services Activities, "SP" is Structural Projects Activities, and "PI" is Public Information Activities, "GIS" is Geographic Information Systems Activities.)

The following terminology is used to update the current status of each proposed project, as suggested by FEMA: "New", "Ongoing", "Continuous Process", "Deleted", and "Completed".

Hazard Mitigation Goals and Objectives	
Goal 1: Mitigate natural hazard damage	
Objective 1.1	Minimize future flood damage
Objective 1.2	Minimize future earthquake damage
Objective 1.3	Minimize future hurricane damage
Objective 1.4	Minimize future wildfire damage
Objective 1.5	Minimize future tornado-related loss of life
Objective 1.6	Reduce existing flood damage
Goal 2: Increase public preparedness and protection	
Objective 2.1	Protect the lives of our citizens from natural and man-made hazards
Objective 2.2	Educating citizens regarding steps to take to reduce vulnerabilities
Objective 2.3	Promote long-term prosperity
Goal 3: Improve infrastructure	
Objective 3.1	Improve hazard resistance of infrastructure
Objective 3.2	Reduce vulnerability of our infrastructure to natural and man-made hazards
Goal 4: Increase environmental well being	
Objective 4.1	Preserve environmental resources
Objective 4.2	Improve water quality
Objective 4.3	Preserve open space
Objective 4.4	Encourage recreational activities

Town of McClellanville Hazard Mitigation Actions

Mitigation Action and Description	Type	Funding Source	Goals and Objectives	Status	Milestones Achieved and Future Plans
	Priority	Responsible Agency		Implementation Schedule	
Continue encouraging the Greenbelt Advisory Board to acquire green space in our community.	NB	Greenbelt Bank funding	1.1, 2.3, 4.1, 4.2, 4.4	Ongoing	The Town purchased greenspace through the Charleston County Greenbelt Program in 2011 and partnered with East Cooper Land Trust in 2019 to submit a Greenbelt Application to place a conservation easement on a commercial fishing dock in Town. Greenspace is also a priority on the Town's Comprehensive Plan.
	2	Planning and Zoning, Town Administration		Continuous Process	
Continue to submit drainage and earth road improvement projects for funding through the County's C-Fund and TST programs.	SP	CTC and TST Funding	1.1, 1.3, 1.6, 2.1, 2.3, 3.1,	Ongoing	The Town submits project requests each year for funding through CTC and TST to make improvements in areas that are affected by flooding.
	1	Town Administration		Continuous Process	
Continue providing hazard related information to all residents of McClellanville.	PI	General Fund	1.1, 1.3, 1.6, 2.1, 2.2, 2.3, 4.2	Ongoing	Education project making information available to all residents through the Town Newsletter, website, and brochures available at Town Hall.
	1	Town Administration		Continuous Process	
Maintain a link to Charleston County's Hazard Mitigation Plan on the town website.	PI	General Fund	2.1, 2.2, 4.2,	In Place	The town provides residents with quick access through a link on the town website. Updated Regularly
	1	Town Administration		Continuous Process	
Maintain a link to the Charleston County Flood Prevention Ordinance adopted by the Town.	PI	General Fund	2.1, 2.2	Ongoing	This page is monitored and updated as changes occur.
	2	Town Administration		Continuous Process	

Town of McClellanville Hazard Mitigation Actions

Mitigation Action and Description	Type	Funding Source	Goals and Objectives	Status	Milestones Achieved and Future Plans
	Priority	Responsible Agency		Implementation Schedule	
Maintain a link to Charleston County's Hurricane Guide, as well as Flood Zone and Flood Protection Information.	PI	General Fund	1.1, 1.6, 2.1, 2.2,	In Place	Respond to and updated on a regular basis. The information is also published in the June Town Newsletter each year.
	1	Town Administration		Continuous Process	
Maintain a webpage with an overlay map of McClellanville properties on the FEMA flood map of the area.	PI	General Fund	2.1, 2.2	In Place	The Town provides a FEMA floodplain map of town properties on its website. Updated as FEMA floodplain changes occur.
	2	Town Administration		Continuous Process	
Continue enforcement of the International series Building-related Fire codes and floodplain management regulations to maintain participation in the National Flood Insurance Program and the Community Rating System.	PP	General Fund	1.1, 1.2, 1.3, 2.1	Ongoing	The Town has an IGA with Charleston County Building Services to perform all building inspection services and floodplain management for the Town.
	1	Charleston County Building Services		Continuous Process	
Continue to support the Community Wildfire Protection Plan by increasing public awareness and encouraging participation in the FireWise program to interested neighborhoods.	PA, PI	General Fund	1.4, 2.1, 2.2, 3.1, 3.2	Ongoing	Information is made available through brochures and the Town Newsletter. The Town is facilitating an informational meeting for interested neighborhoods in 2019.
	2	Awendaw-McClellanville Fire Dept. and Town Administration		Continuous Process	

<i>Town of McClellanville Hazard Mitigation Actions</i>					
<i>Mitigation Action and Description</i>	<i>Type</i>	<i>Funding Source</i>	<i>Goals and Objectives</i>	<i>Status</i>	<i>Milestones Achieved and Future Plans</i>
	<i>Priority</i>	<i>Responsible Agency</i>		<i>Implementation Schedule</i>	
Continue enforcement of zoning regulations, including the low-density zoning provisions of the Town's Zoning and Land Development Ordinance.	PA	General Fund	1.1, 1.2, 1.3, 2.1, 2.3, 4.1, 4.4	Ongoing	The Zoning and Planning Department update the Comp Plan in 2015 encouraging the preservation of open space and requiring vegetated buffers.
	1	Planning		Continuous Process	
Continue enforcement of the Town's tree protection/preservation ordinance.	NB	General Fund	2.3, 4.1, 4.2, 4.3	Ongoing	The Town is a Tree City USA and continues to administer and enforce its tree protection and preservation ordinance which includes grand tree protection and landscape buffer requirements.
	2	Planning		Continuous Process	
Town Building Official will maintain his certification as a Certified Floodplain Manager	PP	General Fund	2.1, 2.2	Ongoing	The Town continues to have an IGA with Charleston County to serve as the Town's Certified Floodplain Manager.
	1	Building Inspection Services		Continuous Process	
Recognize "International Building Safety Week" to promote safety in the built environment	PI	General Fund	2.1, 2.2	Ongoing	The Mayor proclaimed May as Building Safety Month in the Town of McClellanville.
	3	Building Inspection Services		Annual	

Additional Recommended Projects may be added to this project list as the Project Impact/Disaster Resistant Communities committees consider other projects and recommend these projects for implementation.

7.11 - Town of Meggett

Resolution for Adoption

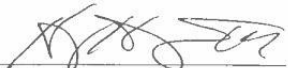
A RESOLUTION FOR THE ADOPTION OF THE REVISED CHARLESTON REGIONAL HAZARD MITIGATION PLAN BY MEGGETT TOWN COUNCIL

Resolution No. 2019-02

- WHEREAS** the Town of Meggett has experienced the effects of natural and man-made hazard events; and
- WHEREAS** the Charleston Regional Hazard Mitigation and Public Information Plan Committee has prepared a recommended *Charleston Regional Hazard Mitigation Plan*; and
- WHEREAS** the recommended *Charleston Regional Hazard Mitigation Plan* has been widely circulated for review by residents / business organizations / professional organizations of the unincorporated and incorporated areas of Charleston County, state, federal, regional and local government agencies and has been supported by those reviewers; and
- WHEREAS** the Town of Meggett originally adopted the *Charleston Regional Hazard Mitigation Plan* in 1999 and readopted it in 2004, 2008, and 2013 and is required to adopt the amended version of this plan on a five-year cycle for the County to remain eligible for certain Federal programs in which Charleston County participates, and
- NOW THEREFORE** be it resolved that
1. The *Charleston Regional Hazard Mitigation Plan* is hereby adopted as an official plan of the Town of Meggett, and
 2. The Charleston Regional Hazard Mitigation and Public Information Plan Committee is recognized as a continuing entity charged with reviewing, maintaining in accordance with Community Rating System, Flood Mitigation Assistance, Disaster Mitigation Act and Program for Public Information requirements, and periodically reporting on the progress towards and revisions to the plan to the Meggett Town Council.

Adopted this 22nd day of July, 2019.

TOWN COUNCIL OF THE
TOWN OF MEGGETT, SOUTH CAROLINA

By: 
Harry V. "Buster" Herrington, III - Mayor



ATTEST:

By: 
Stephanie Smith
Town Administrator

Action Report for the Town of Meggett, SC

This jurisdiction is fully serviced by Charleston County. Please refer to Section 7.1 for the full action plan. There are no proposed projects additional to the action plan of Charleston County.

7.12 – Town of Mt. Pleasant

Resolution for Adoption

RESOLUTION NO. R.17121

STATE OF SOUTH CAROLINA)	
)	A RESOLUTION ADOPTING THE REVISED
COUNTY OF CHARLESTON)	<i>CHARLESTON REGIONAL HAZARD</i>
)	<i>MITIGATION PLAN</i>
TOWN OF MOUNT PLEASANT)	

WHEREAS, the Town of Mount Pleasant has experienced the effects of natural and man-made hazard events; and

WHEREAS, the Charleston Regional Hazard Mitigation and Public Information Plan Committee has prepared a recommended *Charleston Regional Hazard Mitigation Plan*; and

WHEREAS, the recommended *Charleston Regional Hazard Mitigation Plan* has been widely circulated for review by residents / business organizations / professional organizations of the unincorporated and incorporated areas of Charleston County, state, federal, regional and local government agencies and has been supported by those reviewers; and

WHEREAS, the Town of Mount Pleasant originally adopted the *Charleston Regional Hazard Mitigation Plan* in 1999 and readopted it in 2004, 2008, and 2013 and is required to adopt the amended version of this plan on a five-year cycle for the County to remain eligible for certain Federal programs in which the Town of Mount Pleasant participates.

NOW THEREFORE be it resolved by the Mayor and Councilmembers of the Municipality of Mount Pleasant, in Council assembled, that the *Charleston Regional Hazard Mitigation Plan* is hereby adopted as an official plan of the Town of Mount Pleasant.

BE IT FURTHER RESOLVED that the Charleston Regional Hazard Mitigation and Public Information Plan Committee is recognized as a continuing entity charged with reviewing, maintaining in accordance with Community Rating System, Flood Mitigation Assistance, Disaster

Mitigation Act and Program for Public Information requirements, and periodically reporting on the progress towards and revisions to the plan to the Mount Pleasant Town Council.

THIS RESOLUTION SHALL BE EFFECTIVE IMMEDIATELY UPON ITS ADOPTION.

SIGNED, SEALED AND DELIVERED THIS 13 DAY OF December, 2017.



J.W. Haynie, Mayor
Town of Mount Pleasant

ATTEST:




Christine Barrett
Clerk of Council

December 13, 2017

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APPROVED AS TO FORM:



David G. Pagliarini
Corporation Counsel

Action Report for the Town of Mount Pleasant, SC

Following are the proposed projects to be undertaken / continued in Town of Mount Pleasant for hazard mitigation during May 2019 - April 2020 and their status from May 2018-April 2019.

(Abbreviations for "Type" are as follows: "PA" is Preventive Activities, "PP" is Property Protection Activities, "NB" is Natural and Beneficial Functions/Resource Preservation Activities, "ES" is Emergency Services Activities, "SP" is Structural Projects Activities, and "PI" is Public Information Activities, "GIS" is Geographic Information Systems Activities.)

The following terminology is used to update the current status of each proposed project, as suggested by FEMA: "New", "Ongoing", "Continuous Process", "Deleted", and "Completed".

Hazard Mitigation Goals and Objectives	
Goal 1: Mitigate natural hazard damage	
Objective 1.1	Minimize future flood damage
Objective 1.2	Minimize future earthquake damage
Objective 1.3	Minimize future hurricane damage
Objective 1.4	Minimize future wildfire damage
Objective 1.5	Minimize future tornado-related loss of life
Objective 1.6	Reduce existing flood damage
Goal 2: Increase public preparedness and protection	
Objective 2.1	Protect the lives of our citizens from natural and man-made hazards
Objective 2.2	Educating citizens regarding steps to take to reduce vulnerabilities
Objective 2.3	Promote long-term prosperity
Goal 3: Improve infrastructure	
Objective 3.1	Improve hazard resistance of infrastructure
Objective 3.2	Reduce vulnerability of our infrastructure to natural and man-made hazards
Goal 4: Increase environmental well being	
Objective 4.1	Preserve environmental resources
Objective 4.2	Improve water quality
Objective 4.3	Preserve open space
Objective 4.4	Encourage recreational activities

Based upon the responses to the latest survey questionnaire, the following are the goals for this plan (listed in the order of importance):

1. Reduce potential flood damage
2. Improve storm drainage
3. Minimize future flood occurrence
4. Minimize future hurricane damage
5. Improve hazard resistance of infrastructure
6. Minimize future earthquake damage
7. Protect environmental resources/preserve open and green space
8. Minimize future terrorist incidents
9. Improve water quality
10. Preserve historic building inventory
11. Higher regulatory standard
12. Minimize future hazardous material incidents

Town of Mount Pleasant Hazard Mitigation Actions

Mitigation Action and Description	Type	Funding Source	Goals and Objectives	Status	Milestones Achieved and Future Plans
	Priority	Responsible Agency		Implementation Schedule	
Implement Town Strategic Plan Themes, Goals, Objectives, and initiatives which support emergency preparedness and disaster resistance.	PA	General Fund Grant Funds	1.1, 1.2, 1.3, 1.4, 2.1, 2.3, 3.1, 3.2	Ongoing	https://data.tompsc.com/ A live status of progress on the goals is located on this website.
	1	All Departments		Continuous Process	
Continue to review and augment Town activities to improve Community Rating System ranking; incorporate program changes from the new CRS Coordinator's Manual into the Town's activities.	PA	General Fund	1.1, 1.3, 2.1, 2.2, 3.1, 4.1, 4.2	Ongoing	Upgrades to the Town's GIS system are being completed which will enhance mapping capabilities for various activities, a new full time Emergency Manager has been hired who will be able to facilitate improvements in level 300 and 600 activities, and a PPI has been established through Project Impact (administered through Charleston County) that will enhance outreach to the local communities. The Town is a participant in Project Impact.
	1	Building Inspection Division Stormwater Division Emergency Manager		Continuous Process	
Review ISO programs for opportunities to improve ISO ratings.	PA	General Fund	1.1, 1.2, 1.3, 1.4, 2.1, 2.2	Ongoing	The Town's Building Inspection Division maintains a BCEGS rating of 5/4. The Town is currently due for a cycle visit by ISO and has been delayed by ISO. The Fire Department currently has an ISO Class 2 rating. The Department strategic plan identifies the goal to improve ranking Class 1 with to improvements in staffing, public outreach, & equipment.
	1	Fire Department Building Inspection Division		Continuous Process	

Continue enforcement of the State mandated Building Codes, the permissive codes as adopted by Town Council, and the Town's Flood Damage Prevention Ordinance.	PA	General Fund	1.1, 1.2, 1.3, 1.6, 2.1	Ongoing	Building Inspection Division inspections completed for FY 2019 (ending 6/30/19) totaled approximately 30,000. Of these inspections, just under 58% were for buildings located in Special Flood Hazard Areas. The Fire Department completed 3,233 code inspections in FY 2019 and discovered 1,225 violations.
	1	Building Inspection Division Fire Department		Continuous Process	
Review and update regulations regarding construction in flood zones.	PA	General Fund	1.1, 1.2, 1.3, 1.4, 2.1	Ongoing	Preliminary new FIRMs have been released. Updates to the flood regulations are being considered such as a one-foot increase in freeboard (from one foot to two feet), but no updates are likely until the new FIRMs become effective. Currently, the projected effective date is 3/20. No updates were made regarding construction in Flood Zones in 2018. When new FIRM maps are finalized, regulations will be reviewed for updates.
	1	Building Inspection Division		Continuous Process	
Continue Sandbag program for residents.	PA	General Funds	1.1, 1.3, 1.6, 2.1, 2.2	Ongoing	In advance of Hurricane Florence, the town provided several thousand sand bags to residents. The Town maintains a stockpile of sand and sand bags in preparation for events.
	1	Public Services		Continuous	

Continue to enforce stormwater management regulations.	PA	General Fund	1.1, 1.2, 1.3, 1.4, 2.1	Ongoing	<p>In 2018 (50) Projects were reviewed for compliance with stormwater regulations. In 2018, (2,120) inspections were performed. Inspections - were completed for compliance with SW regulations(1269) Compliance Inspections,(57) C&G inspections(14) Civil Inspections(66) NOT Inspections(2) Illicit Discharge Inspections(14) Individual Lot Inspections, (5) Re-Inspections(136) Outfall Inspections, (35) Upstream Structure Inspections(0) Post (Disaster) Event Inspections(247) Post Construction BMP Inspections(40) stabilization Inspections(5) Final Plat Inspections(205) New Pipe Inspections(15) End of Warranty Inspections, (10) Facility Inspections</p>
	1	Stormwater Division Planning Department		Continuous Process	
Continue to review and evaluate development practices such as LEED and LID for incorporation into Town Land Development and construction standards, where feasible.	PA	General Fund	1.1, 1.2, 1.3, 1.6, 2.1, 2.2	Ongoing	<p>Maintain Coastal LID Manual Links to Town Website for Public Access/ Use.</p> <p>Multiple projects in Town are utilizing low impact development practices to comply with standards and regulations. Future implementation of the Comprehensive Plan Update requires a review of design standards.</p>
	2	Planning Department Stormwater Division		Continuous Process	

Continue to participate in climate studies and programs, continue to evaluate infrastructure vulnerability as climate data becomes available. Knowledge exchange occurs internally amongst departments and externally with critical stakeholders, partners and within the community.	PA	General Fund	1.1, 1.2, 1.3, 1.6, 2.1, 2.2, 2.3	Ongoing	Participate in Clemson Climate Study, provide documentation as requested. Identify low lying roadways and possible pipes for future installation of flap gates. Participate in SeaGrant Resiliency Flood Pilot Project. Continue to participate in Resilience Strategy Workshops with partners and stakeholders such as the Charleston Resilience Network, NOAA, SeaGrant, SCDNR, etc. Draft Comprehensive Plan identifies required activities to assess climate vulnerability. Host "Be.Flood.Ready" Workshop for Remley's Point
	3	Emergency Manager Planning Department Stormwater Division		Continuous Process	
Update/ Establish Cyber security measures to protect critical data from loss during natural or man-made events.	PA	General Fund	2.1, 2.3, 3.1, 3.2	Ongoing	The IT Department is in the process of reviewing its current backup system for data preservation (Barracuda) and is evaluating whether upgrades are needed. Since the move into the new Town Hall in July of 2017, the IT Department has instituted mandatory bi-annual cyber security training for employees. The IT Department continues to update hardware and software in all departments, including installing the latest version of FEMA's Substantial Damage Estimator in the computers of the Building Inspection Division. All staff were required to take online cyber security training annually. In FY2019, PD brought Laptops and MDTs into CJIS requirements via encryption.
	2	IT Department Police Department		Continuous Process	
Continue to expand the Community Wildfire Protection Plan (CWPP) to include all Fire Departments / Districts in the County. Support the CWPP by increasing public awareness with the purpose of improving the protection of all structures.	PA, PI	General Fund	1.4, 2.1, 2.2, 3.1, 3.2	Ongoing	Charleston County Consolidated-911 has streamlined response and the department is accredited by the Commission on Accreditation for Law Enforcement Agencies, Inc. Fire Department supports Wildland Team through regional coordination. Agreement in place with US Forestry.

	1	Building Inspection Services Project Impact County-wide fire departments and districts		Continuous Process	
Seek funding for retrofitting, demolishing or relocating repetitively flooded properties if suitable candidates can be identified.	PP, PI	General Fund	1.1, 1.2, 1.3, 1.6, 2.1, 2.2, 2.3, 4.1	Ongoing	Literature is available in the Building Inspection Division Office and through Project Impact. Worked with Department of Insurance and SC Safe Home program to promote retrofitting. Representatives from these programs distributed literature and were available to answer questions at the Be Flood Ready (120 Attendees) event held in May at Town Hall and (25) people at the Scannlonville event. ITEM TO BE DELETED BC IT IS DUPLICATED ELSEWHERE IN PLAN
	4	Building Inspection Division		Continuous Process	
Continue providing information to citizens regarding hazard safe interior rooms (PPI).	PP, PI	General Fund	1.5, 2.2	Ongoing	Education project through use of brochures and information given to citizens. Ongoing on a regular basis as part of established departmental process.
	2	Building Inspection Division Charleston County/ Project Impact		Continuous Process	

Provide hazard and risk related information to all residents through local telephone book, billboards, and other large-scale outreach methods (PPI).	PI	General Fund Grant Funds	2.2	Ongoing	Servicing local phonebooks and updated yearly for new publications. Town ran National Preparedness Month education campaign in social media in September of 2018. Emergency Management support to community associations through HOA/POA information sharing beginning July 2019.
	2	Charleston County/ Project Impact		Continuous Process	
Review and Develop framework for management plans that address flood mitigation and/ or water quality by watersheds.	NB, PP, SP	General Fund, Stormwater Funds, CRAM Funds, Grant Funding	1.1, 1.6, 2.1, 2.3, 3.1, 3.2, 4.1, 4.2	Ongoing	<p>The Town's Draft Comprehensive plan identifies watershed-based planning as a beneficial activity for new development areas.</p> <p>The Town's Stormwater studies are evaluating systems down to a sub-basin level. Completed stormwater study for Hobcaw Point.</p> <p>The Town is undertaking a 9-Element water quality improvement plan for the Shem creek Watershed and is studying Water Quality in the Rathall Watershed to support future improvement plan development.</p>
	1	Planning Department		Continuous Process	
Continue to coordinate local stormwater management regulations for flood control and water quality.	PA, PI	General Fund CRAM Funds Grant Funding (FMA)	1.1, 1.3, 1.6, 2.2, 3.1, 3.2, 4.1, 4.2	Ongoing	<p>Town has New Development Coordination Meetings with other departments/ divisions including Fire, transportation, and Stormwater, and Building Inspections to review submitted projects. The Town's Comprehensive Land Use Plan is being updated and involves staff from multiple departments including Emergency Management and Stormwater in future land use planning and stormwater/ water quality (Natural Benefit, Sustainability, and Resiliency) planning.</p>
	1	Planning Stormwater Division Charleston County/Project Impact Coastal MS4 group/ SC APWA Chapters		In place/In process	

Continue implementing the Stormwater Management plan for Mount Pleasant and the applicable regulations.	PA	Stormwater/ CRAM Fund Grant Funding	1.1, 1.3, 2.1	Ongoing	The Stormwater Management Plan was updated in 2015, enforcement is continuing. Ongoing evaluations and updates on a regular basis as part of established departmental and regulatory processes. Will be updated either when the Comprehensive Plan Update activities are implemented or as directed by state and federal agencies.
	2	Public Services Planning		In place	
Implement new land usage regulations in the Old Village area of the Town to limit the expansion of impervious surfaces and manage stormwater runoff.	PA	General Fund	1.1, 1.6, 2.1, 2.2, 2.3, 3.1, 4.2	New	The new regulations were adopted by ordinance on 6/14/18 and apply to an approx. 975-acre area of the Town. The regulations are enforced through the Building Inspection Division and the Town Engineer. For FY2019 (114) permits were issued under the new regulation.
	2	Planning Department (Engineering) Building Inspection Division		In Place	
Implement new town wide individual lot regulations for drainage, grading, and tree protection and installation during construction.	PA	General Fund	1.1, 1.6, 2.1, 2.2, 2.3, 3.1, 4.2	New	The new regulations became effective 3/1/2019 and apply to residential lots throughout the town. The regulations are enforced through the Building Inspection Division and the Town Engineer. As of 7/16/2019 (204) permits were issued under the new regulation.
	2	Planning Department (Engineering) Building Inspection Division		In Place	
Continue enforcement of zoning regulations, including, the low-density zoning provisions.	PA	General Fund	1.1, 1.2, 1.3, 2.1, 2.3, 4.1, 4.3, 4.4,	Existing	The Planning Department is conducting an update of the Comp. Plan in 2017-2018. Comprehensive Plan Update is under review by Council.
	1	Planning		Continuous Process	

<p>Conduct, support, or participate in seminars, workshops, and other outreach programs regarding the State mandated Building Codes, the Town's Flood Damage Prevention Ordinance, and hazard mitigation strategies.</p>	<p>PA, PI</p>	<p>General Fund</p>		<p>Ongoing</p>	<p>Due to the move into a new Town Hall and work to update the Comprehensive Plan, the Planning Department did not conduct Planning College or Code for Lunch sessions this past fiscal year. These programs will resume in FY 2019. In conjunction with the new Emergency Manager, the Planning and Public Services Departments conducted a "Be Flood Ready" program at Town Hall for the community which included presentations by SC DNR and NOAA. There were approximately 120 participants. Three flood related presentations were also made to community groups by the Floodplain Manager. The Stormwater Manager spoke to (94) members of the Top Producers Real Estate Meeting re- flood mitigation efforts and strategies on 6/11/2018 and to (123) Stormwater Professionals on Resiliency through asset management at the Southeastern Stormwater Association Seminar in Atlanta, GA on 4/26/2019. Staff regularly meets with individual citizens, homeowners, contractors, and other local governments representatives to review building code and flood ordinance requirements.</p>
<p>Continue providing information to citizens regarding propane tank anchoring, hazard safe interior rooms, boat anchoring and maintenance, generator safety, riparian buffer zones, hazard resistant landscaping, and artifact protection, among other issues (PPI).</p>	<p>PA, PP, PI, NB</p>	<p>General Fund Grant Funding (HMGP)</p>	<p>1.1, 1.2, 1.3, 1.6, 2.2, 4.1, 4.2</p>	<p>Ongoing</p>	<p>Brochures are available in the Building Inspection Division lobby concerning these and other related hazard mitigation strategies. Project Impact attended 6 expos since July 2018 where information was distributed to attendees. Ashley Cooper Stormwater Education consortium held multiple events, build projects for water quality protections including shorescaping and pond management in the tri-county region in 2018 – Estimated Impacts are 2,923,278 for indirect education impacts, 85,677 estimated direct outreach impacts, and 37,041 estimated public involvement</p>

	2	Building Inspection Division		Continuous Process	impacts. Project Impact voted on project to promote living shorelines and educate the community.
Continue enforcing ordinance requirements for the elevation and anchoring of manufactured homes.	PA	General Fund	1.1, 1.2, 1.3, 2.1	Ongoing	Ongoing as part of the building code and inspection program - one manufactured home was installed in FY 2018 in the SFHA and it was elevated and anchored in accordance with Ordinance requirements. Zero manufactured homes were installed in SFHA in FY2019.
	1	Building Inspection Division		Continuous Process	
Continue to develop and bolster Emergency Management Program to focus on comprehensive approaches to preparedness, mitigation, response, and recovery. Continue enforcing regulations requiring new manufactured homes brought into the Town to be constructed to wind zone 2 requirements as required per State law.	PA	General Fund	1.1 2.1, 2.2, 2.3, 3.1, 3.2	Ongoing	With the hiring of the Town's new Emergency Manager in September of 2017, the Emergency Management Program continues to be structured. Major milestones in program planning; Emergency Operations Plan, Emergency Operations Center Structure and Operating Procedure, Emergency Notification System to alert staff members, and extensive coordination with key partners within the state and region. Community outreach efforts have been implemented to encourage individual and neighborhood preparedness and local business preparedness. Enforcement has been maintained including regulations requiring a one-foot freeboard (Design Flood Elevation). Ongoing on a regular basis as part of established department processes. There was one manufactured home installed in FY 2018 in the SFHA it was labeled as meeting wind zone 2 requirements. One manufactured home installed in FY2019 not in the SFHA and was labeled as meeting winds zone 2 requirements.

	1	Building Inspection Division		Continuous Process	
Seek funding for retrofitting demolishing, or relocating repetitively flooded properties, if suitable candidates can be identified.	PP	Grant Funding (FMA)	1.2, 1.3, 1.6, 3.1, 3.2, 4.1	Existing	As of 2019, there are no properties proposed or funded. Town discussed potential acquisition of one home in RL via FMA but it did not meet the Cost Benefit requirements.
	1	Building Inspection Division Stormwater Division		In process	
Continue distributing a brochure on protecting boats from damages during hurricanes to interested citizens through expos, offices, marinas, and boat dealers (PPI).	PP, PI	Grant Funding (HMGP)	1.3, 2.2, 3.1, 4.4	Ongoing	Project Impact attended 6 expos since July 2018 where information was distributed to attendees. Brochure has recently been updated with new information.
	3	Charleston County/ Project Impact		Continuous Process	
Continue distributing a brochure on protecting and preserving historic artifacts to interested citizens through expos, government offices, etc. (PPI).	PP, PI	Grant Funding	1.1, 2.2, 3.2	Ongoing	Project Impact attended 6 expos since July 2018 where information was distributed to attendees. Brochure has recently been updated with new information.
	2	Charleston County/ Project Impact		Continuous Process	

Seek funding for retrofitting critical facilities or infrastructure to enhanced hazard resistance and energy efficient in accordance with the Town's Strategic Plan or other applicable plans as funding sources become available.	PP	Grand Funding (FMA, structural), General Funding, CRAM Funding	1.2, 1.3, 1.6, 2.3, 3.2	Ongoing	The Town's CIP/ CMP programs identify future critical facilities improvements and existing facility improvements that include hazard resistance components. Town completed the new Town Hall/ EOC in 2017. Fire station 4 and the Public Services Facilities, and the Edwards Park pumping station continue in design and construction phases. Multiple Town facilities are being repaired or rehabilitated according to the Town's Building Assessment Program. Town requested HMGP and PDM funding for generator at Town Hall but was not awarded PDM. Town requested HMGP funding for flood hazard mitigation for Hobcaw flood study area.
	1	All Departments		In process	
Continue enforcement of the tree protection/landscaping ordinance.	NB	General Fund	2.3, 4.1, 4.2, 4.3	Ongoing	The Town continues to administer and enforce its tree protection and preservation ordinance and landscaping ordinance which include grand tree protection and landscape buffer requirements. Tree ordinance was updated in 2019-2019. All road improvement projects are enhanced with landscape plantings.
	2	Planning Charleston County		Continuous Process	
Continue maintaining permanent open space as parks and restricted use areas.	NB	General Fund Special Revenue Fund	1.1, 2.3, 4.1, 4.3, 4.4	Ongoing	139,848 acres are deeded privately or publicly to remain as open space and an estimated 89,000 of that total is in special flood hazard area throughout Charleston County. In Mount Pleasant, 2960 Acres are protected lands. Approximately 77% (2200 acres) are in a flood zone.

	2	<p>Parks and Recreation Commission</p> <p>Planning Department</p> <p>Public Services</p> <p>Building Inspection Services</p>		Continuous Process	
Continue encouraging the Greenbelt Advisory Board to acquire green space in special flood hazard area, to the extent feasible.	NB	Special Revenue Fund	1.1, 2.3, 4.1, 4.2, 4.4	Ongoing	Since its inception, the Greenbelt program has protected 21,170 acres of land in Charleston County; including parcels in Mount Pleasant at the Hamlin Brewer Tract.
	2	Parks and Recreation Commission		Continuous Process	
Continue to distribute literature on riparian buffer zones and hazard resistant landscaping to citizens through government offices and at expos (PPI).	NB, PI	Partner Donations Grant Funding (HMGP)	1.1, 1.3, 2.2, 3.1, 4.1, 4.2, 4.3, 4.4	Ongoing	Project Impact attended 6 expos since July 2018 where information was distributed to attendees. The Town distributed literature at the Scannlonville Be.Flood.Ready Expo in 2018 to (25) attendees.
	2	<p>Building Inspection Division</p> <p>Stormwater Division</p> <p>Project Impact</p>		Continuous Process	

Develop and implement projects to reduce air and water pollution in Charleston County under the Project Impact partnership. Promote conservation of energy resources.	NB	Grant Funding (HMGP)	4.1, 4.2	Continuous Process	<p>Project Impact attended 6 expos since July 2018 where information was distributed to attendees.</p> <p>Ashley Cooper Stormwater Education consortium held multiple events including build projects for water quality in the tri-county region in 2018 there were estimated 85,677 direct contacts for outreach and 37,7041 estimated public involvement Impacts.</p>
	1	Charleston County/ Project Impact Stormwater Consortium		Continuous Process	
Encourage cooperation between Town departments, other government entities, interested businesses, and citizens regarding recommended sustainable practices to protect environmental quality.	NB	Grant Funding (PDM)General Fund	2.3, 4.1, 4.2	Ongoing	<p>The Town is in the process of completing the five-year update to its Comprehensive Plan. Ongoing public meetings with committees of council to receive input from the community on various issues, including the preservation of green spaces and coastal wetlands and improving water quality. Through the Ashley Cooper Stormwater Education Consortium the Town provides educational and participation activities in sustainable practices such as shoreline buffers, green infrastructure, and pond management.</p>
	2	Ashley Cooper Planning Department Stormwater Division		Continuous Process	
Continue hazardous material training (PPI).	ES, PI	Enterprise Fund Grant Funding	2.1, 3.1, 3.2, 4.1	Ongoing	Charleston County Emergency Management Department conducted training sessions on topics including Clandestine Labs, Site Safety Officer, and Rae Systems Portable Tech.

	2	Charleston County/ Project Impact Public Services Fire Department		Continuous Process	Public Services Department trained 25 personnel in OSHA Level II response in 2018. Fire Department include hazardous material awareness, technician, and operational HazMat training in annual in-service training curriculum; participates multi-jurisdictional training opportunities. Police Department will add Hazmat Awareness Level training to Block Training in FY2020
Continue Active Threat, SWAT, and Significant Event Response Training (PPI).	ES, PI	General Fund	2.1, 2.3, 3.1, 4.1	Ongoing	Training offered through the County occurs on a continual basis, at least annually. TRT included Active Shooter training conducted by FBI, SLED, DHEC and other agencies. Police Department and Fire Department conduct joint response training in annual in-service training curriculum and participates in multi-jurisdictional training opportunities. Development of Multi-Jurisdictional /Organizational Active Violence Emergency Response Team and Rescue Task Force. In service training for all staff members as well as outreach to business and organizations throughout the community.
	1	Hazardous Materials Coordinator Police Department Emergency Management Fire Department		Continuous Process	
Continue coordinating Emergency Operations Center activities related to hazard events, including exercises and real-world activations.	ES	General Fund	2.1, 2.2, 2.3, 4.1	Ongoing	The EOC regularly holds training sessions for Emergency operations staff and officials. The Mount Pleasant EOC successfully activated and effectively coordinated responses to two real world incidents: Hurricane Florence in September of 2018. Additionally, EOC conducted full scale EOC exercise on 6/5/19. After action items include improvement to communications capability inside the Incident Meeting Room were implemented June 2019. Municipal coordination with other

	1	Emergency Management All Departments		Continuous Process	jurisdictions and County Emergency Management Department occurs with every real-world activation and exercise.
Continue responding to hazard emergencies.	ES	General Fund Enterprise Fund		Ongoing	Charleston County Consolidated Dispatch recorded 67 fuel spills, 363 Gas Leaks/Odors, 15 Hazmat Incidences, and 573 Outside fires since May 1, 2018. Town Public Services Spill Team/ Stormwater Staff responded to (31) reports of unknown spills/ discharges in 2018. Town Emergency Personnel coordinate response activities for all scope and scale of hazard emergencies throughout the year.
	1	EMS Fire Departments Sheriff Department Hazmat Coordinator Emergency Management Police Department Public Services		2.1, 2.2, 2.3, 3.2, 4.1	
Continue to evaluate existing Town-owned facilities for hazard resistance and retrofit facilities if feasible and continue to require new Town critical facilities to be located in low risk flood zones (Zone X).	ES	General Fund Bond Fund	1.1, 1.2, 1.3, 2.1, 3.2	Ongoing	The EOC for the Town is located in the new Town Hall that was opened in July of 2017. Town Hall is located in Zone X. Town's Public Services Department is Master Planning a new Public Services Facility for municipal operations and will consider hazard resistance and accommodating emergency operations in the design process.

	1	Public Services Department Building Inspection Division Fire Department Police Department Emergency Management		Continuous Process	(Zone X). Town's Fire Department is close to final design for Fire Station #4 and will consider hazard resistance and accommodating emergency operations in the design process. (Zone X). Construction will begin in Nov. 2019. Design is underway for joint Fire and Police Training facility. (Zone X).
Continue working to attain resources and to provide training for maritime firefighting through the Maritime Incident Response Team (MIRT).	ES	Grant Funding (HMGP)	2.1, 2.3, 3.1	Ongoing	Charleston County offers quarterly training sessions on marine firefighting are held at this time and on a regular basis as part of establish departmental processes.
	1	Hazardous Materials Coordinator Charleston County/ Project Impact		Continuous Process	
Maintain the national Weather Service "Storm Ready" and "Tsunami Ready" Community designations.	ES, PI	General Fund	1.1, 1.3, 1.5, 1.6, 2.1, 2.2	Completed	Charleston County has been recertified as a "Storm Ready" and "Tsunami ready" Community. This designation is valid through 2019.
	1	Emergency Management Charleston County/ Project Impact		Completed	
Continue coordinating the Anti-Terrorism Task Force (COBRA) of specially trained police, fire, and EMS personnel to respond to terrorist acts (PPI).	ES	Grant Funding (HMGP)	2.1, 2.2, 2.3, 3.1, 4.1	Ongoing	In addition to conducting various training sessions, the Charleston County WMD regional Response Team responded to real world assistance calls for suspicious white powder in mailboxes on Sullivan's Island in 2018 and a

	1	Hazardous Materials Coordinator Charleston County/ Project Impact		Continuous Process	possible fentanyl bust in the City of Charleston June 2017 and Lincolnville June 2018. It also conducted a full-scale alert and exercise on Feb. 23 2018, with assistance from SLED, DOE, and other agencies.
Continue sponsoring the Community Emergency Response Training (CERT) program (PPI).	ES, PI	Grant Funding (LEMPG)	2.1, 2.2	Ongoing	As of June 8, 2018, there are 594 CERT members and 51 teen CERT members active on the roster across Charleston County. Classes were conducted at the Charleston County Volunteer Rescue Squad in the fall of 2017 in order to better prepare the citizens of Charleston County for potential incidents. Town will bring CERT courses to Mount Pleasant via Charleston County's acquisition of a CERT trailer.
	2	Emergency Management Charleston County/ Project Impact		Continuous Process	
Coordinate online platforms for Emergency Operations.	ES	General Fund	2.1, 2.3, 4.1	New	The Charleston County successfully upgraded its software to Palmetto which is more robust and has more mapping capabilities than previous software. Palmetto is also used across the state leading to increased coordination and real time interaction in a crisis. The Town Emergency Operations Center utilizes Palmetto, Rhodium, Crisis Track, Alastar and City Works information sharing and operational management platforms. In 2019, Town MEOC will utilize Palmetto updates that are specific to municipal emergency operations.
	1	Emergency Management		Continuous Process	
Continue to seek funding and obtain fire suppression and other equipment for emergency response operations.	ES, PA, PP, PI	General Fund/ Grant Funds	2.1, 2.2, 2.3, 3.1, 3.2	Ongoing	Assessing resource and equipment requirements and needs to be able to respond to all types of hazards. Town acquired four High Water Rescue Vehicles and has budgeted

	1	Emergency Management Public Services Fire Department Police Department		Continuous Process	for equipment to enable salt/brine application prior to winter weather. PD applied for a grant to purchase Police Response boat. FD received funding for SCPA Airpaks (90).
Continue fire rescue training.	ES	General Fund	2.1, 3.1, 3.2	Ongoing	Specialized rescue and fire suppression training activities- confined space, high angle and bridge rescue are ongoing and continue annually.
	1	Fire Department		Continuous Process	
Continue to develop shelter capability.	ES, PA	General Fund	2.1, 22, 2.3	Ongoing	Emergency Management and Recreation Department coordinating American Red Cross, Salvation Army, Charleston County School District and other private sector partners to develop shelter capability for staff as well as community members in hazard emergencies. Hurricane Evacuation shelters are not permitted within the Town due to flood hazard. In 2019, the Town will work to improve communications capability at schools in which emergency personnel are staged during EOC activations.
	1	Emergency Management Recreation Department		Continuous Process	
Continue to seek funding and opportunities to provide safe shelter for residents and town staff for multiple emergencies/ events.	ES	General Fund Grant Fund	2.1	Ongoing	In winter 2018 several emergency warming-shelters were opened in cold weather.
	1	Emergency Management Partner Agencies		Continuous	

Continue to use, develop and enhance public information and warning capability.	ES, PI	General Fund	2.1, 2.2, 2.3	Ongoing	Coordinate messaging through social media, County Emergency Management, media outlets, Civic Plus, and all other available means. Communications staff in the Town will attend Basic, Advanced and Master PIO courses in 2019-2020.
	1	Emergency Management Fire Department Communications Office Police Department Public Services Department		Continuous Process	
Operate and improve the capabilities/ function of the Mobile Command unit for disaster and other town events where command centers are warranted.	ES	General Fund Grant Funding	2.1, 2.3	Complete	The Town's Mobile Command Center has been utilized on several incidents and town events. Operational use and capabilities will continue to be improved as identified.
	1	Police Department		Complete	
Continue to design and construct components of the Emergency Response training facility.	ES	General Fund Grant Funding	2.1	Ongoing	Funding for master planning and site design is funded for 2018-2019. Design is in process and should be complete by Nov. 2019. Construction is only partially funded at this time.
	1	Police Department Fire Department Partner Agencies		Continuous Process	
Continue ICS and NIMS training for all responders and applicable town staff.	ES	General Funds Grant Funding	2.1, 2.3	Ongoing	New Town staff, who provide response activities are required to take ICS 100, 200, 700, and 800. Additional training and course are taken as offered or as appropriate for response rolls. Two personnel are acquiring requisite training to be able to provide 300 and 400 level training at the Town.
	1	All Departments		Continuous Process	

Continue the drainage maintenance and canal cleaning program.	SP	General Fund	1.1, 1.6, 2.1, 2.3, 3.1	Ongoing	In 2018 (136) of canal inspections and (266) maintenance. There were (582) Hot Spot - Choke point inspections after rain events (13) Bridge Inspections were completed.
	1	Public Services		Continuous Process	
Continue to provide funding, design, permitting and construction for the drainage projects defined in Attachment VI-C – and incorporate new projects as they are identified.	SP	General Fund CRAM Fund Grant Funds SRF Funds	1.1, 1.6, 2.1, 2.2, 3.1, 3.2, 4.2	Ongoing	See Plan attachment for updates.
	1	Planning Public Services		Continuous Process	
Continue utility right of way permitting, considering emergency vehicle access and flood zone related issues in permitting decisions.	SP	General Fund Stormwater Program/ CRAM Funds	1.1, 1.6, 2.1, 2.3, 3.1	Ongoing	(206) permits in ROW and (46) permits for drainage easements were processed in FY18/19. (6) New Development projects proposing new roadways were reviewed and permitted for construction following the Town’s standards for minimum road elevations.
	1	Public Services Transportation Planning		Continuous Process	
Continue the Flap Gate inspection and maintenance program.	SP	CRAM Funds General Funds	1.1, 1.3, 1.6, 2.1, 3.1, 3.2	Ongoing	Tidal flap gates are inspected annually and maintained as needed. Assessment of areas that are prone to flooding from tides are evaluated for the installation of new gates.
	1	Public Services Department		Continuous Process	
Continue to provide funding, design, permitting, and construction services for the drainage improvement projects.	SP	Grant Funding General Fund Stormwater Program/ CRAM Funds	1.1, 1.6, 2.1, 2.3, 3.1	Existing	The Snee farm Drainage Improvement Project is under construction in 2018 and 2019. Stormwater Old Village and Hobcaw Point Studies are underway to identify drainage improvement needs. Funding is being sought for Construction Phases. The Town’s CIP/ CMP program funding future drainage studies and projects based upon a cyclical review/ approval process.

	1	Public Services		Continuous Process	
Continue the road/repair construction program, Implement Transportation Management Plan and consider evacuation needs and for soil liquefaction potential in prioritization of decisions.	SP	General Fund Grant Funding (FMA/PDM)	1.1, 1.2, 1.6, 2.1, 2.3, 3.1	Completed	(55) Paved roads were resurfaced or applied a preservation application to provide better vehicle travel conditions in FY 2018.
	1	Transportation Charleston County (Transp. Sales Tax)		Continuous Process	Other road improvement projects as identified in the Traffic Management Plan are ongoing and updated as part of the annual planning/budget process.
Support and sponsor placement of hurricane storm surge signs installed through Project Impact.	SP	General Funds Grant Funding	2.2	Ongoing	The Town has (2) signs that re maintained; Longpoint Road and Highway 41.
	1	Public Services		Continuous	
Continue to distribute a generator safety brochure to interested generator retail outlets, utility companies and the general public (PPI).	SP	Partner Donations General Fund	1.3, 2.1, 2.2, 3.1	Ongoing	Project Impact attended 6 expos since July 2018 where information was distributed to attendees. Brochure has recently been updated with new information.
	2	Charleston County/ Project Impact Building Inspection Division		Continuous Process	
Continue providing hazard-related literature/information to citizens at County and Town offices (PPI).	PI	General Fund	1.1, 1.2, 1.3, 1.4, 1.6, 2.1, 2.2	Existing	Printed materials (brochures, pamphlets, etc.) are always displayed and made available for public use.

	2	Charleston County/ Project Impact Building Inspection Division Stormwater Division		Continuous Process	Printed media are also updated on a regular basis.
Mail an outreach project to floodplain residents to those property owners whose property is located in special flood hazard areas (PPI).	PI	General Fund	1.1, 1.3, 2.1, 2.2, 4.2	Completed	In preparation for the upcoming grant funded community fair, mailing and advertisements were sent out to property owners in the area and invite them to this hazard related event to educate themselves on their flood risk.
	1	Charleston County/ Project Impact		Completed	
Continue providing speakers to civic groups regarding hazard related activities and environmental quality topics. Update the Speaker's Bureau list as needed (PPI).	PI	General Fund	2.1, 2.3, 4.2	Ongoing	Building Inspection Services participated in 47 meetings, expos, or events since May 2018.
	1	Charleston County/ Project Impact		Continuous Process	
Continue programs aimed towards providing resources to local schools and civic groups to enhance their ability to educate students regarding hazard events and hazard event preparation. Provide educational programs to schools on hazards or environmental quality as opportunities arise (PPI).	PI	Grant Funding (HMGP) Project Impact Resources	1.1, 2.1, 2.2, 3.2, 4.2	Ongoing	Project Impact has awarded mini-grant to teachers and other educators to fund special lessons in hazard mitigation annually since 2010. Worked with Kaleidoscope Summer Camp program to give out 100s of activity books this year. Multiple brochures and children's activity books are also handed out to students of all ages on a regular basis at expos and in offices. Ongoing on a regular basis as part of established departmental process.
	1	Project Impact		Continuous Process	

Continue participating in hazard-related/product or environmental protection-related expos or public events (PPI).	PI	General Fund	2.1, 2.2, 3.2, 4.2	Ongoing	Building Inspection Services participated in 47 meetings, expos, or events between May 2017-2018.
	2	Charleston County/ Project Impact		Continuous Process	The Natural Hazard Awareness Expo 2018 was geared towards promoting the awareness of all natural hazards that occur in Charleston. The Expo reached about 1000 people.
Maintain the flood zone frequently asked questions page on the Charleston County web site to provide information on protecting against flood hazards to the public (PPI).	PI	General Fund	2.2	Existing	Respond to, and update on a regular basis. In addition, a flood hotline has been set up for inquiries during the preliminary map review process. This phone line is active and monitored.
	2	Charleston County/ Project Impact		Continuous Process	A newspaper advertisement was also published in March 2017 for citizens to mail in inquiries for a staff member to return with a phone call.
Maintain the Project Impact internet page on the Charleston website to relay information on Project Impact events and methods to reduce hazard-related losses to the public (PPI). Provide Hazard Information and links on Town webpages.	PI	General Fund	2.2	Ongoing	The internet page is monitored constantly and updated with new information and/or brochures as they become available.
	2	Charleston County/ Project Impact		Continuous Process	Town webpages – there were 12,749 web page visits to town hazard related information on town's web pages in 2018.
Continue storm drain marking program with citizen participation	PI, PP, NB	Grant Funding (FMA) General Funds	2.1, 2.2, 2.3, 3.1, 3.2, 4.1	Ongoing	(27) Drains marked by (9) volunteers in 2017. No drains were marked in 2018 - program depends on volunteer interest. Many new drain inlets come pre-marked with no dumping messages.
	4	Public Services		Ongoing	

Maintain a web page with information on environmental resources protection/air and water quality pollution reduction strategies. Promote carpooling, public transportation and bicycle paths.	PI	Grant Funding (HMGP)	2.2, 4.1, 4.2	Ongoing	Facebook and Twitter sites are maintained and updated. Television programming produced is available for view on "YouTube". Town webpages – there were 6,568 web page visits to town Water Quality on town's web pages in 2018.
	1	Charleston County Public Information Stormwater Division		Continuous Process	
Continue educational efforts and initiatives promoting energy conservation. Promote LEED construction practices.	PI	Grant Funding (HMGP) General Fund	2.2, 4.1	Ongoing	Project Impact attended 6 expos since May 2018. Three mini-grants to area schools also supported energy conservation and hazard mitigation.
	2	Charleston County		Continuous Process	
Continue participating in the annual maintenance and approval of Hazard Mitigation Plan / Program for Public Information Committee efforts to achieve maximum public outreach.	PI, PA, PP, NB, ES, SP	General Fund	2.2	Ongoing	During this period, the County has held 2 public meetings and maintained correspondence with jurisdictions about the importance of the Plan. In 2018, Town council was provided notice and information regarding annual update of HMP.
	1	Charleston County Public Services		Continuous Process	
	PI	General Fund	2.2, 4.1, 4.2	Ongoing	Respond to, and update on a regular basis.

Maintain the Web and Facebook Pages for Project Impact (PPI).	1	Building Inspection Services Project Impact Public Information		Continuous Process	Ongoing on a regular basis as part of established departmental process.
Continue inter-departmental efforts to share geographic digital information and property specific construction-related information.	GIS	General Fund Grant Funding (HMGP)	2.1, 3.1, 3.2	Ongoing	The Town continues to improve GIS services. Tracking of New and re-development projects are coordinated for new Development through the Town's New Development Coordination Process, Through Cityworks Database, and the Town's GIS online maps.
	2	All Departments		Continuous Process	
Continue to improve and expand the use of GIS technology and capabilities for use with pre-and post-disaster vulnerabilities assessments, long range asset management and emergency planning.	GIS, ES	General Funds CRAM Funds Grant Funds	G1, G2, G3	Ongoing	Continue compiling updated Topo and Storm Drainage System Expansion information. Received 2017 LiDAR imagery for use in plan review and flood modeling. A FEMA Grant has been applied for in 2018/2019 for a town wide run-odd model/ drainage flood study. Multiple Town departments participated in a NAPSG pilot study in 2017-2018, designed to improve the use of GIS in emergency response. Town is participating in a LiDAR update to provide improved topo data and is updating GIS layers and data collection protocols to improve services and coordination between departments. GIS is being integrated into the EOC operations for Rhodium.
	1	All Departments		Continuous process	
Prepare flood insurance assessment table and address the community's insurance coverage gaps and other concerns.	PI, PP	General Fund	1.1, 1.3, 2.1	Ongoing	Completed assessment for 2019 PIP, will continue to assess for yearly Hazard Mitigation Plan update or as new information becomes available, whichever is sooner. The Natural Hazard Awareness Expo 2018 was geared

	1	Building Inspection Services		Continuing Process	towards promoting the awareness of all natural hazards that occur in Charleston. The Expo reached about 1000 people. Attendees were able to find their property on the new FEMA flood maps in order to address flood insurance concerns.
Continue to conduct studies on BFEs, floodways, and other pertinent flood concerns.	PA, PP	Grant Funding (FMA)	1.1, 1.6, 2.1, 2.2, 2.3, 3.1, 3.2	Existing	Ongoing Program for Drainage studies in older development areas – concurrent with drainage improvement plans and studies being conducted to assess system functionality and vulnerabilities. Studies include reviews of flood zones, impervious area changes, RL properties, drainage system capacity and a 1.5’ Sea Level Rise in the assessment and design process.
	1	Planning Public Services/ Stormwater Building Inspection Services		Continuous Process	
Develop Damage assessment Teams, training programs, and damage assessment maps.	ES, PA, GIS	General Funds Grant Funds	G1, G2, G3	Ongoing	In 2017, following Hurricane Irma, multiple departments provided staff to conduct post event damage assessments. Utilizing Rhodium and other resources the town has met to develop teams and mapping capabilities – this will continue for different emergency scenarios. Damage Assessment Teams mobilized for damage assessment in 2018 following Hurricane Florence. Damage Assessment training occurs annually to ensure up to date knowledge.
	1	All Departments		Continuous Process	

Include Hazard Mitigation, Resilience, and Emergency Management goals within the Town's Comprehensive Plan Update.	PA, PP	General Funds, Grant Funding	G1, G2, G4	Ongoing	The Town's Comprehensive Land use plan is in the process of being updated. Draft plan includes resiliency and emergency management considerations for new and re-development.
	1	?		Continuous Process	
Develop and distribute a stormwater information to all residents to inform them of projects, provide them with flooding, and water quality and resiliency information.	PI	Public Services	2.1, 2.2, 2.3, 3.2, 4.1	Ongoing	Stormwater website, social media platforms utilized. 3,886 web page visits for hazard topics in 2015 (Included in other outreach activities throughout current plan)
	4	Stormwater Fund		Continuous Process	
Continue to work with Charleston County to support and, where possible, directly participate, in the EPA CARE grant and other available programs	PI, PP, SP, NB	General Funds Stormwater Funds Grant Funds (HMGP)	2.1, 2.2, 2.3, 3.1, 4.1,	Complete	Coordinated through Project Impact activities with Charleston County as available. No new grants or programs funded in 2015-2016 (no CARE grants - program closed/ completed - managed by County through Project Impact)
		1		Public Service	
Continue development of WEB EOC- hazard information outreach to residents	PI	Grant Funding (HMGP) General Funds	1.1, 1.3, 1.6, 2.1, 2.2	?	Began implementation and training on Rodium Incident Management System. Web EOC is ongoing operation as needed during large scale events. Hazard information is provided to residents via various social medial platforms. (Rolled into activity in current plan)
	2	All Departments		?	
Work to standardize flood damage reporting system	PA	Stormwater Funds General Funds	2.1, 2.2, 2.3, 3.1, 3.2, 4.1	Ongoing	Utilization and improvements of flood reporting through the Cityworks Database platform is ongoing. (212) flood reports (streets, yards, homes) were logged in 2016. (Rolled into Damage Assessment post major event)
	2	Public Services		Continuous Process	

Update and revise Flood Insurance Rate Maps (FIRM) with SCDNR	PP	Grant Funding (FMA) General Funds	2.1, 2.2, 2.3, 3.1, 3.2, 4.1	Ongoing	Ongoing. New preliminary FIRMs for Charleston County were release in October 2016. Community meetings (3) were held in Charleston County in March 2017 for the new maps. The tentative effective date for the new maps is December 2018. (Rolled into current activity)
	1	Building Services Planning Department		Dec-18	
Continue to update and modify hurricane response plan for Town area. Complete search and rescue grid maps and data	PA	Grant Funding (HMGP) General Fund	1.1, 1.3, 1.6, 2.1, 2.2	Ongoing	Work with the newly formed Emergency Manager position to develop search maps and modify the hurricane response plan. (Rolled into current activity)
	3	Fire Department/ Public Services		?	
Continue to develop and update the elevation reference mark inspection program	SP	General Fund	1.1, 2.2	Ongoing	Benchmarks are annually inventoried and updated and/or recovered in conjunction with Charleston County (Remove, no longer active. Digital Elevations)
	1	Planning Department		Continuous Process	
Continue Terrorist Response Training	ES	General Fund Grant Funding (HMGP)	2.1, 2.2, 2.3, 3.1, 4.1,	Ongoing	Ongoing on a regular basis as part of established departmental processes (Rolled into all hazards training)
	1	Police Department		Continuous Process	
Develop/update Standard Operating Procedures for the Municipal Emergency Operations Center	ES	General Fund Grand Funding (HMGP)	2.1	Ongoing	The town has secured funding and approval for an emergency manager who will write new procedures for the new EOC and lead town wide trainings. (Rolled into current activity)
	2	All Departments Emergency Manager		?	
Develop and implement Illicit Discharge Detection Program to eliminate pollutant discharges into the storm drainage system. Includes staff training and spill responses in conjunction with NPDES program	PA, SP, GIS	General Fund Special Revenue (Stormwater Utility)	4.1, 4.2	Ongoing	The town has hired a GIS coordinator who is assisting all departments. Cityworks software has been implemented in public services and is GIS based and can be used for planning and managing assets. GIS assets for Stormwater operations are being updated though several drainage studies –

	1			?	new data will be incorporated into the main database once the work is complete. (Rolled into hazardous materials activity)
Promote standards for existing homes and single family residences to be retrofitted to exceed minimum code and ordinance requirements	PP	General Fund	1.2, 1.3, 1.6, 2.2, 4.1	Ongoing	Literature is provided in the Building Permit & Inspection Office and through Project Impact (discontinued program) (involved in public education).
	4	Building Inspection Services		?	

7.13 – City of North Charleston

Resolution for Adoption

Resolution # 2017-069

A RESOLUTION

AUTHORIZING THE MAYOR OR HIS DESIGNEE TO ADOPT THE REVISED CHARLESTON REGIONAL HAZARD MITIGATION PLAN AS THE OFFICIAL PLAN FOR THE CITY OF NORTH CHARLESTON REGARDING FEDERAL DISASTER MITIGATION

WHEREAS, the County of Charleston has experienced the effects of natural and manmade hazard events; and

WHEREAS, the Charleston County Council approved the formation of the Charleston Regional Hazard Mitigation and Public Information Plan Committee that prepared a recommended Charleston Regional Hazard Mitigation Plan; and

WHEREAS, the recommended Charleston Regional Hazard Mitigation Plan was widely circulated for review by residents, business organizations, professional organizations of the unincorporated and incorporated areas of Charleston County, state, federal, regional, and local agencies and has been supported by those reviewers; and

WHEREAS, the City of North Charleston has adopted the Charleston Regional Hazard Mitigation Plan, readopted it in 2004, 2008, and 2013, and is required to adopt the amended version of this plan on a five-year cycle for the City to remain eligible for certain Federal programs in which Charleston County participates.


NOW, THEREFORE BE IT RESOLVED, by the Mayor and City Council of the City of North Charleston, in Council assembled, that the Charleston Regional Hazard Mitigation Plan will serve as the official plan of the City of North Charleston and the Mayor and or his designee is authorized to execute any additional documents incident thereto;

AND BE IT FURTHER RESOLVED, that the Charleston Regional Hazard Mitigation and Public Information Plan Committee is recognized as the continuing entity charged with reviewing and maintaining the Charleston Regional Hazard Mitigation Plan in accordance with Community Rating System, Flood Mitigation Assistance, Disaster Mitigation Act and Public Information requirements, and periodically reporting on the progress towards and revisions to the plan to the North Charleston City Council.

The within Resolution shall be effective immediately upon its ratification by City Council.

Resolved in City Council this 21st day of December, in the Year of Our Lord, 2017, and in the 241st year of Independence of the United States of America.


R. KEITH SUMMEY, MAYOR

APPROVED AS TO FORM:

LEGAL COUNSEL

ATTEST:

ELLEN CLARK, MUNICIPAL CLERK

Action Report for the City of North Charleston, SC

Following are the proposed projects to be undertaken / continued in North Charleston for hazard mitigation during May 2018 - April 2019 and their status from May 2017- April 2018.

(Abbreviations for "Type" are as follows: "PA" is Preventive Activities, "PP" is Property Protection Activities, "NB" is Natural and Beneficial Functions/Resource Preservation Activities, "ES" is Emergency Services Activities, "SP" is Structural Projects Activities, and "PI" is Public Information Activities, "GIS" is Geographic Information Systems Activities.)

The following terminology is used to update the current status of each proposed project, as suggested by FEMA: "New", "Ongoing", "Continuous Process", "Deleted", and "Completed".

Hazard Mitigation Goals and Objectives	
Goal 1: Mitigate natural hazard damage	
Objective 1.1	Minimize future flood damage
Objective 1.2	Minimize future earthquake damage
Objective 1.3	Minimize future hurricane damage
Objective 1.4	Minimize future wildfire damage
Objective 1.5	Minimize future tornado-related loss of life
Objective 1.6	Reduce existing flood damage
Goal 2: Increase public preparedness and protection	
Objective 2.1	Protect the lives of our citizens from natural and man-made hazards
Objective 2.2	Educating citizens regarding steps to take to reduce vulnerabilities
Objective 2.3	Promote long-term prosperity
Goal 3: Improve infrastructure	
Objective 3.1	Improve hazard resistance of infrastructure
Objective 3.2	Reduce vulnerability of our infrastructure to natural and man-made hazards
Goal 4: Increase environmental well being	
Objective 4.1	Preserve environmental resources
Objective 4.2	Improve water quality
Objective 4.3	Preserve open space
Objective 4.4	Encourage recreational activities

City of North Charleston Hazard Mitigation Actions

<i>Mitigation Action and Description</i>	<i>Type</i>	<i>Funding Source</i>	<i>Goals and Objectives</i>	<i>Status</i>	<i>Milestones Achieved and Future Plans</i>
	<i>Priority</i>	<i>Responsible Agency</i>		<i>Implementation Schedule</i>	
Continue enforcement of the International Series Building-related and Fire codes and the floodplain management regulations (including the two-foot freeboard, cumulative substantial improvement clause, and/or other provisions deemed necessary to enhance Community Rating System credits) to maintain participation in the National Flood Insurance Program and the Community Rating System.	PA	General Fund	1.1, 1.2, 1.3, 2.1	Ongoing	North Charleston has maintained a Class 7 Rating System (CRS). Upon the next CRS visit, N plans to improve their rating to a Class 4 or 5.
	1	Building Inspection Services		Continuous Process	
Continue to expand the Community Wildfire Protection Plan (CWPP) to include all Fire Departments / Districts in the City. Support the CWPP by increasing public awareness with the purpose of improving the protection of all structures.	PA, PI	General Fund	1.4, 2.1, 2.2, 2.3, 3.2	Ongoing	Charleston County Consolidated-911 has streamlined response and the department is accredited by the Commission on Accreditation for Law Enforcement Agencies, Inc.
	1	Building Inspection Services Project Impact City-Wide Fire Departments and Districts		Continuous Process	
Promote Standards for existing homes to be retrofitted to exceed minimal codes.	PP, PI	General Fund	1.2, 1.3, 1.6, 2.2, 4.1	Ongoing	Reworked and published new brochures to push this message in 2016. Brochures are available at all expos and handed out at City permitting office. Worked with Department of Insurance and SC Safe Home program to promote retrofitting.
	1	Building Inspection Services		Continuous Process	

Continue providing information to citizens regarding hazard safe interior rooms (PPI).	PP, PI	General Fund	1.5, 2.2	Ongoing	Education project through use of brochures and information given to citizens.
	1	Building Inspection Services		Continuous Process	Ongoing on a regular basis as part of established departmental process.
Provide hazard related information to all residents through local telephone book.	PI	General Fund	1.1, 1.3, 2.1, 2.2, 4.2	Ongoing	Servicing local phonebooks and updated yearly for new publications.
	2	Building Inspection Services		Continuous Process	
Continue to provide coordination of City storm water management through development and implementation of a comprehensive program. Enhance efforts at improving water quality through environmental educational activities.	PA, PI	General Fund Enterprise Fund Grant Funding (FMA)	1.1, 1.6, 2.2, 3.1, 3.2, 4.2	Ongoing	Presently working with S. C. Sea Grant Consortium in the Filbin Creek study.
		1		Planning Public Works Building Inspection Services Project Impact	In place/In process
Continue implementing the storm water master plan for North Charleston and the applicable regulations.	PA	Enterprise Fund Grant Funding (FMA)	1.1, 1.3, 2.1	Ongoing	The Storm Water Master Plan was completed in 2012, enforcement is continuing. The City now has current and preliminary digital NFIP Flood Insurance Rate Maps implemented in GIS

	2	Public Works Building Inspection Services Planning		In place	system. Ongoing on a regular basis as part of established departmental process.
Implement new standard requiring reverse grade to move storm water runoff back towards the property and away from waterways.	PA	General Fund	4.2	New	Planning Stage
	2	Public Works Building Inspection Services		In Process	Assessing the best avenues to implement these standards / regulations.
Continue enforcement of zoning regulations, including, the low density zoning provisions of the Zoning and Land Development Regulations (ZLDR).	PA	General Fund	1.1, 1.2, 1.3, 2.1, 2.3, 4.1, 4.3, 4.4	Existing	The Zoning and Planning Department updated the Comp. Plan in 2015 encouraging the preservation of the rural area, preserving open space, and requiring vegetated buffers along the OCRM Critical Line. Plan will be updated and adopted again in 2018.
	1	Planning		Continuous Process	
Conduct or co-sponsor training workshops regarding the International Building-related, flood, and Fire Prevention Codes and Regulations, and on sustainable construction/landscaping practices, when there is interest in these workshops (PPI).	PA, PI	General Fund Self-Supporting through workshop revenues	1.1, 1.2, 1.3, 2.2, 3.1, 4.1	Ongoing	Building Inspection Services participated in meetings, expos, or events between May 2017- April 2018. Darbis Briggman speaks regularly at Trident Home Builders meetings (12 events in the past year).
	1	Building Inspection Services		Continuous Process	The department regular meets with individual citizens, homeowners, contractors, and other local governments.
Continue providing information to citizens regarding propane tank anchoring, hazard safe interior rooms, boat anchoring and maintenance, generator safety, riparian buffer zones, hazard resistant landscaping, and	PA, PP, PI, NB	General Fund Grant Funding (HMGP)	1.1, 1.2, 1.3, 2.2, 4.1	Ongoing	Project Impact attended 6 expos since July 2018 where information was distributed to attendees. Brochure has recently been updated with new information.

artifact protection, among other issues (PPI).	2	Building Inspection Services Project Impact Community Partners		Continuous Process	
Continue enforcing regulations requiring new manufactured homes brought into North Charleston to be constructed to wind zone 2 requirements as required per State law.	PA	General Fund	1.1, 3.2	Ongoing	Enforcement has been maintained including regulations to 2' freeboard. Ongoing on a regular basis as part of established department processes.
	1	Building Inspection Services		Continuous Process	
Continue prohibiting new manufactured homes to be installed in "V" flood zones and requiring manufactured homes installed in "A" flood zones to be on permanent foundations.	PA	General Fund	1.1, 1.2, 1.3, 2.1	Ongoing	Continue to prohibit manufactured homes in VE Zones and require engineered foundations in AE Zones. A change in regulation to 2' freeboard.
	1	Building Inspection Services		Continuous Process	
Continue demolishing structures posing a threat to public safety, considering location within the special flood hazard area as a prioritization factor.	PP	Grant Funding (FMA)	1.1, 1.2, 2.3, 3.2, 4.4	Ongoing	Several houses moved from flood zone on old naval base. Some areas left as green space.
	3	Building Inspection Services		Continuous Process	
Seek funding for retrofitting demolishing, or relocating repetitively flooded properties, if suitable candidates should be identified. Utilize North Charleston Repetitive Loss Area Analysis for identifying suitable candidates.	PP	Grant Funding (FMA)	1.2, 1.3, 1.6, 3.1, 3.2, 4.1	Existing	We are in the grant application process.
	1	Building Inspection Services		In process	

Continue distributing a brochure on protecting boats from damages during hurricanes to interested citizens through expos, offices, marinas, and boat dealers (PPI).	PP, PI	Grant Funding (HMGP)	1.3, 2.2, 3.1, 4.4	Ongoing	Project Impact attended 3 expos during this time period where information was distributed to attendees. Brochure has recently been updated with new information.
	3	Building Inspection Services Project Impact		Continuous Process	
Continue distributing a brochure on protecting and preserving historic artifacts to interested citizens through expos, government offices, etc. (PPI).	PP, PI	Grant Funding	1.1, 2.2, 3.2	Ongoing	Project Impact attended 3 expos during this time period where information was distributed to attendees. Brochure has recently been updated with new information.
	2	Building Inspection Services Project Impact		Continuous Process	
Seek funding for retrofitting critical facilities or infrastructure to enhanced hazard resistance in accordance with North Charleston master plan.	PP	Grant Funding	1.2, 1.3, 1.6, 2.3, 3.2	Ongoing	Two grants to Charleston County were awarded for educational programs however no structural components were included in these grants. Grants are being closed out now. Roper St. Francis in partnership with Charleston County received a structural grant to upgrade emergency systems. Grant is in progress
	1	Building Inspection Services		In process	
Continue enforcement of the tree protection/landscaping ordinance.	NB	General Fund	2.3, 4.1, 4.2, 4.3	Ongoing	All road improvement projects are enhanced with landscape plantings for roads and constructed under the half-percent (1.2%) sales tax. The county continues to administer and enforce its tree protection and preservation ordinance and landscaping ordinance which include grand tree protection and landscape buffer requirements.
	2	Planning		Continuous Process	

Continue maintaining permanent open space as parks and restricted use areas.	NB	General Fund Special Revenue Fund	1.1, 2.3, 4.1, 4.4	Ongoing	Areas are deeded privately or publicly to remain as open space.
	2	Parks and Recreation Commission Building Inspection Services		Continuous Process	Working to establish more open spaces in special flood hazard area.
Continue inter-department efforts to share geographical digital information and property specific construction-related information.	GIS	General Fund	1.1, 1.3, 2.1, 4.1	Ongoing	GIS works closely with and in support of all members of Damage Assessment with training and installing new software to the DA team's tablets.
	2	Building Inspection Services GIS Emergency Services		Continuous Process	GIS participates and is expanding its role with the Emergency Preparedness department.
Continue participating in "Build-A-Dune" projects as funding permits, and assist other jurisdictions in participating in this initiative upon request. Implement and participate in the Charleston County Beachfront Management Plan to enhance and preserve our coastlines.	NB	Grant Funding (PDM, FMA, HMGP)	1.1, 1.3, 1.6, 2.2, 3.1, 4.1	Depending on Funding / Ongoing	No grant funding was secured for "Build-A-Dune" projects during this time period.
	2	Building Inspection Services Public Works Project Impact		Depending on Funding / Continuous Process	North Charleston's Management Plan focuses on current conditions, regulations, strategies for preservation and other relevant information and is being maintained as required.
Continue to distribute literature on riparian buffer zones and hazard resistant landscaping to citizens through government offices and at expos (PPI).	NB, PI	Partner Donations Grant Funding (HMGP)	1.1, 1.3, 2.2, 3.1, 4.1, 4.2, 4.3, 4.4	Ongoing	Project Impact attended 6 expos since July 2018 where information was distributed to attendees. Brochure has recently been updated with new information.

	2	Building Inspection Services Project Impact		Continuous Process	
Develop and implement projects to reduce air and water pollution in North Charleston under the Project Impact partnership. Promote conservation of energy resources.	NB	Grant Funding (HMGP)	4.1, 4.2	Completed	Project Impact attended 6 expos since July 2018 where information was distributed to attendees. Brochure has recently been updated with new information.
	1	Building Inspection Services Project Impact		Completed	
Encourage cooperation between city departments, other government entities, interested businesses, and citizens regarding recommended sustainable practices to protect environmental quality.	NB	Grant Funding (PDM) General Fund	2.3, 4.1, 4.2	Ongoing	We share information through GIS web-based software program for our departments.
	2	Building Inspection Services Project Impact Other City Departments as Applicable		Continuous Process	
Continue hazardous material training (PPI).	ES, PI	Enterprise Fund Grant Funding	2.1, 3.1, 3.2, 4.1	Ongoing	Emergency Management conducted training sessions on topics including Clandestine Labs, Site Safety Officer, and Rae Systems Portable Tech. In addition, Individuals were sent to specialized training at nationwide core competence centers.
	2	Hazardous Materials Coordinator		Continuous Process	
Continue Terrorist Response Training (PPI).	ES	General Fund	2.1, 2.3, 3.1, 4.1	Ongoing	Training occurs on a continual basis, at least annually. For the 2017-18 period, TRT included

	1	Hazardous Materials Coordinator		Continuous Process	<p>Active Shooter training conducted by FBI, SLED, DHEC and other agencies.</p> <p>Training occurs on a continual basis, at least annually. For the 2016-2017 period, Terrorist Response Training included Weapons of Mass Destruction Refresher training conducted by the FBI, SLED, DHEC and other agencies on January 10, 2017 and Preparedness for Suicide Bombing Incidents conducted on Feb. 23-34, 2017.</p>
Continue coordinating Emergency Operations Center activities related to a hazard event, including holding drills for EOC personnel and maintain the Charleston Count Continuity of Operations Plan (COOP).	ES	General Fund	2.1, 2.2, 2.3, 4.1	Ongoing	<p>The EOC regularly holds training sessions for area responders, officials and staff.</p> <p>The Charleston County Emergency Operations Center successfully activated for and effectively coordinated responses to two real world incidents - including Hurricane Irma in 2017 and the ice storm January 2018. Additionally, EOC conducted full scale drill on 6/6/18, to practice and improve practices for an earthquake event.</p>
	1	Emergency Management		Continuous Process	
Continue responding to hazard emergencies.	ES	General Fund Enterprise Fund	2.1, 2.2, 2.3, 3.2, 4.1	Ongoing	North Charleston worked fuel spills, gas leaks/odors, Hazmat Incidences, and outside fires
	1	EMS Fire Department Sheriff Department Hazmat Coordinator Emergency Management		Continuous Process	

Continue to require improved construction practices for new City-owned critical facilities that are sensitive to flood zone (e.g. avoiding "A" and "V" flood zones where feasible) and seismic considerations.	ES	General Fund Bond Fund	1.1, 1.2, 1.3, 2.1, 3.2	Ongoing	North Charleston Emergency (EOC) is located inland outside the SFHA and is fully operational.
	1	Facilities Management		Continuous Process	
Continue working to attain resources and to provide training for maritime firefighting through the Maritime Incident Response Team (MIRT).	ES	Grant Funding (HMGP)	2.1, 2.3, 3.1	Ongoing	Quarterly training sessions on marine firefighting are held at this time and on a regular basis as part of establish departmental processes.
	1	Hazardous Materials Coordinator		Continuous Process	
Maintain the national Weather Service "Storm Ready" and "Tsunami Ready" Community designations.	ES, PI	General Fund	1.1, 1.3, 1.5, 1.6, 2.1, 2.2	Completed	North Charleston has been recertified as a "Storm Ready" and "Tsunami ready" Community. This designation is valid through 2018.
	1	Emergency Management		Completed	
Continue coordinating the Anti-Terrorism Task Force (Charleston County WMD Team) of specially trained police, fire, and EMS personnel to respond to terrorist acts (PPI).	ES	Grant Funding (HMGP)	2.1, 2.2, 2.3, 3.1, 4.1	Ongoing	In addition to conducting various training sessions, the WMD regional Response Team responded to real world assistance calls for suspicious white powder in mailboxes on Sullivan's Island in 2018 and a possible fentanyl bust in the City of Charleston June 2017 and Lincolnville June 2018. It also conducted a full scale alert and exercise on Feb. 23 2018, with assistance from SLED, DOE, and other agencies.
	1	Hazardous Materials Coordinator		Continuous Process	
Continue sponsoring the Community Emergency Response Training (CERT) program (PPI).	ES, PI	Grant Funding (LEMPG)	2.1, 2.2	Ongoing	Members of VERT were invited to attend our June earthquake drill. We email e-newsletters, neighborhood meetings, and faith base groups.

	2	Emergency Management		Continuous Process	
Maintain a web-based Emergency Operations Center Capability.	ES	General Fund	2.1, 2.3, 4.1	New	The NCEOC successfully upgraded its software to Palmetto which is more robust and has more mapping capabilities than previous software. Palmetto is also used across the state leading to increased coordination and real time interaction in a crisis. Multiple training has been applied throughout the year.
	1	Emergency Management		Continuous Process	
Continue the drainage maintenance and canal cleaning program.	SP	General Fund	1.1, 1.6, 2.1, 2.3, 3.1	Ongoing	Continue to survey drainage features and compile a GIS database to improve tracking efficiency. Program goal to reduce mean time between recurring maintenance activities.
	1	Public Works		Continuous Process	
Continue utility right of way permitting, considering emergency vehicle access and flood zone related issues in permitting decisions.	SP	General Fund	1.1, 1.6, 2.1, 2.3, 3.1	Ongoing	Continue the encroachment permitting process to manage encroachments in ROW and drainage easements to maintain and improve emergency vehicle access and flood zone issues. Continue to require that when new ROW is permitted/added deeded drainage easements are required as part of the permit/approval process.
	1	Public Works		Continuous Process	
Continue the elevation reference mark inspection program.	SP	General Fund	1.1	Existing	Benchmarks are annually inventoried and updated and/or recovered. By tilting high accuracy GPS the National Geodetic Survey has accepted Stability B benchmarks.
	1	Public Works		Continuous Process	
Continue to provide design, permitting, and construction services for the drainage improvement projects.	SP	Grant Funding General Fund	1.1, 1.6, 2.1, 2.3, 3.1	Existing	There were a number of completed projects providing drainage improvements paving of dirt roads and sidewalks and a number of paved roads were resurfaced or applied a preservation application to provide better vehicle travel conditions.

	1	Public Works Assistant Admin for Transp. & Public Works (Transp. Sales Tax)		Continuous Process	There were two completed flood studies completed by HMGP. Other projects are ongoing on a regular basis as part of establish departmental process.
Continue the road/repair construction program considering needs during evacuation and soil liquefaction potential in prioritization decisions.	SP	General Fund Grant Funding (FMA/PDM) Enterprise Funding	1.1, 1.2, 1.6, 2.1, 2.3, 3.1	Completed	There were a number of completed projects providing drainage improvements paving of dirt roads and sidewalks and a number of paved roads were resurfaced or applied a preservation application to provide better vehicle travel conditions.
	1	Public Works Assistant Admin for Transp. & Public Works (Transp. Sales Tax)		Continuous Process	There were two completed flood studies completed by HMGP. Other projects are ongoing on a regular basis as part of establish departmental process.
Continue to distribute a generator safety brochure to interested generator retail outlets, utility companies and the general public (PPI).	SP	Partner Donations General Fund	1.3, 2.1, 2.2, 3.1	Ongoing	Project Impact attended 6 expos since July 2018 where information was distributed to attendees. Brochure has recently been updated with new information.
	2	Building Inspection Services Project Impact		Continuous Process	
Continue to provide information about the USGS stream gauge program to the public (PPI).	SP	Partner Donations Grant Funding	1.1, 1.3, 2.1, 2.2, 4.2	New	Working on possible new avenues for disseminating new information such as brochures, expo presentations and continuing the partnership with USGS.

	2	Building Inspection Services Project Impact		Continuous Process	
Continue providing hazard-related literature/information to citizens at City offices (PPI).	PI	General Fund	1.1, 1.2, 1.3, 1.4, 1.6, 2.1, 2.2	Existing	Printed materials (brochures, pamphlets, etc.) are always displayed and made available for public use. Printed media are also updated on a regular basis.
	2	Building Inspection Services Project Impact		Continuous Process	
Mail an outreach project to floodplain residents to those property owners whose property is located in special flood hazard areas (PPI).	PI	General Fund	1.1, 1.3, 2.1, 2.2, 4.2	Completed	In preparation for the upcoming grant funded community fair, mailing and advertisements were sent out to property owners in the area and invite them to this hazard related event to educate themselves on their flood risk.
	1	Building Inspection Services Project Impact		Completed	
Continue providing speakers to civic groups regarding hazard related activities and environmental quality topics. Update the Speaker's Bureau list as needed (PPI).	PI	General Fund	2.1, 2.3, 4.2	Ongoing	Building Inspection Services participated in 47 meetings, expos, or events since May 2018. The department regular meets with individual citizens, homeowners, contractors, and other local governments.
	1	Building Inspection Services Project Impact		Continuous Process	
Continue programs aimed towards providing resources to local schools and civic groups to enhance their ability to educate students regarding hazard events and hazard event preparation. Provide educational programs to schools on hazards or	PI	Grant Funding (HMGP) Project Impact Resources	1.1, 2.1, 2.2, 3.2, 4.2	Ongoing	Project Impact has awarded mini-grant to teachers and other educators to fund special lessons in hazard mitigation annually since 2010. Multiple brochures and children's activity books are also handed out to students

environmental quality as opportunities arise (PPI).	1	Project Impact		Continuous Process	of all ages on a regular basis at expos and in offices. Ongoing on a regular basis as part of established departmental process.
Continue participating in hazard-related/product or environmental protection-related expos or public events (PPI).	PI	General Fund	2.1, 2.2, 3.2, 4.2	Ongoing	<p>Building Inspection Services participated in 47 meetings, expos, or events since May 2018.</p> <p>The department regular meets with individual citizens, homeowners, contractors, and other local governments.</p>
	2	Building Inspection Services Project Impact		Continuous Process	
Maintain the flood zone frequently asked questions page on the Charleston County web site to provide information on protecting against flood hazards to the public (PPI).	PI	General Fund	2.2	Existing	Respond to, and update on a regular basis, as well as monitor and answer inquiries submitted via social media.
	2	Building Inspection Services		Continuous Process	
Maintain the Project Impact internet page on the Charleston website to relay information on Project Impact events and methods to reduce hazard-related losses to the public (PPI).	PI	General Fund	2.2	Ongoing	The internet page is monitored constantly and updated with new information and/or brochures as they become available.
	2	Building Inspection Services		Continuous Process	
Maintain a web page with information on environmental resources protection/air and water quality pollution reduction strategies. Promote carpooling, public transportation and bicycle paths.	PI	Grant Funding (HMGP)	2.2, 4.1, 4.2	Ongoing	<p>Facebook and Twitter sites are maintained and updated.</p> <p>Utilize in-house videography to push all relevant messages to the public, and as a source of data collection, solicit input.</p>
	1	Building Inspection Services Public Information		Continuous Process	

Continue educational efforts and initiatives promoting energy conservation. Promote LEED construction practices.	PI	Grant Funding (HMGP) General Fund	2.2, 4.1	Ongoing	Project Impact attended 6 expos since July 2018 where information was distributed to attendees. Brochure has recently been updated with new information.
	2	Building Inspection Services		Continuous Process	Three mini-grants to area schools also supported energy conservation and hazard mitigation.
Continue participating in the annual maintenance and approval of Hazard Mitigation Plan / Program for Public Information Committee efforts to achieve maximum public outreach.	PI, PA, PP, NB, ES, SP	General Fund	2.2	Ongoing	During this period, the City has attended 2 public meetings and maintained correspondence with jurisdictions about the importance of the Plan.
	1	Building Inspection Services Project Impact		Continuous Process	
Maintain the Web and Facebook Pages for Project Impact (PPI).	PI	General Fund	2.2, 4.1, 4.2	Ongoing	Respond to, and update on a regular basis. Ongoing on a regular basis as part of established departmental process.
	1	Building Inspection Services Project Impact Public Information		Continuous Process	
Continue inter-departmental efforts to share geographic digital information and property specific construction-related information.	GIS	General Fund, Grant Funding (HMGP)	2.1	Ongoing	Continue compiling updated Topo and Storm Drainage System Expansion information. This system is maintained constantly and updated whenever new data is available.
	2	GIS Building Inspection Services Planning at Stormwater Emergency Management		Continuous Process	
Digitize elevation certificates and make them accessible to the public.	PI	Project Impact Fund General Fund	1.1	Ongoing	Completed archive and continues as new elevation certificates are received. Ongoing on a regular basis

	2	Building Inspection Services		Completed	as part of establish departmental process.
Prepare flood insurance assessment table and address the community's insurance coverage gaps and other concerns.	PI, PP	General Fund	1.1, 1.3, 2.1	Ongoing	Completed assessment for 2019 PIP, will continue to assess for yearly Hazard Mitigation Plan update or as new information becomes available, whichever is sooner. The Natural Hazard Awareness Expo 2018 was geared towards promoting the awareness of all natural hazards that occur in Charleston. The Expo reached about 1000 people. Attendees were able to find their property on the new FEMA flood maps in order to address flood insurance concerns.
	1	Building Inspection Services		Continuing Process	
Continue to conduct studies on BFEs, floodways, and other pertinent flood concerns.	PA, PP	Grant Funding (FMA)	1.1, 1.6, 2.1	Existing	Active process - concurrent with drainage improvement plans and studies being conducted in reference to new Federal Emergency Management Agency maps.
	1	Planning Building Inspection Services		Continuous Process	
Maintain the beachfront management plan that preserves our shorelines.	NB	General Fund	1.1, 2.1	New	Beachfront management plan is required by state law; regulations will be implemented with the next ordinance amendment later in 2018 and approved by City Council.
	1	Building Inspection Services		Continuous Process	
Continue energy conservation retrofitting of County-owned facilities as resources are available	PP	General Fund Grant Funding (HMGP)	4.1	Ongoing	Ongoing on a regular basis as part of established departmental processes
	2	North Charleston Facilities Management Department		Continuous Process	

Continue encouraging the Greenbelt Advisory Board to acquire green space in the special flood hazard area, to the extent feasible	NB	General Fund Special Revenue Fund	1.1, 2.3, 4.1, 4.4	Ongoing	Proposing limiting construction and acquiring lots in special flood hazard areas
	2	North Charleston Parks and Recreation Department North Charleston Building Inspection Services		Continuous Process	
Continue working with Scouts on the Project Impact Scout Patch Program	NB	Grant Funding (HMGP) General Fund	2.2, 3.2	Ongoing	In transition to Program for Public Information. Ongoing on a regular basis as part of established departmental processes
	2	North Charleston Building Inspection Services Project Impact Partners		Continuous Process	
Design/elevate roadways being constructed or reworked through the 1/2 cent sales tax program to minimize flooding potential to the extent feasible. Identify those roads susceptible to flooding.	SP	Special Revenue Funding	1.1, 1.6, 2.1, 2.3, 3.1	Ongoing	Ongoing on a regular basis as part of established departmental processes
	1	Deputy Administrator (Transportation sales tax)		Continuous Process	
Create a Flood Plain Management page available through the City of North Charleston website	PI	General Fund	2.2	Ongoing	Development Stage
	2	North Charleston Building Inspection Services		Continuous Process	
Continue participating in the Project Impact Outreach	PI	General Fund	2.2	Ongoing	In transition to Program for Public Information.

Project Strategy for the Community Rating System	1	North Charleston Building Inspection Services/ Project Impact committee members	Continuous Process	Ongoing
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7.14 - Town of Ravenel

Resolution for Adoption

A RESOLUTION FOR THE ADOPTION OF THE REVISED CHARLESTON REGIONAL HAZARD MITIGATION PLAN BY THE TOWN OF RAVENEL'S TOWN COUNCIL

WHEREAS the Town of Ravenel has experienced the effects of natural and man-made hazard events; and

WHEREAS the Charleston Regional Hazard Mitigation and Public Information Plan Committee has prepared a recommended *Charleston Regional Hazard Mitigation Plan*; and

WHEREAS the recommended *Charleston Regional Hazard Mitigation Plan* has been widely circulated for review by residents / business organizations / professional organizations of the unincorporated and incorporated areas of Charleston County, state, federal, regional and local government agencies and has been supported by those reviewers; and

WHEREAS the Town of Ravenel originally adopted the *Charleston Regional Hazard Mitigation Plan* in 1999 and readopted it in 2004, 2008, and 2013 and is required to adopt the amended version of this plan on a five-year cycle for the Town to remain eligible for certain Federal programs in which the Town of Ravenel participates, and

NOW THEREFORE be it resolved that

1. The *Charleston Regional Hazard Mitigation Plan* is hereby adopted as an official plan of the Town of Ravenel, and
2. The Charleston Regional Hazard Mitigation and Public Information Plan Committee is recognized as a continuing entity charged with reviewing, maintaining in accordance with Community Rating System, Flood Mitigation Assistance, Disaster Mitigation Act and Program for Public Information requirements, and periodically reporting on the progress towards and revisions to the plan to the Ravenel Town Council.

Effective this 28th Day of November, 2017

Action Report for the Town of Ravenel, SC

This jurisdiction is fully serviced by Charleston County. Please refer to Section 7.1 for the full action plan. There are no proposed projects additional to the action plan of Charleston County.

7.15 - Town of Rockville

Resolution for Adoption

**A RESOLUTION FOR THE ADOPTION OF THE REVISED
CHARLESTON REGIONAL HAZARD MITIGATION PLAN BY
Town of Rockville Mayor and Council**

Resolution No. 111813

WHEREAS the County of Charleston has experienced the effects of natural and man-made hazard events; and

WHEREAS the Charleston Regional Hazard Mitigation Project Committee has prepared a recommended *Charleston Regional Hazard Mitigation Plan*; and


WHEREAS the recommended *Charleston Regional Hazard Mitigation Plan* has been widely circulated for review by residents / business organizations / professional organizations of the unincorporated and incorporated areas of Charleston County, state, federal, regional and local government agencies and has been supported by those reviewers; and

WHEREAS the Town of Rockville originally adopted the *Charleston Regional Hazard Mitigation Plan* in 1999 and readopted it in 2004, again in 2008, and is required to adopt the amended version of this plan on a five-year cycle for the Town of Rockville, Charleston County, South Carolina to remain eligible for certain Federal programs in which Charleston County participates, and

NOW THEREFORE be it resolved that

1. The *Charleston Regional Hazard Mitigation Plan* is hereby adopted as an official plan of the Town of Rockville, and
2. The Charleston Regional Hazard Mitigation Project Committee is recognized as a continuing entity charged with reviewing, maintaining in accordance with Community Rating System, Flood Mitigation Assistance, and Disaster Mitigation Act requirements, and periodically reporting on the progress towards and revisions to the plan to the Town of Rockville and its Mayor and Council

Effective this 18 Day of November, 2013


Mayor, Town of Rockville

Action Report for the Town of Rockville, SC

This jurisdiction is fully serviced by Charleston County. Please refer to Section 7.1 for the full action plan. There are no proposed projects additional to the action plan of Charleston County.

7.16 – Town of Seabrook Island

Resolution for Adoption

**A RESOLUTION FOR THE ADOPTION OF THE REVISED
CHARLESTON REGIONAL HAZARD MITIGATION PLAN BY
TOWN OF SEABROOK ISLAND
RESOLUTION 2017-06**

WHEREAS, the Town of Seabrook Island has experienced the effects of natural and man-made hazard events; and

WHEREAS, the Charleston County Council approved the formation of the Charleston Regional Hazard Mitigation Plan Committee that has prepared a recommended *Charleston Regional Hazard Mitigation Plan*; and

WHEREAS, the recommended *Charleston Regional Hazard Mitigation Plan* has been widely circulated for review by residents/business organizations/professional organizations of the unincorporated and incorporated areas of Charleston County, state, federal, regional and local government agencies and has been supported by those reviewers; and

WHEREAS, the Town of Seabrook Island has adopted the *Charleston Regional Hazard Mitigation Plan*, most recently readopted it in 2013, and is required to adopt the amended version of this plan on a five-year cycle for the Town to remain eligible for certain Federal programs in which Charleston County participates; and

NOW, THEREFORE, be it resolved that

1. The *Charleston Regional Hazard Mitigation Plan* is hereby adopted as an official plan of the Town of Seabrook Island.
2. The Charleston Regional Hazard Mitigation Project Committee is recognized as a continuing entity charged with reviewing, maintaining the *Charleston Regional Hazard Mitigation Plan* in accordance with Community Rating System, Flood Mitigation Assistance, Disaster Mitigation Act and Public Information Plan requirements, and periodically reporting on the progress towards and revisions to the plan to the Town Council for the Town of Seabrook Island.

Done this 28th day of November, 2017.

TOWN OF SEABROOK ISLAND



Mayor

Action Report for the Town of Seabrook Island, SC

This jurisdiction is fully serviced by Charleston County. Please refer to Section 7.1 for the full action plan. Below are the proposed projects additional to the action plan of Charleston County.

(Abbreviations for "Type" are as follows: "PA" is Preventive Activities, "PP" is Property Protection Activities, "NB" is Natural and Beneficial Functions/Resource Preservation Activities, "ES" is Emergency Services Activities, "SP" is Structural Projects Activities, and "PI" is Public Information Activities, "GIS" is Geographic Information Systems Activities.)

Town of Sullivan's Island Hazard Mitigation Actions					
Mitigation Action and Description	Type	Funding source	Goals and Objectives	Status	Milestones Achieved and Future Plans
	Priority	Responsible Agency		Implementation Schedule	
Seabrook Island Road Drainage Study and Master Plan	PA, PP, NB	General Funds	This plan will identify options to address issues with tidal flooding and freshwater ponding on Seabrook Island Road	Ongoing	The town has contracted with ESP Associates for completion of a drainage study and master plan for Seabrook Island Road. The study is currently ongoing. This project is being funded by the town with general funds.
	1	Town of Seabrook Island		Study to be completed by end of 2019	
Seabrook Island Road Elevation Study	PA, ES, SP	General Funds	This project will develop alternatives for raising the minimum elevation of Seabrook Island Road as a protective measure against tidal flooding and rising sea level	Ongoing	The town has contracted with G. Robert George & Associates for completion of an elevation survey for Seabrook Island Road. The survey work has been completed and the consultant has provided preliminary estimates to raise the road elevation to the county's minimum elevation, as well as the elevation of the Freshfields Traffic Circle. Should the town elect to proceed with construction, this project will require public-private coordination and funding. The study is being funded by the town with general funds.
	1	Town of Seabrook Island		Study to be completed by end of 2019	

7.17 - Town of Sullivan's Island

Resolution for Adoption

**A RESOLUTION FOR THE ADOPTION OF THE REVISED
CHARLESTON REGIONAL HAZARD MITIGATION PLAN**

WHEREAS the Town of Sullivan's Island has experienced the effects of natural and man-made hazard events; and

WHEREAS the Charleston Regional Hazard Mitigation and Public Information Plan Committee has prepared a recommended *Charleston Regional Hazard Mitigation Plan*; and

WHEREAS the recommended *Charleston Regional Hazard Mitigation Plan* has been widely circulated for review by residents / business organizations / professional organizations of the unincorporated and incorporated areas of Charleston County, state, federal, regional and local government agencies and has been supported by those reviewers; and

WHEREAS the Town of Sullivan's Island originally adopted the *Charleston Regional Hazard Mitigation Plan* in 1999 and readopted it in 2004, 2008, and 2013 and is required to adopt the amended version of this plan on a five-year cycle for the County to remain eligible for certain Federal programs in which Charleston County participates, and

NOW THEREFORE be it resolved that

1. The *Charleston Regional Hazard Mitigation Plan* is hereby adopted as an official plan of the Town of Sullivan's Island, and
2. The Charleston Regional Hazard Mitigation and Public Information Plan Committee is recognized as a continuing entity charged with reviewing, maintaining in accordance with Community Rating System, Flood Mitigation Assistance, Disaster Mitigation Act and Program for Public Information requirements, and periodically reporting on the progress towards and revisions to the plan to the Town of Sullivan's Island Town Council.

Effective this 20th day of February 2018.



Patrick M. O'Neil, Mayor

Action Report for the Town of Sullivan’s Island, SC

Following are the proposed projects to be undertaken / continued in the Town of Sullivan’s Island for hazard mitigation during May 2018 - April 2019 and their status from May 2017-April 2018.

(Abbreviations for “Type” are as follows: “PA” is Preventive Activities, “PP” is Property Protection Activities, “NB” is Natural and Beneficial Functions/Resource Preservation Activities, “ES” is Emergency Services Activities, “SP” is Structural Projects Activities, and “PI” is Public Information Activities, “GIS” is Geographic Information Systems Activities.)

The following terminology is used to update the current status of each proposed project, as suggested by FEMA: “New”, “Ongoing”, “Continuous Process”, “Deleted”, and “Completed”.

Hazard Mitigation Goals and Objectives	
Goal 1: Mitigate natural hazard damage	
Objective 1.1	Minimize future flood damage
Objective 1.2	Minimize future earthquake damage
Objective 1.3	Minimize future hurricane damage
Objective 1.4	Minimize future wildfire damage
Objective 1.5	Minimize future tornado-related loss of life
Objective 1.6	Reduce existing flood damage
Goal 2: Increase public preparedness and protection	
Objective 2.1	Protect the lives of our citizens from natural and man-made hazards
Objective 2.2	Educating citizens regarding steps to take to reduce vulnerabilities
Objective 2.3	Promote long-term prosperity
Goal 3: Improve infrastructure	
Objective 3.1	Improve hazard resistance of infrastructure
Objective 3.2	Reduce vulnerability of our infrastructure to natural and man-made hazards
Goal 4: Increase environmental well being	
Objective 4.1	Preserve environmental resources
Objective 4.2	Improve water quality
Objective 4.3	Preserve open space
Objective 4.4	Encourage recreational activities

Town of Sullivan's Island Hazard Mitigation Actions

<i>Mitigation Action and Description</i>	<i>Type</i>	<i>Funding source</i>	<i>Goals and Objectives</i>	<i>Status</i>	<i>Milestones Achieved and Future Plans</i>
	<i>Priority</i>	<i>Responsible Agency</i>		<i>Implementation Schedule</i>	
Continue enforcement of the International series Building-related and Fire codes and the floodplain management regulations to include additional freeboard regulations, cumulative substantial improvement requirements as recommended and required for participation in the national Flood Insurance program.	PA	General Fund	1.1, 1.2, 1.3 2.1	Ongoing	The Town of Sullivan's Island maintains a class 5 CRS Rating. Plans are to improve Class Rating as opportunity to improve arises.
	1	Building Inspection Services and Zoning Services		Continuous process	
Continue support for coordination of departments to implement the storm-water management regulations as stated in the NPDES permit requirements.	PA	General Fund	1.1, 1.3, 1.6, 2.1, 3.1, 3.2, 4.1, 4.2	Ongoing	Monthly meetings being held with Charleston County Storm water manager to address various issues with storm water drainage. Applying for SMS 4 permit renewal. Continue with pipe, ditch maintenance and to improve outfalls.
	1	Building Inspection Services and Zoning Services		Continuous process	
Continue enforcement of zoning regulations; seek assistance with developing regulations to continue the single-family character of the island and to encourage open space preservation.	PA	General Fund	1.1, 1.6, 2.3, 4.1, 4.2, 4.3, 4.4	Ongoing	Continue with text amendments to strengthen single family character. Limiting structure square footage and lot coverage. Began Comprehensive Plan rewrite.
	1	Zoning		Continuous process	

Continue providing information to citizens regarding propane tank anchoring.	PA	General Fund	1.1, 1.3, 1.6, 2.1, 2.2, 4.1	Ongoing	Revised brochure on elevating and anchoring fuel tanks using FEMA technical bulletin. Continue with one on one education of residents and contractors. Continue to provide technical information by way of brochures available at town hall.
	1	Building Inspection Services		Continuous process	
Promote the use of voluntary standards for single-family residences to exceed minimal Building Inspection Services code requirements for wind and seismic design.	PP	General Fund	1.1, 1.2, 1.3, 2.1, 2.3	Ongoing	Continue to discuss better design and structural integrity of all buildings. All buildings on Sullivan's Island are designed by an engineer and engineered for seismic activity, wind and water loads.
	2	Building Inspection Services and Zoning		Continuous process	
Continue to enforce the Trimming & Pruning ordinance in the RC-1 and RC-2 areas.	NB	Tree Fund and General Fund	1.3, 1.6, 2.1, 4.1, 4.2, 4.3, 4.4	Ongoing	Violations were observed and investigated resulting in citations for destruction of vegetation. Continue to monitor these areas and work with Land trust representatives to protect the property.
	2	Zoning and Tree Commission		Continuous process	
Protect and enhance the tree canopy and enhance the natural benefits of native trees and vegetation.	NB	Tree Fund and General Fund	2.3, 4.1	Ongoing	Continue as a Tree City USA, installed palm trees with tree fund, held Arbor Day activities. Continue to look for ways to enhance the tree canopy on public and private properties with the Sullivan's Island Tree Commission.
	2	Zoning and Tree Commission		Continuous process	
Replace existing Town water treatment plant and upgrade parts of the collection system.	SP	Bond and Grant Funding	1.1, 1.2, 1.3, 2.3, 3.1, 3.2, 4.2	New	Construction and funding source approved by Town Council. Funds for plant secured. Plans finalized and are waiting on DHEC approval. Construction to take over a year. Several sewer pipe sections have been replaced and relined to improve collection system to decrease I and I.
	1	Admin, Water and Sewer Department		In process	

Implement requiring storm-water plans for residential properties requiring construction to have no adverse impact to neighboring properties.	PP	General Fund	1.1, 1.6, 2.3, 4.2	New	Ordinance requiring any construction over 625 square feet to trigger a storm-water plan from a design professional for the property. Plans include pre and post certifications.
	1	Building and Zoning		Ongoing	Process implemented and staff is currently working to improve the quality of the plans submitted. Future plans are to find ways to enforce the on-going maintenance of the plans.
Continue to update and implement procedures and automate systems to better enhance the ability of contractors and homeowners in securing permits and receiving information on construction to better protect life and property.	ES	General Fund	2.1, 2.3	New	Purchased program, received training and went live to the public with new program.
	1	Building and Zoning		Ongoing	Continue to train with software company to be more proficient in using the program.
Continue to train contractors in technical aspects of the building code, coastal construction, permitting and inspections.	PI	General fund	1.1, 1.2, 1.3, 2.1, 2.2, 2.3, 3.2	Ongoing	Held training class for contractors on new software program. Continue to train construction workers on a continuous basis on how to properly construct areas below BFE to meet standards as set forth in the Flood Damage Prevention Ordinance.
	2			Continuous process	
Evaluate existing Town-owned facilities for hazard resistance and retrofit facilities if needed where feasible.	SP	General Fund/ Grant Funding/ Bonds	1.1, 1.2, 1.3, 2.3, 3.1, 3.2, 4.1, 4.2	Ongoing	Oxidation ditch at sewer plant being rebuilt to exceed seismic and flood requirements. Pump stations to receive attention.
	1	Building, Fire Department Water and Sewer		Continuous process	Fire station being evaluated at this time for new impact windows, siding and higher wind speed engineering to meet current building code. Fire station and sewer plant to be under construction within next year. Waiting on DHEC approval for sewer plant

Continue the drainage maintenance program.	SP	General Fund	1.1, 1.6, 2.1, 4.2	Ongoing	Continue to meet with SCDOT officials and Charleston County officials to improve maintenance schedule for stormwater conveyance system.
	2	Maintenance and Charleston County		Continuous process	
Continue the road repair/construction program, considering needs during evacuation and sea level rise in prioritization decisions.	SP	General Fund and Grant Funding	2.1, 2.3, 3.1, 3.2	Ongoing	Attended meetings with city of Charleston representatives addressing sea level rise. Continue to monitor and apply for grant funding if available to address concerns for sea level rise in the future.
	1	Building, zoning, Town Council and Administration Staff		Continuous process	Strive to develop the Town's sea level rise adaptation plan in Comp Plan.
Continue providing hazard-related literature/information to citizens visiting Sullivan's Island Town Hall.	PI	General Fund	2.2	Ongoing	Installed brochure racks and brochure kiosk in town hall to display and distribute FEMA, County and local information and brochures.
	2	Planning		Continuous Process	
Continue providing speakers or in-house training sessions to civic groups and local citizens regarding hazard related activities.	PI	General Fund	1.1, 1.2, 1.3, 1.6, 2.2, 4.1	Ongoing	Building and Planning staff conducts training for Island residents and members of the development community (real-estate, engineers, etc.) throughout the year.
	1	Building, Zoning, Fire and Police		Continuous process	
Continue participating in the Project Impact Program for Public Information (PPI) to achieve maximum public outreach and	PI	General Fund	1.1, 1.2, 1.3, 1.4, 1.6, 2.2	Ongoing	Staff attends regular meetings for PPI participation.

participation in Regional Hazard mitigation Plan.	1	Building Inspection Services/ Project Impact committee Members		Continuous process	
Continue working with State Department of Natural Resources, Charleston County and ISO to maximize Community Rating System (CRS) rating.	PI	General Fund	1.1, 1.2, 1.3, 1.6, 2.1, 2.2, 2.3	Ongoing	Staff attends regular SCDHEC-OCRM group meetings to assist in CRS class advancement.
	3	Zoning/ Building Inspection Services		Continuous process	
Create Floodplain Management and Hazard Mitigation Web Page with regular updates.	PI	General Fund	2.2	Ongoing	Continue to update website
	1	Zoning/ Building Inspection Services		Continuous process	
Continue to develop Town GIS.	GIS	General Fund	1.1, 1.2, 1.3, 1.6, 2.1, 3.1, 3.2	Ongoing	Continue to update GIS information.
	1	Zoning/ Building Inspection Services		Continuous process	
Recognize Building Inspection Services Safety Week to promote safety in the built environment	PI	General Fund	2.2	Ongoing	Ongoing on a regular basis as part of established departmental processes
	3	Building Inspection Services		Continuous process	
Participate in "Hazard Awareness Week"	PI	General Fund	1.1, 1.2, 1.3, 1.5, 2.2	Ongoing	Ongoing no end date, will reevaluate as needed
	2	Building/ Zoning		No end date	

Support Charleston County in maintaining hurricane storm surge signs installed through Project Impact	SP	Partner Donations/ General Fund	1.1, 1.3, 1.6, 2.1, 2.2	Ongoing	Ongoing on a regular basis as part of established departmental processes
	2	Building Inspection Services		Continuous process	
Continue to requires stringent construction practices for new critical facilities that are sensitive to flood zone and seismic considerations	ES	General Fund Grant Funding (HMGP)	1.1, 1.2, 1.3, 2.1, 2.2	Ongoing	New Town Hall EOC facility Exceeding current Building Codes via participation in the CRS program
	1	Administrative and Building		Continuous process	TOSI PPI
Continue Responding to Hazard Emergencies	ES	General Fund	2.1, 2.2, 2.3	Ongoing	Ongoing on a regular basis as part of established departmental processes
	1	Fire Department Police Department		Continuous process	
Continue coordinating Emergency Operations Center activities in the event of a hazard event	ES	General Fund Fire Department	2.1, 2.2, 2.3	Ongoing	Constructing new Town Hall, which will serve as a support facility to the current Emergency Operations Center (Town of Sullivan's Island Fire Station). The both facilities will be equipped with a generator for emergency power. 99% complete at this time.
	1	Administrative Fire Department Police Department		Continuous process	
Continue Terrorist Response Training	ES	General Fund	2.1, 2.2, 2.3, 3.1, 3.2,	Ongoing	Ongoing on a regular basis as part of established departmental processes
	1	Fire Department Police Department		Continuous process	
Continue Hazardous Material Training	ES	General Fund	2.1, 2.2, 3.1, 4.1	Ongoing	Fire Department held training for volunteers and participates with Charleston County EMD with training exercises
	1	Fire Department		Continuous process	
Continue to participate in Charleston County's initiative to distribute literature on riparian buffer zones and hazard resistant landscaping to citizens through government offices and at expos	NB	None	1.1, 1.3, 2.2, 3.1, 4.1, 4.2, 4.4	Ongoing	Literature is in all Town offices and replenished as necessary.
	2	Building Inspection Services		Continuous process	

Continue to participate in Build-A-Dune projects as funding permits	NB	Grant Funding (HMGP/FMA)	1.1, 1.3, 1.6, 2.2, 3.1, 4.1,	Deleted	No grants are currently being pursued.
	2	Building Inspection Services and Maintenance		No longer in existence	

Additional Recommended Projects may be added to this project list as the committees consider other projects and recommend these projects for implementation.

7.18 - Charleston County Parks & Recreation Commission

Resolution for Adoption

**A RESOLUTION FOR THE ADOPTION OF THE REVISED
CHARLESTON REGIONAL HAZARD MITIGATION PLAN BY
The Charleston County Park and Recreation Commission**

Resolution No. _____

WHEREAS the County of Charleston has experienced the effects of natural and man-made hazard events; and

WHEREAS the Charleston Regional Hazard Mitigation Project Committee has prepared a recommended *Charleston Regional Hazard Mitigation Plan*; and

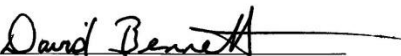
WHEREAS the recommended *Charleston Regional Hazard Mitigation Plan* has been widely circulated for review by residents / business organizations / professional organizations of the unincorporated and incorporated areas of Charleston County, state, federal, regional and local government agencies and has been supported by those reviewers; and

WHEREAS the **The Charleston County Park and Recreation Commission** originally adopted the *Charleston Regional Hazard Mitigation Plan* in 1999 and readopted it in 2004, again in 2008, and is required to adopt the amended version of this plan on a five-year cycle for the **The Charleston County Park and Recreation Commission** to remain eligible for certain Federal programs in which Charleston County participates, and

NOW THEREFORE be it resolved that

1. The *Charleston Regional Hazard Mitigation Plan* is hereby adopted as an official plan of the **The Charleston County Park and Recreation Commission**, and
2. The Charleston Regional Hazard Mitigation Project Committee is recognized as a continuing entity charged with reviewing, maintaining in accordance with Community Rating System, Flood Mitigation Assistance, and Disaster Mitigation Act requirements, and periodically reporting on the progress towards and revisions to the plan to the **The Charleston County Park and Recreation Commission**

Effective this 18th Day of Oct., 2013



Action Report for the Charleston County Park and Recreation Commission

Following are the proposed projects to be undertaken / continued in the Charleston

County Parks and Recreation Commission for hazard mitigation during the 2018-2019 school year and their status as of July 2018.

(Abbreviations for "Type" are as follows: "PA" is Preventive Activities, "PP" is Property Protection Activities, "NB" is Natural and Beneficial Functions/Resource Preservation Activities, "ES" is Emergency Services Activities, "SP" is Structural Projects Activities, and "PI" is Public Information Activities, "GIS" is Geographic Information Systems Activities.)

The following terminology is used to update the current status of each proposed project, as suggested by FEMA: "New", "Ongoing", "Continuous Process", "Deleted", and "Completed".

Hazard Mitigation Goals and Objectives	
Goal 1: Mitigate natural hazard damage	
Objective 1.1	Minimize future flood damage
Objective 1.2	Minimize future earthquake damage
Objective 1.3	Minimize future hurricane damage
Objective 1.4	Minimize future wildfire damage
Objective 1.5	Minimize future tornado-related loss of life
Objective 1.6	Reduce existing flood damage

Charleston County Parks and Recreation Hazard Mitigation Actions					
<i>Mitigation Action and Description</i>	<i>Type</i>	<i>Funding Source</i>	<i>Goals and Objectives</i>	<i>Status</i>	<i>Milestone Achieved and Future Plans</i>
	<i>Priority</i>	<i>Responsible Agency</i>		<i>Implementation Schedule</i>	
Distribute brochures to marina guest on protecting boats from damages during hurricanes.	PP	General Fund	1.3	Ongoing	No future plans but to continue program as needed.
	1	FEMA		Continuous	
Continue to purchase and maintain permanent open space as parks.	NB	Grants (HMGP/ FMA) Bond Funding	1.1, 1.6	Ongoing	No future plans but to continue program as needed.
	1	CCPRC		Continuous	
Continue preservation of beach access and shoreline ecology.	NB	Grants (HMGP/ FMA) General Funds	1.1, 1.3	Ongoing	No future plans but to continue program as needed.
	1	CCPRC		Continuous	

Charleston County Parks and Recreation Hazard Mitigation Actions

<i>Mitigation Action and Description</i>	<i>Type</i>	<i>Funding Source</i>	<i>Goals and Objectives</i>	<i>Status</i>	<i>Milestone Achieved and Future Plans</i>
	<i>Priority</i>	<i>Responsible Agency</i>		<i>Implementation Schedule</i>	
Continue involvement in local hazard mitigation initiatives by providing information to the community.	PI	General Fund	1.2, 1.3, 1.4, 1.5	Ongoing	No future plans but to continue program as needed.
	1	CCPRC		Continuous	
Evaluate CCPRC property and structures to man- made and natural hazards.	PP	General Fund	1.1, 1.2, 1.3, 1.4, 1.5	Ongoing	No future plans but to continue program as needed.
	2	CCPRC		Continuing Annual Assessment	
Re-establish beach dunes and vegetation.	NB	General Fund	1.1, 1.3	Ongoing	No future plans but to continue program as needed.
	1	CCPRC		Continuous	
Re-establish riparian buffer zones at all applicable water resources' owned by CCPRC.	NB	General Fund	1.1, 1.3, 1.6	Ongoing	No future plans but to continue program as needed.
	1	CCPRC		Continuous	
Continue providing programs and resources to schools to enhance education of students to hazards and environmental issues.	PI	General Fund	1.1, 1.2, 1.3, 1.4, 1.5, 1.6	Ongoing	No future plans but to continue program as needed.
	2	CCPRC		Continuous	
Accelerate agency's Hazard Tree Identification program. Identify and remove problem trees.	PP	General Fund	1.3, 1.5	Ongoing	No future plans but to continue program as needed.
	2	CCPRC		Continuing periodic assessment of property vegetation	
Continue to update and inform employees of hazardous weather conditions as outlined in the Hurricane plan.	PP	General Fund	1.1, 1.2, 1.3, 1.4, 1.5, 1.6	Ongoing	No future plans but to continue program as needed.

Charleston County Parks and Recreation Hazard Mitigation Actions

<i>Mitigation Action and Description</i>	<i>Type</i>	<i>Funding Source</i>	<i>Goals and Objectives</i>	<i>Status</i>	<i>Milestone Achieved and Future Plans</i>
	<i>Priority</i>	<i>Responsible Agency</i>		<i>Implementation Schedule</i>	
	2	CCPRC		Continuing annual updates of agency's E.A.P.	
Reforestation of selected zones within the developed CCPRC parks, Re-establish natural vegetation.	NB	General Fund	1.3	Ongoing	No future plans but to continue program as needed.
	2	CCPRC		Continuous	
Purchase energy efficient and hybrid vehicles.	NB	General Fund	1.1, 1.2, 1.3, 1.4, 1.5, 1.6	Ongoing	No future plans but to continue program as needed.
	2	CCPRC		Continuous	
Evaluate structure vulnerability to wildfire events at parks. Work with local Fire departments.	PP	General Fund	1.4	Ongoing	No future plans but to continue program as needed.
	1	CCPRC		Continuous	
Develop procedures to protect computer equipment and records.	PA	General Fund	1.1, 1.2, 1.3, 1.4, 1.5, 1.6	Ongoing	No future plans but to continue program as needed.
	2	CCPRC		Continuous	
Establish riparian buffer zones around facility lakes and water bodies.	NB	General Fund	1.1, 1.2, 1.3, 1.6	Ongoing	No future plans but to continue program as needed.
	2	CCPRC		Continuous	
Monitor bodies of water near CCPRC dog parks for bacterial levels.	NB	General Fund	1.1, 1.6	Ongoing	No future plans but to continue program as needed.

Charleston County Parks and Recreation Hazard Mitigation Actions

<i>Mitigation Action and Description</i>	<i>Type</i>	<i>Funding Source</i>	<i>Goals and Objectives</i>	<i>Status</i>	<i>Milestone Achieved and Future Plans</i>
	<i>Priority</i>	<i>Responsible Agency</i>		<i>Implementation Schedule</i>	
	2	CCPRC		Continuous	
Increase emphasis in recycling at all CCPRC facilities. Install recycling containers and drop off locations, etc.	NB	General Fund	1.1, 1.2, 1.3, 1.4, 1.6	Ongoing	No future plans but to continue program as needed.
	2	CCPRC		Continuous	

7.19 - Charleston County School District

Resolution for Adoption

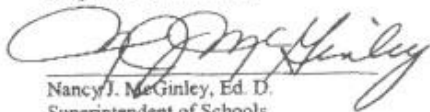
Charleston County School District
75 Calhoun Street
Charleston, SC 29401

TO: Board of Trustees
FROM: William H. Lewis, Chief Operating Officer for Capital Programs
DATE: August 11, 2008
SUBJECT: Hazard Mitigation Plan for Charleston County School District

Recommendation: Charleston County School Board officially agrees to pass the proposed resolution for the adoption of the revised Charleston Regional Hazard Mitigation Plan by the Charleston County School District.

The material submitted is for: Action Information

Respectfully submitted:


Nancy J. McGinley, Ed. D.
Superintendent of Schools


Michael Bobby
Chief of Finance and Operations Officer


William H. Lewis
Chief Operating Officer Capital Programs

APPROVED: Yes No

VOTE 6-0

9.4-1

Action Report for the Charleston County School District

Following are the proposed projects to be undertaken / continued in the Charleston County School District for hazard mitigation during the 2019-2020 school year and

their status after the 2018-2019 school year.

(Abbreviations for “Type” are as follows: “PA” is Preventive Activities, “PP” is Property Protection Activities, “NB” is Natural and Beneficial Functions/Resource Preservation Activities, “ES” is Emergency Services Activities, “SP” is Structural Projects Activities, and “PI” is Public Information Activities, “GIS” is Geographic Information Systems Activities.)

The following terminology is used to update the current status of each proposed project, as suggested by FEMA: “New”, “Ongoing”, “Continuous Process”, “Deleted”, and “Completed”.

Hazard Mitigation Goals and Objectives	
Goal 1: Increase public preparedness and protection	
Objective 1.1	Protect the lives of children from natural and man-made hazards.
Objective 1.2	Educate citizens regarding steps to take to reduce vulnerabilities.
Goal 2: Mitigate natural hazard damage	
Objective 2.1	Minimize future hurricane damage.
Objective 2.2	Minimize future earthquake damage.
Objective 2.3	Minimize future hurricane damage.
Objective 2.4	Minimize future tornado-related loss of life.
Goal 3: Improve critical infrastructure	
Objective 3.1	Improve hazard resistance of critical infrastructure.
Objective 3.2	Reduce vulnerability of critical infrastructure to natural and man-made hazards.

The following are the goals for this plan (listed in the order of importance):

1. Protect the lives of our children from natural and man-made hazards.
2. Improve hazard resistance of infrastructure.
3. Reduce vulnerability of our infrastructure to natural and man-made hazards.
4. Educating citizens regarding steps to take to reduce vulnerabilities.
5. Minimize future hurricane damage.
6. Minimize future earthquake damage.
7. Minimize future flood damage.
8. Minimize future tornado-related loss of life.

Charleston County School District Hazard Mitigation Actions

Mitigation Action and Description	Type	Funding Source	Goals and Objectives	Status	Milestones Achieved and Future Plans
	Priority	Responsible Agency		Implementation Schedule	
Continue to prepare a comprehensive hazard plan.	PA, NB	General Fund	1.1, 1.2, 3.1, 3.2	Ongoing	Schools complete annual review of school safety plans. District hired an Emergency Preparedness Coordinator in November 2018 to focus on emergency planning efforts.
	1	CCSD		Completed	
Continued development of emergency response activities and training for all schools and other occupied structures.	PA, PI	General Fund	1.1, 1.2, 3.1, 3.2	Ongoing	Ongoing training programs are being maintained such as New Hire Orientation, SafeSchools online training, First Five training series, FEMA online courses, monthly drills, and SRO training.
	1	CCSD		Continuous Process	
Continue distributing information related to hazard preparations to educate Charleston County School District staff and the public regarding hazard events.	PI	General Fund	1.1, 1.2, 2.1, 2.2, 2.3, 2.4	Ongoing	Distribution of annual hurricane bulletin, participation in the Great American Shake Out drill, and participation in Severe Weather Awareness Week.
	2	CCSD		Continuous Process	
Continue working with local municipalities and Charleston County to enhance hazard event preparations and response.	PI	General Fund	1.1, 1.2, 3.1, 3.2	Ongoing	Conducting public education and outreach efforts for hazard-related activities. Presentation of First Five videos; School Resource Officer Memorandum of Understanding; participation in Charleston County's annual EOC drill; participation in Charleston Area School Safety Working Group.
	2	CCSD		Continuous Process	

Charleston County School District Hazard Mitigation Actions

Mitigation Action and Description	Type	Funding Source	Goals and Objectives	Status	Milestones Achieved and Future Plans
	Priority	Responsible Agency		Implementation Schedule	
Continue development of an Emergency Operations Center for Charleston County School District.	PA	One Cent Sales Tax	1.1, 3.1, 3.2	Completed	The EOC, which opened in October 2017, provides a central facility for monitoring and coordinating responses to natural and man-made hazards. It is used for daily incidents, such as fire alarms, power outages, etc. It is also activated for larger scale incidents/events including tidal flooding in December 2018.
	2	CCSD		Completed	
Retrofit CCSD-owned facilities for hazard resistance as opportunities become available.	PP, SP	One Cent Sales Tax, FCO Bond Money	1.1, 2.1, 2.2, 2.3, 2.4, 3.1, 3.2	Ongoing	Use of one cent sales tax and FCO bonds to execute capital preventative maintenance strategy to replace major building features at end-of-life, such as roofs.
	2	CCSD		Continuous Process	
Continue to update design specifications that will ensure new and renovated facilities will better resist natural and man-made disasters.	PA, PP, SP	General Fund, One Cent Sales Tax, FCO Bond Money	1.1, 1.2, 2.1, 2.2, 2.3, 2.4, 3.1, 3.2	Existing	Provide architects designing CCSD projects with guidelines that ensure their designs are hazard-resistant.
	1	CCSD		Continuous Process	
Remove and rebuild schools identified as needing earthquake improvements.	PA, PP, SP	One Cent Sales Tax, FCO Bond Money	1.1, 1.2, 2.1, 2.2, 2.3, 2.4, 3.1, 3.2	Ongoing	Ongoing engineering and planning for the repair and replacement of buildings identified as being particularly susceptible to earthquake damage.
	1	CCSD		Continuous Process	

Additional Recommended Projects may be added to this project list as the Project Impact/Disaster Resistant Communities or Charleston County School District committees consider other projects and recommend these projects for implementation.

7.20 – Charleston Water System

Resolution for Adoption

**A RESOLUTION FOR THE ADOPTION OF THE REVISED
CHARLESTON REGIONAL HAZARD MITIGATION PLAN
BY THE COMMISSIONERS OF PUBLIC WORKS
Of the City of Charleston, South Carolina
(DBA CHARLESTON WATER SYSTEM)**

Resolution No. 2019-05

WHEREAS the Charleston Water System service area has experienced the effects of natural and man-made hazard events; and

WHEREAS the Charleston Regional Hazard Mitigation and Public Information Plan Committee has prepared a recommended *Charleston Regional Hazard Mitigation Plan*; and

WHEREAS the recommended *Charleston Regional Hazard Mitigation Plan* has been widely circulated for review by residents / business organizations / professional organizations of the unincorporated and incorporated areas of Charleston County, state, federal, regional and local government agencies and has been supported by those reviewers; and

WHEREAS the Charleston Water System originally adopted the *Charleston Regional Hazard Mitigation Plan* in 1999 and is required to adopt the amended version of this plan on a five-year cycle for the Commission to remain eligible for certain Federal programs in which Charleston Water System participates;

NOW THEREFORE be it resolved that:


1. The *Charleston Regional Hazard Mitigation Plan* is hereby adopted as an official plan of the Charleston Water System, and
2. The Charleston Regional Hazard Mitigation and Public Information Plan Committee is recognized as a continuing entity charged with reviewing, maintaining in accordance with Community Rating System, Flood Mitigation Assistance, Disaster Mitigation Act and Program for Public Information requirements, and periodically reporting on the progress towards and revisions to the plan to the Charleston Water System.

Effective this 23rd day of July, 2019

Attest:



F. Z. Hill, Jr., CEO



Virginia D. Tate
Witness

STATE OF SOUTH CAROLINA

COUNTY OF CHARLESTON

I, the undersigned, Secretary of the Commissioners of Public Works of the City of Charleston, South Carolina ("Commission"), **DO HEREBY CERTIFY:**

That the foregoing constitutes a true, correct and verbatim copy of a Resolution adopted by said Commissioners on July 23, 2019. A quorum of the Commissioners was present and remained present throughout the meeting.

The resolution is now in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my Hand, this 23 day of JULY 2019, 2019.



Secretary, Commissioners of Public Works of
the City of Charleston, South Carolina

Action Report for the Charleston Water System

(Commissioners of Public Works for the City of Charleston)

**The Charleston Water System is located in Charleston County, SC.
The following are proposed projects to be undertaken/ continued by the Charleston
Water System service area for hazard mitigation during 2019-2020**

(Abbreviations for “Type” are as follows: “PA” is Preventive Activities, “PP” is Property Protection Activities, “NB” is Natural and Beneficial Functions/Resource Preservation Activities, “ES” is Emergency Services Activities, “SP” is Structural Projects Activities, and “PI” is Public Information Activities, “GIS” is Geographic Information Systems Activities.)

*The following terminology is used to update the current status of each proposed project, as suggested by FEMA:
“New”, “Ongoing”, “Continuous Process”, “Deleted”, and “Completed”.*

(Abbreviations for “Responsible Agency” are as follows: “CS” is Customer Service, “E&C” is Engineering and Construction, “EO” is Executive Office, “ERD” is Environmental Resources (Wastewater Treatment), “IT” is Information Technology, “HR” is Human Resources, “HWTP” is Hanahan Water Treatment Plant, “WWC” is Wastewater Collection and “WDD” is Water Distribution)

Charleston Water System Hazard Mitigation Actions					
Mitigation Action and Description	Type	Funding Source	Goals and Objectives	Status	Milestones Achieved and Future Plans
	Priority	Responsible Agency		Implementation Schedule	
Continue to maintain 25-year master plans for water supply, distribution, collection, and treatment.	SP	Major and Recurring Capital	Maintain up-to-date master plans to proactively replace aging infrastructure, ensure hydraulic efficiencies, and prepare for area growth.	Existing	Updated a minimum of every 10 years.
	1	E&C		In Place	
Replace West Ashley Wastewater Tunnel.	SP	Major Capital	Replaces worn out infrastructure, accommodates growth and helps prevent sanitary sewer overflows in West Ashley area.	Ongoing	Project is 94% complete.
	1	E&C		In Process	
Install emergency generators or stand-by power connections at pump stations.	ES	Major and Recurring Capital	Ensure continuous operations during power outages to protect the environment.	Ongoing	Targeted locations are complete. New installations ongoing as system grows and new pump stations are commissioned.
	3	E&C, WWC		In Place	
Require design, engineering, and construction which meets code	PP	Major and Recurring Capital	Minimizes the impacts from natural disasters to help ensure continual operations.	Ongoing	Existing facilities subject to these code requirements are complete. New facilities under

requirements for flood, hurricane, and seismic considerations.	1	E&C HWTP ERD WWC WDD		Continuous Process	construction are being built to code requirements.
Maintain GIS, and implement system upgrades when released.	GIS	Major and Recurring Capital O&M	Maintain up-to-date, accurate system mapping for normal and emergency operations.	Ongoing	GIS mapping system is updated regularly with new data as infrastructure is commissioned and accuracy is regularly validated through user input and CMMS data.
	1	AMGIS; WDD; WWC		Continuous Process	
Water main replacement/rehabilitation.	SP	Major and Recurring Capital	Helps ensure reliability of water infrastructure for delivery of abundant drinking water for domestic needs and fire protection.	Ongoing	Assets for replacement or rehabilitation in major capital are identified and prioritized through master planning and may be reprioritized based on AMP and CMMS data. Assets for replacement or rehabilitation in recurring capital are identified and prioritized annually based on AMP and CMMS data.
	2	E&C; WDD		Continuous Process	
Cross Connection Control Program.	PA	O&M	Protects CWS's water system from contaminants and back siphonage; hence, public health protection.	Ongoing	Regular permitting and inspections of new backflow prevention device installations. Annual testing requirements for existing backflow prevention devices.
	1	E&C		Continuous Process	
Expand/improve Supervisory Control and Data Acquisition (SCADA) infrastructure and system.	SP	Major and recurring capital; O&M	Increase ability to monitor water and wastewater systems throughout plants and service area.	Ongoing	Install new RTUs as needed at new or existing facilities. RTUs included with all Major Capital funding facility improvements. Replace antenna poles as needed.
	2	EO		Continuous Process	
Replacement / rehabilitation of treatment plant infrastructure.	SP	Major and Recurring Capital	Helps assure reliability and robustness of mechanical, electrical equipment/facilities and unit processes.	Ongoing	Assets for replacement or rehabilitation in major capital are identified and prioritized through master planning and may be

	2	E&C, HWTP, ERD		Continuous Process	reprioritized based on AMP and CMMS data. Assets for replacement or rehabilitation in recurring capital are identified and prioritized annually based on AMP and CMMS data.
Wastewater main / pump station replacement and rehabilitation.	SP	Major and Recurring Capital	Helps ensure reliability of wastewater infrastructure; reduces blockages and I&I; protects against SSOs.	Ongoing	Assets for replacement or rehabilitation in major capital are identified and prioritized through master planning and may be reprioritized based on AMP and CMMS data. Assets for replacement or rehabilitation in recurring capital are identified and prioritized annually based on AMP and CMMS data.
	1	E&C, WWC		Continuous Process	
Confirm with ISO 14001 Standards for maintaining an Environmental Management System (EMS).	PA	O&M	Serves to minimize risk of activities adversely impacting the environment and public health, and enhance emergency preparedness. Standardizes operating procedures and documentation requirements.	Ongoing	Annual internal and external audits of EMS.
	1	All departments		Continuous Process	
Maintain and expand corporate and departmental emergency plans	ES	O&M	Corporate-level emergency plans aids in consistent preparation & response to emergency situations. Comprehensive departmental emergency preparedness plans are used to direct operations before, during, and after a disaster to minimize adverse impacts.	Ongoing	Annual reviews, updates, and training. Complete AWIA required risk and resiliency assessments.
	1	EO and all departments		Continuous Process	
Development of Asset Management Program	PA	O&M	Prioritize critical assets; initiate efforts to reduce risk.	Ongoing	Implement asset registry hierarchy structure, populate asset registry, establish asset criticality criteria, and identify critical assets.
	1	AMGIS, ERD, HWTP, WWC, WDD, SSS, EO		Continuous Process	
Participate in the S.C. mutual aid Water/wastewater Agency Response Network (SC WARN).	ES	O&M	Mutual aid agreements for member S.C. utilities to share resources prior to, during, or after an emergency event.	Ongoing	Membership renewed annually and associates assigned as liaisons.

	2	All Departments		Continuous Process	
Use sodium hypochlorite at the wastewater plant for disinfection purposes.	PA	O&M	Greatly reduces risks associated with gaseous chlorine storage.	Ongoing	2019-2022 WWTP improvement plans include replacement of existing hypochlorite storage/feed facility with more resilient facility.
	1	ERD		Continuous Process	
Industrial pre-treatment program.	PA	O&M	Enforcement minimizes risk of toxicity to the WWTP	Ongoing	Establish and/or renew permits with industrial dischargers.
	2	ERD; WWC		Continuous Process	
Cyber security systems for corporate business IT and SCADA systems.	PA	O&M	Maintain protection against potential cyber risks that could threaten continuity and sustainability of business and operations systems.	Ongoing	Conduct cyber risk and resiliency assessment. Hire Cyber Security Manager
	1	IT / SCADA		Continuous Process	
Safety Program	PA	O&M	Help ensure safe working conditions for CWS associates, contractors, and CWS customers and visitors.	Ongoing	Conduct monthly training on workplace safety topics.
	1	SSS		Continuous Process	
Risk Management Plan.	PI	O&M	Reduce risk of chlorine release. Mitigate impact in case of chlorine release. Help ensure safety of HWTP staff. Communicate with public and emergency responders.	Ongoing	EPA required. Review, update, and train annually. Third-party program audits, plan update and resubmittal to EPA every five years.
	1	HWTP		Continuous Process	
Process Safety Management Plan	PA	O&M	Workplace procedures designed to mitigate potential chemical releases or hazards. Help ensure safety of HWTP staff and contractors.	Ongoing	OSHA required. Review, update, and train annually. Third-party program audits every three years.
	1	HWTP		Continuous Process	
Spill Prevention Control and Countermeasures Plan	PA	O&M	Facilities and procedures established to prevent, or enhance preparedness and response to petroleum product releases. Help ensure containment and prevent contamination of water bodies.	Ongoing	EPA required. Review, update, and train annually. Third-party program audits, plan update and resubmittal to EPA every five years.
	1	HWTP, ERD, SSS		Continuous Process	
Emergency response training with local emergency planning department, and area first responders.	ES	O&M	Helps ensure that chemical releases are dealt with quickly with minimum of property damage and risk to public.	Ongoing	Annual meetings, plant tours and drills with local emergency response agencies.

	1	HWTP		Continuous Process	
Manage raw water supplies.	PA	O&M	Ensures safety and treatability of source water supplies.	Current	Hired Source Water Manager. Developing source water monitoring and protection program according to AWWA standards.
	1	HWTP		Continuous Process	
Maintain and expand on-line monitoring system for raw water sources and finished water distribution system.	ES	Grant (FMA) and O&M	Will help protect public health by monitoring in real-time any abnormalities in the potable water.	Current	In conjunction with RTU installations at new and existing sites. Source Water Manager collaboration with raw water users and industries adjacent to reservoir.
	1	HWTP; WDD; EO		Continuous Process	
Manage and maintain corporate water and wastewater rules and regulations.	PA	O&M	Standardized and uniform management of water supply and wastewater collection systems, and customer services.	Ongoing	Review and update corporate water and wastewater rules and regulations annually or as needed. Enforcement actions occur daily.
	1	All departments		Continuous Process	
Public education.	PI	O&M	Educating the public will help CWS to convey value of services and help minimize system operational problems.	Ongoing	Participating in regional campaign against non-flushable items. Annual publication of water and wastewater quality reports. Bill inserts distributed monthly.
	2	EO		Continuous Process	
Continue Sewer System Evaluation Surveys (SSES).	PA	O&M	Identifies deficiencies basin by basin for prioritizing capital expenditures for corrective activities such as main, manhole and service lateral rehab or replacement.	Ongoing	Annual programs for main cleaning, CCTV, smoke testing and flow monitoring
	1	WWC		Continuous Process	
Continue fire hydrant installations, replacements, and improvements	ES	Major and Recurring Capital	Helps ensure proper levels of water quantity for fighting emergency fires	Ongoing	Complete planned hydrant replacements and repair activities annually.
	1	WDD, E&C			

7.21 - College of Charleston

Resolution for Adoption

A RESOLUTION FOR THE ADOPTION OF THE REVISED CHARLESTON REGIONAL HAZARD MITIGATION PLAN BY THE College of Charleston, Charleston, SC

WHEREAS the College of Charleston has experienced the effects of natural and man-made hazard events; and

WHEREAS the Charleston Regional Hazard Mitigation and Public Information Plan Committee has prepared a recommended *Charleston Regional Hazard Mitigation Plan*; and

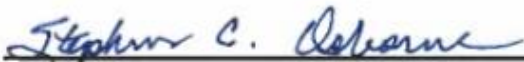
WHEREAS the recommended *Charleston Regional Hazard Mitigation Plan* has been widely circulated for review by residents / business organizations / professional organizations of the unincorporated and incorporated areas of Charleston County, state, federal, regional and local government agencies and has been supported by those reviewers; and

WHEREAS the College of Charleston originally adopted the *Charleston Regional Hazard Mitigation Plan* in 1999 and readopted it in 2004, 2008, and 2013 and is required to adopt the amended version of this plan on a five-year cycle for the College of Charleston to remain eligible for certain Federal programs in which the College of Charleston participates, and

NOW THEREFORE be it resolved that

1. The *Charleston Regional Hazard Mitigation Plan* is hereby adopted as an official plan of the College of Charleston, and
2. The Charleston Regional Hazard Mitigation and Public Information Plan Committee is recognized as a continuing entity charged with reviewing, maintaining in accordance with Community Rating System, Flood Mitigation Assistance, Disaster Mitigation Act and Program for Public Information requirements, and periodically reporting on the progress towards and revisions to the plan to the President at the College of Charleston.

Effective this 16th Day of April, 2019



Stephen C. Osborne, President, College of Charleston

Action Report for the College of Charleston

**Unincorporated Charleston County, SC fully services the College of Charleston and therefore has the same action report. Additions and individualized projects for this plan will be shown under the College of Charleston report below.*

Following are the proposed projects to be undertaken/continued at the College of Charleston for hazard mitigation during May 2019-April 2020, and includes the status from May 2018-April 2019.

(Abbreviations for "Type" are as follows: "PA" is Preventive Activities, "PP" is Property Protection Activities, "NB" is Natural and Beneficial Functions/Resource Preservation Activities, "ES" is Emergency Services Activities, "SP" is Structural Projects Activities, and "PI" is Public Information Activities, "GIS" is Geographic Information Systems Activities.)

The following terminology is used to update the current status of each proposed project, as suggested by FEMA: "New", "Ongoing", "Continuous Process", "Deleted", and "Completed".

Hazard Mitigation Goals and Objectives	
Goal 1: Mitigate natural hazard damage	
Objective 1.1	Minimize future flood damage
Objective 1.2	Minimize future earthquake damage
Objective 1.3	Minimize future hurricane damage
Objective 1.4	Minimize future wildfire damage
Objective 1.5	Minimize future tornado-related loss of life
Objective 1.6	Reduce existing flood damage
Goal 2: Increase public preparedness and protection	
Objective 2.1	Protect the lives of our citizens from natural and man-made hazards
Objective 2.2	Educating citizens regarding steps to take to reduce vulnerabilities
Objective 2.3	Promote long-term prosperity
Goal 3: Improve infrastructure	
Objective 3.1	Improve hazard resistance of infrastructure
Objective 3.2	Reduce vulnerability of our infrastructure to natural and man-made hazards
Goal 4: Increase environmental well being	
Objective 4.1	Preserve environmental resources
Objective 4.2	Improve water quality
Objective 4.3	Preserve open space
Objective 4.4	Encourage recreational activities

<i>Mitigation Action and Description</i>	<i>Type</i>	<i>Funding Source</i>	<i>Goals and Objectives</i>	<i>Status</i>	<i>Milestones Achieved and Future Plans</i>
	<i>Priority</i>	<i>Responsible Agency</i>		<i>Implementation Schedule</i>	
Continued training and coordination activities with the campus- emergency operations team.	PA/PP/ES/PI	General Fund	1.1, 1.2, 1.3, 1.4, 2.1, 2.2, 3.1, 3.2	Ongoing	<p>Emergency Operations Team (EOT) met quarterly May 2018-April 2019.</p> <p>Training was conducted in the following topics: Fire/Event Response; Hurricane and Flood Preparation, Response and Recovery; Event/Crowd Security Awareness.</p> <p>Campus-wide training is consistently offered on Active-Shooter Response (internal video made); weather-related emergencies and response; workplace violence; fire and evacuation drills; health and safety, and driving safety.</p>
	1	Emergency Management Director		Continuous Process	
Continued development and refinement of campus-wide emergency management protocols.	PA/PS/ES/PI	General Fund	2.1, 2.2, 3.1, 1.1, 1.2, 1.3, 1.4	Completed/Ongoing	<p>The College Emergency Preparedness and Management Plan was reviewed for current status during the May 2018-April 2019 time for this report.</p>
	2	Emergency Management Director		Continuous Process	
Continue enforcement of the International series Building, environmental safety and Fire codes.	PA/PP	General Fund	2.1 ,2.2, 3.2	Existing/Ongoing	<p>Continued inspection of buildings, in compliance with the IBC, SCDHEC, OSHA, EPA, and SC Fire Codes was conducted by Public Safety/Fire and EHS employees.</p> <p>Continuing Education was attended which provided code and statute updates.</p>
	1	Physical Plant/EHS/Public Safety		Continuous Process	
Participation in Project Impact with the purpose of improving education on Hazards to the college and community.	PA	General Fund	1.1, 1.2, 1.3, 1.4, 2.1, 2.2	Ongoing	<p>Education materials were provided from state EMD for Hurricane season to all employees and available to all students.</p> <p>Applicable information provided by PIP is forwarded through Emergency Operations Team or campus population.</p>
	2	Emergency Management Director		Continuous Process	

Continued support of the campus sustainability program at the College of Charleston.	NB	General Fund	4.1, 4.2	Ongoing	Campus Sustainability has been provided a new location to operate which has better meeting and program spaces. The process of intern projects and collaboration with other campus departments, as well as the Charleston Resiliency Network activities are providing more educational and functioning opportunities.
	3	Office of Sustainability		Continuous Process	
Continue energy conservation retrofitting of college-owned facilities as resources are available.	PP	General Fund	3.1, 3.2, 4.1	Ongoing	Continued LED placement in place of fluorescent and incandescent bulbs will show more energy conservation. Several existing buildings' windows have been replaced and two new buildings have had energy conservation-based windows installed thereby creating a better indoor air quality control.
	4	Facilities Management		In Process	
Continue hazardous material training.	ES	General Fund	2.1, 2.2, 3.2	Existing	Continued new employee chemical safety training in the Science, Art, and Facility Departments. Purchases are monitored by EHS to deter any high-hazard purchases that would present unnecessary risks. Chemical management system in place to monitor quantities and hazards of materials. Training on the hazardous material is also provided by the chemical inventory management system in place.
	1	EHS		Continuous Process	
Continue coordinating Emergency Operations Center activities related to a hazard event, including holding drills for EOC personnel.	ES	General Fund	1.1, 1.2, 2.2, 3.2	Completed	Continue to monitor supplies to update and assure sufficient to establish the EOC. Monthly/quarterly Emergency Operations Team meetings review EOC operations, provide hazards trainings, and discuss recovery operations and assessments for funding/insurance support.
	1	Emergency Management		Continuous Process	
Continue responding to hazard emergencies.	ES	General Fund	2.1, 3.1, 3.2	Existing	Fire/EMS/Public Safety, EHS and Facilities continued responding to incidents involving injury/illnesses; fire; chemical spills; gas leaks; suspicious odors; hurricane response and recovery; and flooding.
	1	Public Safety/EHS/Emergency Management		Continuous Process	

Continue working to attain resources and to provide training for campus community on hurricane, earthquake and other natural hazards in the Region.	ES	General Fund	1.1,1.2,1.3, 1.4,2.1,3.1, 3.2	Ongoing	Continued to meet with higher education partners in the city, county, and state to compare, contrast, and support the EHS/EM positions and resources. Shared EM and EHS policy and practice information, had monthly open discussions, and routinely networked with institutes of higher education partners of all sizes. Earthquake education is provided routinely by partnering with the Geology Department and their Seismologists.
	1	Emergency Management Director			Continuous Process
Continued development of campus EOC / GIS computing / Web-EOC center.	GIS/ES/PI	General Funds	1.1, 1.2, 1.3, 1.3, 1.4, 2.1, 2.2, 3.1, 3.2	Ongoing	Continued development of campus EOC. Shifting to new location with more secure and functional capabilities.
	2	Emergency Management SCGIS Lab			Continuous Process
Development of campus web pages and email blasts for natural and man-made hazards on Campus.	PI	General Fund	2.1,2.2, 3.1,3.2	Ongoing	Continued, through the Marketing and Communications Department and IT Department to develop the emergency.cofc.edu webpage. Continued to review and modify, as necessary, the Cougar Alert pre-planned scripts to support more rapid deployment of alerts, as much as possible. EHS website being updated to include more user-friendly guidance on risk and hazard control.
	1	Emergency Management Director/ Marketing			Continuous Process
Continue participating in the Project Impact Program for Public Information (PPI) to achieve maximum public outreach.	PI	General Fund	1.1, 1.2, 1.3, 1.4, 2.1, 2.2, 3.1, 3.2, 4.1	Ongoing	Quarterly conversations, meetings, and annual reporting and feedback sessions provide us with information and support to be able to provide our constituents current information.
	1	Building Inspection Services/ Project Impact Committee			Continuous Process

Continued development of campus map including referenced blue prints.	GIS	General Fund	1.1, 1.2, 1.3, 1.4, 2.1, 2.2, 3.1, 3.2	Existing/ Ongoing	<p>Facilities Management and Planning continues to update CAD information when buildings are renovated, newly built, or have significant changes.</p> <p>Campus mapping updates are also connected to updating the evacuation maps and shelter in place guidance documents in all buildings.</p> <p>Plan to connect building CAD with work order process to be able to cross check changes and modifications by reference to new or existing prints.</p> <p>In process</p>
	2	EHS/Public Safety/ Facilities Management SCGIS Lab			
Continued use of Cougar Alert system.	PI	General Fund	2.2, 2.1, 1.1, 1.2, 1.3, 1.4	Existing	<p>The Cougar Alert mass notification system was used 14 times during the May 2018-April 2019 period. Emergency and non-emergency messages were sent to support the following events: Steam Outage, Gas Leak, Violent Intruder Nearby, Water Leak, Storm Potential.</p> <p>Approx. 14,000 + persons per notification were informed/warned.</p>
	1	Emergency Management Director/ Marketing		In Place	

7.22 - Cooper River Parks & Playground Commission

Resolution for Adoption

Cooper River Park & Playground Commission
P.O. Box 71846
North Charleston, S.C. 29415 - 1846
Phone (843) 747 - 0776 Fax (843) 747 - 8851

July 29, 2015

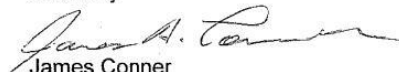
Ms. Pamela Mecke
Technical Service Coordinator
Charleston County Building Inspection Services
4045 Bridgewater Drive, S.C. 29405

Dear Pamela:

The City of North Charleston entered into a lease with the Cooper River Park and Playground Commission in 2005 in which the City of North Charleston leased from the Commission the recreation facilities owned by the Commission. This is a fifty year lease and the City of North Charleston assumes all liability for the properties, buildings, athletic and other facilities; the city will provide insurance coverage, and provide all necessary maintenance to the properties.

The Cooper River Park and Playground Commission agrees because of this lease with the City of North Charleston and their participation and operation of these facilities they will also include the Commission's property in the Charleston County Hazard Mitigation Plan. This will be an ongoing policy between the Commission and the City unless you receive further notification.

Sincerely


James Conner
Chairman

E Mail Gare@Comcast.Net

Action Report for Cooper River Parks & Playground Commission

This jurisdiction is fully serviced by the City of North Charleston. Please refer to Section 7.13 for the full action report as well as the letter below. There are no proposed projects additional to the action report of the City of North Charleston.

7.23 – James Island Public Service District Commission

Resolution for Adoption

A RESOLUTION FOR THE ADOPTION OF THE REVISED CHARLESTON REGIONAL HAZARD MITIGATION PLAN BY JAMES ISLAND PUBLIC SERVICE DISTRICT

Resolution No. 13-02

WHEREAS the James Island Public Service District (JIPSD) has experienced the effects of natural and man-made hazard events; and

WHEREAS the Charleston Regional Hazard Mitigation Project Committee has prepared a recommended *Charleston Regional Hazard Mitigation Plan*; and

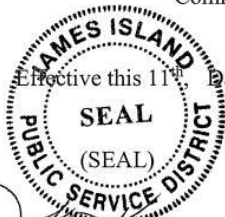
WHEREAS the recommended *Charleston Regional Hazard Mitigation Plan* has been widely circulated for review by residents / business organizations / professional organizations of the unincorporated and incorporated areas of Charleston County, state, federal, regional and local government agencies and has been supported by those reviewers; and

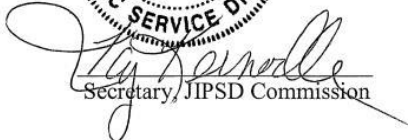
WHEREAS the JIPSD originally adopted the *Charleston Regional Hazard Mitigation Plan* in 1999 and readopted it in 2004, 2008, 2013, and is required to adopt the amended version of this plan on a five-year cycle for the JIPSD to remain eligible for certain Federal programs in which Charleston County participates, and

NOW THEREFORE be it resolved that

1. The *Charleston Regional Hazard Mitigation Plan* is hereby adopted as an official plan of the JIPSD, and
2. The Charleston Regional Hazard Mitigation Project Committee is recognized as a continuing entity charged with reviewing, maintaining in accordance with Community Rating System, Flood Mitigation Assistance, and Disaster Mitigation Act requirements, and periodically reporting on the progress towards and revisions to the plan to the Commission of the JIPSD.

Effective this 11th day of December, 2017




Secretary, JIPSD Commission


Chair, JIPSD Commission

Action Report for James Island Public Service District

Following are the proposed projects to be undertaken / continued in James Island Public Service District for hazard mitigation during May 2019 - April 2020 and their status from May 2018 - April 2019.

(Abbreviations for "Type" are as follows: "PA" is Preventive Activities, "PP" is Property Protection Activities, "NB" is Natural and Beneficial Functions/Resource Preservation Activities, "ES" is Emergency Services Activities, "SP" is Structural Projects Activities, and "PI" is Public Information Activities, "GIS" is Geographic Information Systems Activities.)

The following terminology is used to update the current status of each proposed project, as suggested by FEMA: "New", "Ongoing", "Continuous Process", "Deleted", and "Completed".

Hazard Mitigation Goals and Objectives	
Goal 1: Mitigate natural hazard damage	
Objective 1.1	Minimize future flood damage
Objective 1.2	Minimize future earthquake damage
Objective 1.3	Minimize future hurricane damage
Objective 1.4	Minimize future wildfire damage
Objective 1.5	Minimize future tornado-related loss of life
Objective 1.6	Reduce existing flood damage
Goal 2: Increase public preparedness and protection	
Objective 2.1	Protect the lives of our citizens from natural and man-made hazards
Objective 2.2	Educating citizens regarding steps to take to reduce vulnerabilities
Objective 2.3	Promote long-term prosperity
Goal 3: Improve infrastructure	
Objective 3.1	Improve hazard resistance of infrastructure
Objective 3.2	Reduce vulnerability of our infrastructure to natural and man-made hazards
Goal 4: Increase environmental well being	
Objective 4.1	Preserve environmental resources
Objective 4.2	Improve water quality
Objective 4.3	Preserve open space
Objective 4.4	Encourage recreational activities

James Island Public Service District Hazard Mitigation Actions

<i>Mitigation Action and Description</i>	<i>Type</i>	<i>Funding Source</i>	<i>Goals and Objectives</i>	<i>Status</i>	<i>Milestones Achieved and Future Plans</i>
	<i>Priority</i>	<i>Responsible Agency</i>		<i>Implementation Schedule</i>	
Continue enforcement of the International series Building-related and Fire codes and the floodplain management regulations (including the two-foot freeboard, cumulative substantial improvement clause, and/or other provisions deemed necessary to enhance Community Rating System credits) to maintain participation in the National Flood Insurance Program and the Community Rating System.	PA	General Fund	1.1, 1.2, 1.3, 2.1	Ongoing	Unincorporated Charleston County has maintained a Class 4 Rating System (CRS). Upon the next CRS visit, the County plans to improve their rating to a Class 2 or 3.
	1	Chas. County Building Inspection Services		Continuous Process	
Continue to provide coordination of County stormwater management through development and implementation of a comprehensive program. Enhance efforts at improving water quality through environmental educational activities.	PA, PI	General Fund Enterprise Fund Grant Funding (FMA)	1.1, 1.6, 2.2, 3.1, 3.2, 4.2	Ongoing	Charleston County has completed the Stormwater Comprehensive Plan for the 72,000-acre Mead Westvaco site known as East Edisto for development that is now in progress. Chas. County Building Inspection Services has process LOMRs for land area not included in Comprehensive Plan. Project Impact voted on project to promote living shorelines and educate the community.
	1	Chas. County Planning Public Works Charleston County Building Inspection Services Project Impact		In place/In process	

Promote Standards for existing homes to be retrofitted to exceed minimal codes.	PP, PI	General Fund	1.2, 1.3, 1.6, 2.2, 4.1	Ongoing	Reworked and published new brochures to push this message in 2016. Brochures are available at all expos and handed out at County permitting office. Worked with Department of Insurance and SC Safe Home program to promote retrofiting.
	1	Chas. County Building Inspection Services		Continuous Process	Developed grant-funded community fair for the public to educate on retrofiting practices.
Continue implementing the stormwater master plan for Charleston County and the applicable regulations.	PA	Enterprise Fund Grant Funding (FMA)	1.1, 1.3, 2.1	Ongoing	The Stormwater Master Plan was completed in 2012, enforcement is continuing. The county now has current and preliminary digital NFIP Flood Insurance Rate Maps implemented in GIS system. Ongoing on a regular basis as part of established departmental process.
	2	Public Works Charleston County Building Inspection Services Charleston County Planning		In Place	
Continue providing information to citizens regarding propane tank anchoring, hazard safe interior rooms, boat anchoring and maintenance, generator safety, riparian buffer zones, hazard resistant landscaping, and artifact protection, among other issues (PPI).	PA, PP, PI, NB	General Fund Grant Funding (HMGP)	1.1, 1.2, 1.3, 2.2, 4.1	Ongoing	Project Impact attended 3 expos during this time period where information was distributed to attendees.
	1	Chas. County Building Inspection Services Project Impact		Continuous Process	
Continue enforcing regulations requiring new manufactured homes brought into Charleston County to be constructed to wind zone 2 requirements as required per State law.	PA	General Fund	1.1, 3.2	Ongoing	Enforcement has been maintained including regulations to 2' freeboard.
	1	Chas. County Building Inspection Services		Continuous Process	Ongoing on a regular basis as part of established department processes.

Continue prohibiting new manufactured homes to be installed in "V" flood zones and requiring manufactured homes installed in "A" flood zones to be on permanent foundations.	PA	General Fund	1.1, 1.2, 1.3, 2.1	Ongoing	Continue to prohibit manufactured homes in VE Zones and require engineered foundations in AE Zones. A change in regulation to 2' freeboard.
	1	Chas. County Building Inspection Services		Continuous Process	
Conduct or co-sponsor training workshops regarding the International Building-related, flood, and Fire Prevention Codes and Regulations, and on sustainable construction/landscaping practices, when there is interest in these workshops (PPI).	PA, PI	General Fund	1.1, 1.2, 1.3, 2.2, 3.1, 4.1	Ongoing	Chas. County Building Inspection Services participated in 43 meetings, expos, or events between May 2017- April 2018. Director Carl Simmons who spoke at a total of 10 events from SC DOI meetings to FEMA flood map sessions, and Jim Houser speaks regularly at Trident Home Builders meetings (12 events in the past year). The department regular meets with individual citizens, homeowners, contractors, and other local governments.
	1	Chas. County Building Inspection Services		Continuous Process	
Continue enforcement of zoning regulations, including, the low density zoning provisions of the Zoning and Land Development Regulations (ZLDR).	PA	General Fund	1.1, 1.2, 1.3, 2.1, 2.3, 4.1, 4.3, 4.4	Existing	The Zoning and Chas. County Planning Department updated the Comp. Plan in 2015 encouraging the preservation of the rural area, preserving open space, and requiring vegetated buffers along the OCRM Critical Line. Plan will be updated and adopted again in 2018.
	1	Chas. County Planning		Continuous Process	
Support requirements for construction practices for new JIPSD-owned critical facilities that are sensitive to flood zone (e.g. avoiding "A" and "V" flood zones where feasible) and seismic considerations.	PP	Grant Funding		Ongoing	The JIPSD is currently in the design phase of a new Fire Station 1, to include wind and seismic considerations, and to avoid potential future flooding.
	1	JIPSD		Continuous Process	
Seek funding for retrofitting demolishing, or relocating repetitively flooded properties, if suitable candidates should be identified. Utilize Charleston County Repetitive Loss Area Analysis for	PP	Grant Funding (FMA)	1.2, 1.3, 1.6, 3.1, 3.2, 4.1	Existing	As of 2017, there is one suitable candidate that met the eligibility requirements and is in grant application process.

identifying suitable candidates.	1	Chas. County Building Inspection Services		In process	
Evaluate existing JIPSD-owned facilities for hazard resistance and retrofit facilities if needed where feasible.	PP	General Fund	2.2	Ongoing	The JIPSD evaluates all facilities on a yearly basis as part of our strategic planning, to identify facilities that need retrofit and improvement.
	1	JIPSD		Continuous Process	
Encourage cooperation between county departments, other government entities, interested businesses, and citizens regarding recommended sustainable practices to protect environmental quality.	NB	Grant Funding (PDM) General Fund	2.3, 4.1, 4.2	Ongoing	JIPSD is actively moving towards being a paperless administrative entity. More and more paperwork is being done digitally to help cut down our carbon footprint.
	2	Chas. County Building Inspection Services Project Impact JIPSD		Continuous Process	
Promote the use of voluntary standards for single-family residences to exceed minimal building code requirements for wind and seismic design.	PA, PP	General Fund	1.1, 1.2, 1.3, 2.1, 2.2	Ongoing	JIPSD actively promotes the education of our citizens in the hazards associated with building damage in a natural disaster.
	1	Chas. County Building Inspection Services		Continuous Process	
Support providing information to citizens regarding hazard safe interior rooms.	PP	General Fund	2.1, 2.2	Ongoing	JIPSD distributes literature at all community events including information about safety during seismic and hurricane events.
	3	Chas. County Building Inspection Services JIPSD		Continuous Process	

Continue coordinating Emergency Operations Center activities related to a hazard event, including holding drills for EOC personnel and maintain the Charleston County Continuity of Operations Plan (COOP).	ES	General Fund	2.1, 2.2, 2.3, 4.1	Ongoing	<p>The EOC regularly holds training sessions for area responders, officials and staff.</p> <p>The Charleston County Emergency Operations Center successfully activated for and effectively coordinated responses to two real world incidents – including Hurricane Irma in 2017 and the ice storm January 2018. Additionally, EOC conducted full scale drill on 6/6/18, to practice and improve practices for an earthquake event.</p>
	1	Emergency Management JIPSD		Continuous Process	
Continue to provide hazard-related literature/information to citizens at James Island Public Service District Offices.	PI	General Fund	2.1, 2.2	Ongoing	The JIPSD has increased its distribution of material and information dramatically with the creation of various social media platforms, dissemination more information to a wider audience.
	1	JIPSD		Continuous Process	
Maintain the national Weather Service “Storm Ready” and “Tsunami Ready” Community designations.	ES, PI	General Fund	1.1, 1.3, 1.5, 1.6, 2.1, 2.2	Completed	Charleston County has been recertified as a “Storm Ready” and “Tsunami ready” Community. This designation is valid through 2018.
	1	Emergency Management JIPSD		Completed	
Continue participating in the annual maintenance and approval of Hazard Mitigation Plan / Program for Public Information Committee efforts to achieve maximum public outreach.	PI, PA, PP, NB, ES, SP	General Fund	2.2	Ongoing	During this period, the County has held 2 public meetings and maintained correspondence with jurisdictions about the importance of the Plan.

	1	Chas. County Building Inspection Services Project Impact JIPSD		Continuous Process	
Sponsor a Fire Prevention Week, including information on Hazard awareness and assist other communities in participating in this activity.	PI	General Fund	1.1, 1.2, 1.3, 1.5, 2.1, 2.3	Ongoing	The JIPSD through the JIPSDFD hosted its annual Community Safety Event in October, 2017, and had over 500 attendees, and hosted other fire, rescue, and emergency response agencies. Also, our community out-reach programs have contacted almost 1000 people in 2018 alone.
	1	JIPSD		Continuous Process	
Continue Hazardous Materials Training.	ES	General Fund	2.1	Ongoing	Annual training of all emergency responders, including material safety awareness, response, and mitigation.
	1	JIPSD		Continuous Process	
Continue Terrorist Response Training.	ES	General Fund	2.2	Ongoing	Annual training including terrorism recognition, Command level staff training for incident command for active violence/active shooter scenes.
	1	JIPSD		Continuous Process	
Maintain a web-based Emergency Operations Center Capability.	ES	General Fund	2.1, 2.2	Ongoing	The JIPSD upgraded its online EOC capabilities with the Palmetto system to align itself with Chas. County EMD and continues to train in its use.
	1	JIPSD		Continuous Process	
Continue responding to hazard emergencies	ES	General Fund Enterprise Fund	2.1, 2.2, 2.3, 4.1	Ongoing	No end date- operational readiness (NEW)
	1	EMS, Fire Departments, Sheriff Department, Hazard Mitigation Coordinator, Emergency Preparedness		Continuous Process	
Sponsor training programs for medical	ES	General Fund	2.1, 2.2	Ongoing	Training offered as it becomes available, until

providers on topics of interest such as decontamination procedures, etc. if there is interest in these programs	1	Charleston County Hazardous Materials Coordinator, James Island Public Service District Fire Department		No End Date	all personnel trained (NEW)
Continue coordinating the Anti-Terrorism Task Force of specially trained police, fire, and EMS personnel to respond to terrorist acts	ES	Grant Funding (HMGP) General Fund		Ongoing	Training performed as it becomes available (NEW)
	1	Charleston County Hazardous Materials Coordinator, James Island Public Service District Fire Department	2.1, 2.2, 2.3, 3.1, 3.2,	No End Date	
Assist with outreach initiatives to the small business community to encourage businesses to prepare for hazard events	PI	Project Impact Resources		Ongoing	Help educate businesses during annual fire inspection, and public education events (NEW)
	2	Charleston County Building Inspection Services Project Impact Partners	2.1, 2.2, 2.3, 3.1	No End Date	
Support maintaining permanent open space as parks	NB	General Fund		Ongoing	Provide public support for the maintenance of green space through public outreach (NEW)
	2	Parks and Recreation Commission JIPSD	1.1, 2.3, 4.1, 4.4	No End Date	
Support utility right of way permitting, considering emergency vehicle access and flood zone related issues in permitting decisions	SP	General Fund		Ongoing	Work with develops and DOT as programs arise (NEW)
	1	JIPSD	1.1, 1.6, 2.1, 3.1, 4.1	No End Date	
Support provision of information about the USGS stream gauge program to the public	SP	Partner Donations/ Grant Funding	1.6, 2.1, 2.2	Ongoing	Help educate public and businesses at public outreach and community events (NEW)

	2	Charleston County Building Inspection Services JIPSD		No End Date	
Recognize "International Building Safety Week" to promote safety in the built environment	PI	General Fund	2.1, 2.2	Ongoing	Public posts on social media, and through public events and outreach (NEW)
	3	JIPSD		No End Date	
Assist with providing speakers to civic groups regarding hazard related activities	PI	General Fund	2.1, 2.2	Ongoing	Provide information to community groups, HOAs and church groups (NEW)
	1	JIPSD		No End Date	
Continue participating in hazard-related/product expos	PI	General Fund	2.1, 2.2	Ongoing	JIPSD participates in the Lowe's Fire Expo every October (NEW)
	2	JIPSD		No End Date	

Additional Recommended Projects may be added to this project list as the Disaster Resistant Communities committees consider other projects and recommend these projects for implementation.

7.24 - Mt. Pleasant Water Works Commission

Resolution for Adoption

STATE OF SOUTH CAROLINA)
)
COUNTY OF CHARLESTON)

RESOLUTION NO. 12-2018

A RESOLUTION TO RE-ADOPT THE CHARLESTON REGIONAL HAZARD MITIGATION PLAN.

WHEREAS, the Commissioners of Public Works of the Town of Mount Pleasant, South Carolina (the "Commission") have experienced the effects of natural and man-made hazard events; and

WHEREAS, the Charleston Regional Hazard Mitigation Project Committee has prepared a recommended Charleston Regional Hazard Mitigation Plan; and

WHEREAS, the recommended Charleston Regional Hazard Mitigation Plan has been widely circulated for review by residents / business organizations / professional organizations of the unincorporated areas of Charleston County, state, federal, regional and local government agencies and has been supported by those reviewers; and

WHEREAS, the Commission originally adopted the Charleston Regional Hazard Mitigation Plan in 2004 and readopted it in 2008 and are required to adopt the amended version of this plan on a five-year cycle for the Commission to remain eligible for certain Federal programs in which Charleston County participates.

NOW, THEREFORE, BE IT RESOLVED, that

1. The Charleston Regional Hazard Mitigation Plan is hereby adopted as an official plan of the Commission; and
2. The Charleston Regional Hazard Mitigation Project Committee is recognized as a continuing entity with reviewing, maintaining in accordance with Community Rating System, Flood Mitigation Assistance, and Disaster Mitigation Act requirements, and periodically reporting on the progress towards and revisions to the plan to the Charleston County Council.

DONE AND RATIFIED THIS 17th day of December, 2018.

MOUNT PLEASANT WATERWORKS


Rick M. Crosby, Chair


Susan I. Mellichamp, Vice-Chair


H. Mac Jenkinson, Secretary-Treasurer

Action Report for Mount Pleasant Waterworks

(Commissioners of Public Works for the Town of Mount Pleasant)

Following are the proposed projects to be undertaken / continued by Mount Pleasant Waterworks for hazard mitigation during May 2019 - April 2020 and their status from May 2018 - April 2019.

(Abbreviations for "Type" are as follows: "PA" is Preventive Activities, "PP" is Property Protection Activities, "NB" is Natural and Beneficial Functions/Resource Preservation Activities, "ES" is Emergency Services Activities, "SP" is Structural Projects Activities, and "PI" is Public Information Activities, "GIS" is Geographic Information Systems Activities.)

*The following terminology is used to update the current status of each proposed project, as suggested by FEMA:
"New", "Ongoing", "Continuous Process", "Deleted", and "Completed".*

Hazard Mitigation Goals and Objectives	
Goal 1: Protect public health and safety	
Objective 1.1	Improve detection and rapid internal notification of abnormal operating conditions.
Objective 1.2	Ensure the ability to make rapid mass public notifications.
Objective 1.3	Ensure adequate fire protection within our service area.
Goal 2: Mitigate impacts from all threats / hazards.	
Objective 2.1	Mitigate impacts from natural threats / hazards.
Objective 2.2	Mitigate impacts from man-made threats / hazards.
Objective 2.3	Reduce vulnerability and improve resilience of our infrastructures.
Objective 2.4	Improve our ability to prepare for and respond to all threats and hazards.
Goal 3: Promote hazard awareness, education, and preparedness.	
Objective 3.1	Support Project Impact Public Information efforts.
Objective 3.2	Promote awareness and preparedness among our employees and external customers.

Mount Pleasant Waterworks Hazard Mitigation Actions

Mitigation Action and Description	Type	Funding Source	Goals and Objectives	Status	Milestones Achieved and Future Plans
	Priority	Responsible Agency		Implementation Schedule	
Continue installing water pressure & quality sensors, linked to SCADA, throughout the water system as needed.	PP, PA, ES	Capital Funds	1.1, 1.3, 2.4	Ongoing	Ongoing and routine process. Most recently 2 Pressure monitors and 6 Chlorine analyzers have been installed in the last 6 months
	3	Instrumentation Dept.		Continuous Process	
Continue to maintain and optimize SCADA capabilities throughout critical areas of our water and wastewater systems.	PP, PA, ES	Operating Funds	1.1, 1.3, 2.4	Ongoing	Ongoing and routine process.
	2	Instrumentation Dept.		Continuous Process	
Continue installing emergency generators at critical locations as needed.	PP, ES	Capital Funds	2.1, 2.2, 2.3, 2.4	Ongoing	Ongoing and routine process. Purchased 2 portable generators in the last 2 years & will install 12 more over the next 4 years
	3	Electrical Dept.		Continuous Process	
Continue installing Fire Hydrants in locations determined by the Fire Department, and/or in new areas of our water system.	PP, ES	Capital Funds	1.3, 2.1, 2.2	Ongoing	Ongoing and routine process. 79 fire hydrants have been installed since 7/1/18 - a hydrant must be installed within 300 feet of every building per city ordinance.

Mount Pleasant Waterworks Hazard Mitigation Actions

Mitigation Action and Description	Type	Funding Source	Goals and Objectives	Status	Milestones Achieved and Future Plans
	Priority	Responsible Agency		Implementation Schedule	
	3	Engineering Dept.		Continuous Process	
Continue physically locating, GPS locating, and exercising all isolation valves in water and wastewater systems.	PP, ES, GIS	Operating Funds	1.3, 2.1, 2.2, 2.4	Ongoing	Ongoing and routine process. There are 20 zones within Mt. Pleasant and every valve is tested at least once every 5 years
	2	Engineering, Water Quality, Wastewater Collections		Continuous Process	
Maintain and utilize multiple platforms to facilitate the timely notification of our customers and surrounding community.	PA, PP, NB, ES, PI	Operating Funds	1.2, 2.3, 2.4, 3.1, 3.2	Ongoing	Ongoing and routine process. Notices sent out via emails, texts and phone.
	2	Public Information		Continuous Process	
Continue assessing the potential threats, hazards, and risks to MPW; mitigate probability and severity where possible and feasible.	PA, PP, NB, ES	Operating Funds	2.1, 2.2, 2.3, 2.4	Ongoing	Ongoing and routine process.
	3	Technical Services Dept.		Continuous Process	
Continue Emergency Management training, drills, and exercises for all departments and employees.	ES	Operating Funds	2.1, 2.2, 2.3, 2.4	Ongoing	Ongoing and routine process. MPW conducted a Drought Table top exercise on 5/13/19 and conducts 2 emergency drills annually. Next drill will be a fire drill in July/August timeframe.

Mount Pleasant Waterworks Hazard Mitigation Actions

Mitigation Action and Description	Type	Funding Source	Goals and Objectives	Status	Milestones Achieved and Future Plans
	Priority	Responsible Agency		Implementation Schedule	
	3	Technical Services Dept.		Continuous Process	
Continue public outreach & education efforts to enhance threat & hazard awareness and preparedness.	NB, PI	Operating Funds	3.1, 3.2	Ongoing	Ongoing and routine process. MPW will begin a campaign in August to prepare customers for the Hurricane Season. Also, will use email, text and phone for notifications as well as press advisories as needed.
	3	Public Information		Continuous Process	

7.25 – North Charleston District

This jurisdiction is fully serviced by the City of North Charleston. Please refer to Section 7.13 for the full action report as well as the letter below. There are no proposed projects additional to the action report of the City of North Charleston.

From: Chief Financial Officer, County of North Charleston District

July 24, 2018

We received the Emergency Action Report from the County for the North Charleston District. While we fully support the County's efforts and are completing the Report for the North Charleston Sewer District, the North Charleston District no longer has the ability to assist in these areas and we are asking if you will allow us to forgo completing the Report for the North Charleston District.

The North Charleston District was established in 1972 to provide fire protection, refuse collection, street signage, and street lighting. Since that time, the City of North Charleston has steadily grown and annexed the majority of the original District.

The District has an agreement with the City to provide all the services listed above to the remaining unincorporated properties until they are annexed and in return the District remits the County tax collections from the properties to the City. All District assets have been turned over to the City and the District no longer has any employees.

7.26 – North Charleston Sewer District

Resolution for Adoption

A RESOLUTION FOR THE ADOPTION OF THE REVISED CHARLESTON REGIONAL HAZARD MITIGATION PLAN BY THE NORTH CHARLESTON SEWER DISTRICT COMMISSION

Resolution No. 2019-06

WHEREAS the County of Charleston has experienced the effects of natural and man-made hazard events; and

WHEREAS the Charleston Regional Hazard Mitigation and Public Information Plan Committee has prepared a recommended *Charleston Regional Hazard Mitigation Plan*; and

WHEREAS the recommended *Charleston Regional Hazard Mitigation Plan* has been widely circulated for review by residents / business organizations / professional organizations of the unincorporated and incorporated areas of Charleston County, state, federal, regional and local government agencies and has been supported by those reviewers; and

WHEREAS the County of Charleston originally adopted the *Charleston Regional Hazard Mitigation Plan* in 1999 and readopted it in 2004, 2008, and 2013 and is required to adopt the amended version of this plan on a five-year cycle for the County to remain eligible for certain Federal programs in which Charleston County participates, and

NOW THEREFORE be it resolved that

1. The *Charleston Regional Hazard Mitigation Plan* is hereby adopted as an official plan of the County of Charleston, and
2. The Charleston Regional Hazard Mitigation and Public Information Plan Committee is recognized as a continuing entity charged with reviewing, maintaining in accordance with Community Rating System, Flood Mitigation Assistance, Disaster Mitigation Act and Program for Public Information requirements, and Members from the North Charleston Sewer District are charged with periodically reporting on the progress towards and revisions to the plan to the North Charleston Sewer District Commission.

The Chairman declared this Resolution duly adopted this 13th day of May, 2019



Sylderrial T. Pryor, Secretary



George Gomes, Chairman

Action Report for the North Charleston Sewer District

Following are the proposed projects to be undertaken / continued in Unincorporated Charleston County for hazard mitigation during May 2019 - April 2020 and their status from May 2018 - April 2019.

(Abbreviations for "Type" are as follows: "PA" is Preventive Activities, "PP" is Property Protection Activities, "NB" is Natural and Beneficial Functions/Resource Preservation Activities, "ES" is Emergency Services Activities, "SP" is Structural Projects Activities, and "PI" is Public Information Activities, "GIS" is Geographic Information Systems Activities.)

The following terminology is used to update the current status of each proposed project, as suggested by FEMA: "New", "Ongoing", "Continuous Process", "Deleted", and "Completed".

North Charleston Sewer District Hazard Mitigation Actions					
<i>Mitigation Action and Description</i>	<i>Type</i>	<i>Funding Source</i>	<i>Goals and Objectives</i>	<i>Status</i>	<i>Milestones Achieved and Future Plans</i>
	<i>Priority</i>	<i>Responsible Agency</i>		<i>Implementation Schedule</i>	
Continue enforcement of the Sewer Disposal Use Resolution	PA	General Fund	Minimize future flood damage; protect the lives of our citizens from man-made hazards.	Ongoing	Held one (1) industry enforcement hearing. Continue to monitor industry. Continue enforcement
	1	Administrative Division		Continuing Process	
Continue enforcing regulation requiring new manholes to be elevated above the 50 year flood elevation.	PA	General Fund	Minimize future flood damage; protect the lives of our citizens from man-made hazards.	Ongoing	Continue enforcement
	1	Systems Division		Continuing Process	
Implement cMOM.	PA	General Fund	Minimize the potential for sanitary sewer system overflows.	Ongoing	Continuously collect information on current systems and activities.
	1	Systems Division		Continuing Process	

Continue reduction of Inflow and Infiltration (I&I) into the treatment system.	PA	General Fund	Minimize the potential for sanitary sewer overflows (SSOs), maximize WWTP treatment capacity.	Ongoing	Smoke test and repair one (1) basin every two (2) years. Monitor flow.
	1	Capital Projects		Continuing Process	
Seek funding for retrofitting critical facilities to enhance hazard resistance if funding sources become available.	PP	Grant Funding (HMGP)	Reduce vulnerability of infrastructure to natural and man-made hazards; minimize future hurricane damage; minimize future earthquake damage; reduce existing flood damage; promote long term economic prosperity.	Ongoing	Received funding for PS repair/upgrade. Continue to search for grants.
	1	Systems Division		Continuing Process	
Continue providing information to citizens about hazard of improper grease disposal.	PP	General Fund	Minimize future flood damage; protect the lives of our citizens from man-made hazards.	Ongoing	<ul style="list-style-type: none"> • Visit schools and community meetings/events. • Utilizing a Rapid Response technique to educate citizens in grease-overflow-prone areas. • Engaging in multi-utility campaigns to educate about FOG.
	2	Industrial Pretreatment		Continuing Process	
Continue support of the SC Water Quality Association.	NB	General Fund	Preserve environmental resources; promote long term economic prosperity; encourage recreational activities.	Ongoing	NCS D COO is board member. Attend quarterly meetings.
	2	Administrative Division		Continuing Process	

Continue to provide hazard communication, anti-terrorism, and emergency preparedness training to employees.	ES	General Fund	Protecting lives of our citizens from man-made hazards; minimize future hazardous materials incidents; preserve environmental resources; assessing vulnerability to man-made hazards.	Ongoing	Yearly training provided by in-house trainer and outside vendor. Established Emergency Response Team (ERT) in 2019.
	1	Systems Division		Continuing Process	
Continue to provide Designated First Aid Response Team and associated supplies at the Stall Road and Herbert Street facilities.	ES	General Fund	Protecting lives of our citizens from man-made hazards; minimize future hazardous materials incidents; preserve environmental resources; assessing vulnerability to man-made hazards.	Ongoing	Provided by in-house Safety Coordinator. Yearly training.
	2	Systems Division		Continuing Process	
Continue to provide visitors and contractors hazard materials orientation at the Herbert Street facility.	ES	General Fund	Protecting lives of our citizens from man-made hazards; minimize future hazardous materials incidents; preserve environmental resources; assessing vulnerability to man-made hazards.	Ongoing	Provided on an as-needed basis.
	1	Plant Division		Continuing Process	

Continue to include contractor and visitor safety program as part of our construction contracts.	ES	General Fund	Protecting lives of our citizens from man-made hazards; minimize future hazardous materials incidents; preserve environmental resources; assessing vulnerability to man-made hazards.	Ongoing	Provided on an as-needed basis.
	1	Systems Division		Continuing Process	
Continue to attend LEPC meetings and emergency response exercises.	ES	General Fund	Protecting lives of our citizens from man-made hazards; minimize future hazardous materials incidents; preserve environmental resources; assessing vulnerability to man-made hazards.	Ongoing	Safety Coordinator attends quarterly meetings.
	2	Systems Division		Continuing Process	
Continue to host LEPC sponsored emergency response exercises.	ES	General Fund	Protecting lives of our citizens from man-made hazards; minimize future hazardous materials incidents; preserve environmental resources; assessing vulnerability to man-made hazards.	Ongoing	Hosts meeting when asked by LEPC.
	2	Plant Division		Continuing Process	

Include construction practices that are sensitive to flood, seismic and hurricane considerations on all facility upgrade projects.	SP	General Fund	Minimize future flood damage; protect the lives of our citizens from man-made hazards; improve water quality; improve hazard resistance of infrastructure; promote long term economic growth.	Ongoing	Provided on an as-needed basis.
	2	Systems Division		Continuing Process	
Continue to use manhole inserts in flood prone areas.	SP	General Fund	Minimize future flood damage; protect the lives of our citizens from man-made hazards; improve water quality; improve hazard resistance of infrastructure; promote long term economic growth.	Ongoing	Provided and installed when manholes are determined to be prone to infiltration during I/I evaluation.
	3	Systems Division		Continuing Process	
Continue to use submersible or dry pit submersible pumps for new or upgraded pump stations.	SP	General Fund	Minimize future flood damage; protect the lives of our citizens from man-made hazards; improve water quality; improve hazard resistance of infrastructure; promote long term economic growth.	Ongoing	Pumps are used when practicable.
	2	Systems Division		Continuing Process	
Continue fats, oils, and grease (FOG) public education program.	PI	General Fund	Educating citizens regarding their vulnerability to man-made hazards and	Ongoing	•FOG program provided over 2000 doorhangers and FOG education kits to citizens.

	2	Industrial Pretreatment	steps to take to reduce vulnerability.	Continuing Process	<ul style="list-style-type: none"> • Invested in professional development of public education materials, distributing these in targeted neighborhood campaigns. • Conducted FOG mitigation classes at the Culinary Institute of Charleston.
Continue providing annual report to citizens.	PI	General Fund	Educating citizens regarding their vulnerability to man-made hazards and steps to take to reduce vulnerability.	Ongoing	Annual report is available for all citizens.
	2	Administrative Division		Continuing Process	
Continue to provide speakers to civic groups regarding sewer district operations.	PI	General Fund	Protecting the lives of citizens from man-made hazards; educating citizens regarding their vulnerability to man-made hazards and steps to take to reduce vulnerability.	Ongoing	<ul style="list-style-type: none"> • Provided speakers, demonstrations, and educational materials for civic group meetings and neighborhood events. • FOG Program Manager is a member of the Community Advisory Panel and attends quarterly meetings. • Continue to provide speakers when needed and/or asked.
	3	Administrative Division		Continuing Process	
Continue to maintain NCSD web page.	PI	General Fund	Educating citizens regarding their vulnerability to man-made hazards and steps to take to reduce vulnerability.	Ongoing	Updates are provided when necessary (SSO reporting, weather events, construction activities, etc.)
	3	Administrative Division		Continuing Process	

Continue to update the GIS System.	GIS	General Fund	Minimize future flood damage; protect the lives of our citizens from man-made hazards; improve water quality; improve hazard resistance of infrastructure; promote long term economic growth.	Ongoing	Ongoing process. GIS is updated when new lines, manholes, etc., are installed, or when assets are discovered to not be in the system.
	3	Capital Projects		Continuing Process	
Integrate GIS System with other NCSD engineering and business systems.	GIS	General Fund	Improve efficiency between departments and decrease response time to hazards.	Ongoing	Ongoing process.
	3	Capital Projects		Continuing Process	
Educate citizens about improper disposal of garbage into sewer system.	PI	General Fund	Educate citizens regarding their vulnerability to man-made hazards and take steps to reduce vulnerability.	Ongoing	<ul style="list-style-type: none"> • Continue to educate citizens concerning the use of disposable wipes at all public events. • Vehicles are wrapped with relevant signage and/or information. • Obtained educational material specific to the improper disposal of garbage, to be distributed in targeted neighborhood programs.
	2	Industrial Pretreatment		Continuing Process	

Continue to implement fats, oils, and grease initiative.	PI	General Fund	Educate citizens and food service establishments regarding the proper disposal of fats, oils, and grease	Ongoing	<ul style="list-style-type: none"> • Continuing biannual grease trap inspections of food service establishments (FSEs). • Continuing biannual review of FSE cleaning compliance and best management Practices.
	2	Industrial Pretreatment		Continuing Process	

The North Charleston Sewer District shall, through Project Impact, provide support to the many activities and projects that will benefit the residents of the NCSD. Additional recommended projects may be added to this project list as other projects are recommended to the North Charleston Sewer District Commission. Some Projects that are being undertaken by other jurisdictions may not necessarily be listed here but may affect the North Charleston Sewer District.

7.27 - Roper St. Francis

Resolution for Adoption

**A RESOLUTION FOR THE ADOPTION OF THE REVISED
CHARLESTON REGIONAL HAZARD MITIGATION PLAN
BY ROPER ST. FRANCIS HEALTHCARE**

WHEREAS Roper St. Francis Healthcare (known as Roper St. Francis), a not-for-profit healthcare system located in Charleston County, has experienced the effects of natural and man-made hazard events; and

WHEREAS the Charleston Regional Hazard Mitigation Project Committee has prepared a recommended *Charleston Regional Hazard Mitigation Plan*; and

WHEREAS the recommended *PI Charleston Regional Hazard Mitigation Plan* has been widely circulated for review by residents/business organizations/professional organizations of the unincorporated and incorporated areas of Charleston County, state, federal regional and local government agencies, with support being given by those reviewers; and

WHEREAS Roper St. Francis Healthcare originally adopted the *Charleston Regional Hazard Mitigation Plan* in 1999 and readopted it in 2004, 2008, and 2013 and is required to adopt the amended version of the *Charleston Regional Hazard Mitigation Plan* on a five-year to remain eligible for certain Federal programs in which Roper St. Francis Healthcare participates, and

NOW THEREFORE be it resolved that

1. The *Charleston Regional Hazard Mitigation Plan* is hereby adopted as an official plan as part of hazard mitigation planning of the Roper St. Francis Healthcare system; and
2. The Charleston Regional Hazard Mitigation and Public Information Plan Committee is recognized as a continuing entity charged with reviewing, maintaining in accordance with Community Rating System, Flood Mitigation Assistance, and Disaster Mitigation Act and Program for Public Information requirements, and with periodically reporting on progress towards and revisions to the plan to the Emergency Management Committee of Roper St. Francis Healthcare, led by the Roper St. Francis Emergency Manager under the direction of the Chief Executive Officer, Acute Care Division.
3. Effective this 15th Day of May, 2019



Lorraine L. Lutton, President and Chief Executive Officer
Roper St. Francis Healthcare

Action Report for Roper St. Francis

Roper St. Francis Healthcare, a non-profit health system with three critical care hospital facilities located in Charleston County, bases this Action Plan Report on the health care system’s 2018 Summary Hazard Vulnerability Analysis (HVA). The analysis represents an “all hazards” approach to the management of emergency conditions occurring in Roper St. Francis Healthcare critical care facilities and in the greater Charleston County area. The HVA evaluated the specific probability impact on persons, property, and business, as well as the relative level of the organization's and the community’s response capabilities and general preparedness.

Roper St. Francis Healthcare Hazard Mitigation Projects to be undertaken and/or continued May 2019 - April 2020.

RSFH Hazard Mitigation Goals and Objectives	
Goal 1: Mitigate natural hazard damage to allow delivery of essential critical care services during and after austere events.	
Objective 1.1	Minimize future flood damage
Objective 1.2	Minimize future hurricane damage
Objective 1.3	Minimize future earthquake damage
Objective 1.4	Reduce existing flood damage
Objective 1.5	Develop system-wide hazard mitigation plan
Goal 2: Increase public preparedness and protection of the lives of our patients and staff	
Objective 2.1	Allow for simultaneous notification of all staff/visitors of austere events or life safety events.
Objective 2.2	Coordinate with external agencies for planning, exercise, and preparedness initiatives.
Objective 2.3	Reduce risk of technological hazards
Goal 3: Improve Infrastructure	
Objective 3.1	Improve hazard resistance of infrastructure of critical care physical plants
Objective 3.2	Reduce vulnerability of our infrastructure to natural and man-made hazards
Objective 3.3	Reduce vulnerability to communications failures
Goal 4: Increase environmental well being	
Objective 4.1	Reduce future human hazards incidents
Objective 4.2	Minimize hazardous materials incidents
Objective 4.3	Infectious disease

FEMA Terminology for Use in the Following Action Plan:

- **Type Designations:** "PA" Preventive Activities, "PP" Property Protection Activities, "NB" Natural and Beneficial Functions/Resource Preservation Activities, "ES" Emergency Services Activities, "SP" Structural Projects Activities, "PI" is Public Information Activities, "GIS" Geographic Information Systems Activities.
- **Status Designations:** "New," "Ongoing," "Continuous Process," "Deleted," "Completed"
- **Priority:** Prioritize each action on a scale from 1 to 5, with 1 the highest priority and 5 the lowest priority
- **Funding Source:** Identify source(s) of financial support for each action (ex. General Fund).
- **Responsible Agency (Department):** Identify party in charge of managing each action.
- **Goals and Objectives:** Correlate objective(s) affiliated with action using associated number(s).
- **Implementation Schedule:** Designations: "In Process," "Continuing Process," "In Place," "Completed"
- **Milestones Achieved and Future Plans** Describe the details concerning affiliated successes and intended goals for each action

Roper St. Francis Hazard Mitigation Actions

Mitigation Action and Description	Type	Funding Source	Goals and Objectives	Status	Milestones Achieved and Future Plans
	Priority	Responsible Agency		Implementation Schedule	
Obtain funding for elevating existing utilities at Roper Hospital to meet shelter in place criteria as mandated by SC DHEC.	SP, PP, PA	FEMA Grant (HMGP), Capital Investment	1.1., 1.4., 3.1., 3.2	Ongoing	Grant-funded Fire Pump Project and Backup Generator Project in Implementation Stage; Grant-funded Chiller Project in startup design phase. A new Fuel Tank Flood Mitigation grant is pending with SCEMD/FEMA.
	1	Engineering, Grant Services, Emergency Management		In Process	
Continue educational trainings in relation to disaster preparedness in healthcare facilities for staff/community members.	PA	Emergency Management Budget	1.2, 2.1, 2.2, 4.1, 4.2	Ongoing	Multiple trainings held, training is ongoing. Community and internal exercises continually being conducted.
	2	Emergency Management		In Process	
Potable water equipment for water outages / boil water advisories	ES, PA	Emergency Management Budget, Engineering Budget, Capital Investment	1.1-1.3, 3.1, 3.2	Completed	Water loss plan and mitigation measures approved. Fixed external water connections in place at all RSF hospitals with contractor in place to supply water via tank truck. Additional water in storage on site. Plan expansion and additions complete.
	1	Emergency Management, Engineering		In Place	
Establish mass notification alert system for health care system	PA	Emergency Management Budget	1.1-1.3, 2.1-2.3, 3.1-3.3, 4.2	Completed	Everbridge mass notification system was implemented. System includes internal and external communication templates for immediate notification of needed parties in austere events. System tested monthly.
	1	Emergency Management, Corporate Communications		Continuous Process	
Continue building review/future building planning to minimize impact from naturally occurring and man-made austere events	SP, PA, PP	Capital Investment	1.1-1.6, 3.1, 3.2	Ongoing	Ongoing, committee review.
	2	Engineering, Information Services, Leadership, Emergency Management		Continuous Process	

Continue hazard planning and mitigation strategies	PA, PP	Emergency Management Fund	2.1-3.2	Ongoing	2018 HVA completed for facility. Regional healthcare HVA completed in conjunction with SC DHEC. Planning to upgrade security measures. Pursue opportunities for mitigation planning partnerships and grants.
	1	Emergency Management, Department Directors		Continuous Process	
Emergency Preparedness Coordination with External Agencies	ES	Emergency Management Fund	1.1-1.3, 2.1-2.3, 3.1, 3.2	Ongoing	Regularly attend county, regional, and state meetings.
	1	Emergency Management		Continuous Process	
Obtain funding for utility water equipment for chill and condenser water make-up during extended flooding and water loss events.	PA, ES	Emergency Management Budget, Engineering Budget, Capital Investment	1.1-1.3, 3.1, 3.2	New	Design complete for well water addition to supply make-up water to critical utility systems during extended water loss events. This remains a capital expenditure low priority.
	1	Emergency Management, Engineering		In process	

7.28 - St. Andrews Parish Park & Recreation Commission

Resolution for Adoption

A RESOLUTION FOR THE ADOPTION OF THE REVISED *CHARLESTON REGIONAL HAZARD MITIGATION PLAN* BY ST. ANDREW'S PARKS AND PLAYGROUND COMMISSION

Resolution No. 2019-1

WHEREAS the County of Charleston has experienced the effects of natural and man-made hazard events; and

WHEREAS the Charleston Regional Hazard Mitigation and Public Information Plan Committee has prepared a recommended *Charleston Regional Hazard Mitigation Plan*; and


WHEREAS the recommended *Charleston Regional Hazard Mitigation Plan* has been widely circulated for review by residents / business organizations / professional organizations of the unincorporated and incorporated areas of Charleston County, state, federal, regional and local government agencies and has been supported by those reviewers; and

WHEREAS the County of Charleston originally adopted the *Charleston Regional Hazard Mitigation Plan* in 1999 and readopted it in 2004, 2008, and 2013 and is required to adopt the amended version of this plan on a five-year cycle for the County to remain eligible for certain Federal programs in which Charleston County participates, and

NOW THEREFORE be it resolved that

1. The *Charleston Regional Hazard Mitigation Plan* is hereby adopted as an official plan of St. Andrew's Parks and Playground Commission, and
2. The Charleston Regional Hazard Mitigation and Public Information Plan Committee is recognized as a continuing entity charged with reviewing, maintaining in accordance with Community Rating System, Flood Mitigation Assistance, Disaster Mitigation Act and Program for Public Information requirements, and periodically reporting on the progress towards and revisions to the plan to the St. Andrew's Parks and Playground Commission.

ATTEST:


Chairman


Secretary

Effective this 25th day of April 2019

Action Report for St. Andrew's Parish Parks and Playground Commission

The following are proposed hazard mitigation projects to be undertaken or continued by the St. Andrew's Parish Parks and Playground Commission for during 2019 - 2020 and their status through April 2019.

(Abbreviations: PP- Property Protection; NB- Natural Benefits; PI- Public Information, PA – Preventive Activities)

St. Andrew's Parish Parks and Playground Commission Hazard Mitigation Actions					
<i>Mitigation Action and Description</i>	<i>Type</i>	<i>Funding Source</i>	<i>Goals and Objectives</i>	<i>Status</i>	<i>Milestones Achieved</i>
	<i>Priority</i>	<i>Responsible Agency</i>		<i>Implementation Schedule</i>	<i>and Future Plans</i>
Continue to update and inform employees of hazardous weather conditions as outlined in the Hurricane Plan.	PP	General Fund	Protecting the lives of St. Andrew's staff from natural hazards.	Ongoing	Biweekly staff meetings.
	1	St. Andrew's		Continuous Process	
Continue maintaining permanent open space as parks.	NB	General Fund	Preserve environmental resources; promote long-term economic prosperity; encourage recreational activities.	Ongoing	Parks receive daily maintenance and repair.
	1	St. Andrew's		Continuous Process	
Continue to distribute and provide a Safety and Security Manual that deals with severe weather conditions and hazardous materials.	PA	General Fund	Education of employees on safe practices.	Ongoing	There is 24/7 access to the internal document site.
	2	St. Andrew's		Continuous Process	
Prepare and provide park facilities that may be used for tent cities for those who have lost their homes due to extreme weather conditions.	PI	General Fund	To provide park facilities.	Ongoing	Weekly mowing and maintenance occurs in park facilities.
	2	St. Andrew's		Weekly mowing and maintenance	
Continue involvement in local hazard mitigation initiatives providing information to St. Andrew's Parks and Playground Staff.	PI	General Fund	Protect the lives of agency staff.	Ongoing	Frequent meetings and emails disseminate this information.
	2	St. Andrew's		Meetings and emails	

St. Andrew's Parish Parks and Playground Commission Hazard Mitigation Actions

<i>Mitigation Action and Description</i>	<i>Type</i>	<i>Funding Source</i>	<i>Goals and Objectives</i>	<i>Status</i>	<i>Milestones Achieved and Future Plans</i>
	<i>Priority</i>	<i>Responsible Agency</i>		<i>Implementation Schedule</i>	
Accelerate agency's Hazard Tree identification program. Identify and remove problem trees.	PP	General Fund	Preserve environmental resources; minimize future hurricane damage.	Ongoing	Several trees have been removed.
	2	CCPRC		Continuous Process	
Seek funding to retrofit facilities for enhanced hazard resistance, if funding becomes available and suitable projects are identified.	PP	Grant Funding (HMGP)	Reduce vulnerability of infrastructure to natural and man-made hazards; minimize future hurricane damage; minimize future earthquake damage; reduce existing flood damage; preserve historic building inventory; promote long-term economic prosperity.	Ongoing	Regularly check current grant and other funding opportunities to retrofit facilities.
	1	St. Andrew's		Continuous Process	
Continue efforts to flood-proof low lying buildings. Maintain inventory of sand and sandbags to be used in a flood event	PA	General Fund	Protect interior buildings and equipment from water damage	Ongoing	?
	1	St. Andrew's		Continuous Process	
Develop procedures to protect sensitive computer equipment and documents	PA	General Fund	Establish and maintain computer back up schedules and follow established Records Retention and Destruction policy	Ongoing	?
	2	St. Andrew's		Continuous Process	

7.29 – St. Andrews Public Service District

Resolution for Adoption

A RESOLUTION FOR THE ADOPTION OF THE REVISED CHARLESTON REGIONAL HAZARD MITIGATION PLAN BY ST. ANDREWS PUBLIC SERVICE DISTRICT

Resolution No. 2017-001

WHEREAS the **St. Andrews Public Service District** has experienced the effects of natural and man-made hazard events; and

WHEREAS the Charleston Regional Hazard Mitigation and Public Information Plan Committee has prepared a recommended *Charleston Regional Hazard Mitigation Plan*; and

WHEREAS the recommended *Charleston Regional Hazard Mitigation Plan* has been widely circulated for review by residents / business organizations / professional organizations of the unincorporated and incorporated areas of Charleston County, state, federal, regional and local government agencies and has been supported by those reviewers; and

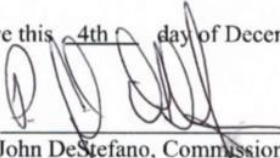
WHEREAS the **St. Andrews Public Service District** originally adopted the *Charleston Regional Hazard Mitigation Plan* in 1999 and readopted it in 2004, 2008, and 2013 and is required to adopt the amended version of this plan on a five-year cycle for the **St. Andrews Public Service District** to remain eligible for certain Federal programs in which Charleston County participates, and

NOW THEREFORE be it resolved that

1. The *Charleston Regional Hazard Mitigation Plan* is hereby adopted as an official plan of the **St. Andrews Public Service District**, and
2. The Charleston Regional Hazard Mitigation and Public Information Plan Committee is recognized as a continuing entity charged with reviewing, maintaining in accordance with Community Rating System, Flood Mitigation Assistance, Disaster Mitigation Act and Program for Public Information requirements, and periodically reporting on the progress towards and revisions to the plan to the **St. Andrews Public Service District Commission**.

Effective this 4th day of December, 2017

Attest:


John DeStefano, Commission Chairperson

Action Report for the St. Andrews Public Service District

Following are the proposed projects to be undertaken / continued in the St. Andrews P.S.D. for hazard mitigation during May 2019 - April 2020 and their status from May 2018 - April 2019.

(Abbreviations for "Type" are as follows: "PA" is Preventive Activities, "PP" is Property Protection Activities, "NB" is Natural and Beneficial Functions/Resource Preservation Activities, "ES" is Emergency Services Activities, "SP" is Structural Projects Activities, and "PI" is Public Information Activities, "GIS" is Geographic Information Systems Activities.)

*The following terminology is used to update the current status of each proposed project, as suggested by FEMA:
"New", "Ongoing", "Continuous Process", "Deleted", and "Completed".*

Hazard Mitigation Goals and Objectives

Goal 1: Provide Fire Prevention Training and Complete Fire Inspections

- Objective 1.1 Continue employee training in Fire Prevention
- Objective 1.2 Conduct training for children and the elderly
- Objective 1.3 Complete Fire Inspections of all PSD Businesses
- Objective 1.4 Educate the public regarding vulnerability to hazards and Steps to reduce vulnerability

Goal 2: Protect Lives, Property and the Environment

- Objective 2.1 Protect lives and environment from man-made hazards
- Objective 2.2 Minimize future hazardous materials incidents
- Objective 2.3 Minimize future terrorist incidents
- Objective 2.4 Keep PSD Officials aware of on-going major emergencies
- Objective 2.5 Enhance preparedness and response for hazard events and Emergency incidents

St. Andrews P.S.D. Hazard Mitigation Actions

Mitigation Action and Description	Type	Funding Source	Goals and Objectives	Status	Milestones Achieved and Future Plans
	Priority	Responsible Agency		Implementation Schedule	
Continue training courses to educate the public in regards to natural fire hazards and how to minimize fire damage	PA	General Budget	1.1, 1.2, 1.4	Ongoing	We have hired a full-time employee within a newly created position which is Fire Inspections, Investigations & Public Education
	1	Fire Prevention and Inspections		Continuous Process	
Promote a voluntary program of all Fire Prevention codes and fire hazards	PP, PI, PA	General Budget	1.1, 1.3, 1.4	Ongoing	We will inspect all businesses within the PSD annually and educate the owner/occupant of all related hazards
	1	Fire Prevention and Inspections		Continuous Process	
Participate in “Hazardous Awareness Week” and “Fire Prevention Month”	PP, PI	General Budget	1.2, 1.4	Ongoing	We will conduct training opportunities in the fire station, schools and numerous public displays
	1	Fire Prevention and Inspections		Continuous Process	
Continue programs aimed towards providing resources to local schools to enhance their ability to educate students regarding hazard events and hazard event preparation	PP, PI	General Budget	1.2, 1.4	Ongoing	We provide fire prevention materials to help the students learn in a manner depending upon their learning level
	1	Fire Prevention and Inspections		Continuous Process	

St. Andrews P.S.D. Hazard Mitigation Actions

<i>Mitigation Action and Description</i>	<i>Type</i>	<i>Funding Source</i>	<i>Goals and Objectives</i>	<i>Status</i>	<i>Milestones Achieved and Future Plans</i>
	<i>Priority</i>	<i>Responsible Agency</i>		<i>Implementation Schedule</i>	
Continue participating in the Project Impact Program for Public Information (PPI) to achieve maximum public outreach	PI	General Budget	1.4	Ongoing	Establishing cooperative relationships between public, private and non-profit sectors to enhance preparedness and recovery for hazard events; educating citizens regarding their vulnerability to natural hazards and steps to take to reduce vulnerability
	1	Admin personnel		Continuous Process	
Continue Hazardous materials training and terrorism response training	ES	General Budget	2.2, 2.3, 2.5	Ongoing	Conduct annual refresher training and initial training for new and existing employees
	1	Training Division		Continuous process	
Provide a member of our staff to report to the County EOC in the event of a major emergency incident and/or set up a MEOC at our location	ES	General Budget	2.4, 2.5	Ongoing	Protecting lives; establishing cooperative relations between the public and private sectors; keeping PSD officials abreast of on-going activity
	1	Admin Personnel		In place	
Continue responding to hazard emergencies	ES	General Fund	1.4, 2.1, 2.5	Ongoing	Protecting lives and property; enhancing our response for hazard events; educating citizens regarding vulnerability to hazards
	1	Fire Suppression and Operations Personnel		Continuous process	

St. Andrews P.S.D. Hazard Mitigation Actions

<i>Mitigation Action and Description</i>	<i>Type</i>	<i>Funding Source</i>	<i>Goals and Objectives</i>	<i>Status</i>	<i>Milestones Achieved and Future Plans</i>
	<i>Priority</i>	<i>Responsible Agency</i>		<i>Implementation Schedule</i>	
Continue working to attain resources and to provide training for maritime firefighting through the Maritime Incident Response Team (MIRT)	ES	General Budget	2.5	Ongoing	We have sent three personnel to complete the maritime incidents training, this was conducted during June 2018
	1	Training Division and MIRT team members		Continuous Process	
Continue with Public Relations Programs	PI	General Budget	2.2	Ongoing	Participate on a requested basis from within the community
	1	Training Division		Continuous Process	
Continue training programs for the Anti-Terrorism Task Force	ES	General Budget	2.1	Ongoing	Annual refresher training as required
	1	Training Division		Continuous Process	
Provide information to citizens regarding the propane tank anchoring	PA	General Budget	2.2	Deleted	Not Funded
	4	Fire Prevention			

7.30 – St. John’s Fire District Commission

Resolution for Adoption

A RESOLUTION FOR THE ADOPTION OF THE REVISED CHARLESTON REGIONAL HAZARD MITIGATION PLAN BY THE ST JOHNS FIRE DISTRICT

WHEREAS the County of Charleston has experienced the effects of natural and man-made hazard events; and

WHEREAS the Charleston Regional Hazard Mitigation and Public Information Plan Committee has prepared a recommended *Charleston Regional Hazard Mitigation Plan*; and

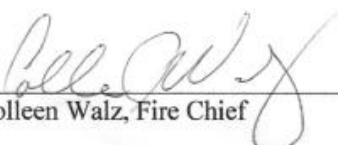
WHEREAS the recommended *Charleston Regional Hazard Mitigation Plan* has been widely circulated for review by residents / business organizations / professional organizations of the unincorporated and incorporated areas of Charleston County, state, federal, regional and local government agencies and has been supported by those reviewers; and

WHEREAS the St Johns Fire District has adopted the *Charleston Regional Hazard Mitigation Plan* and is required to adopt the amended version of this plan on a five-year cycle for the District to remain eligible for certain Federal programs in which Charleston County participates, and

NOW THEREFORE be it resolved that

1. The *Charleston Regional Hazard Mitigation Plan* is hereby adopted as an official plan of the St Johns Fire District, and
2. The Charleston Regional Hazard Mitigation and Public Information Plan Committee is recognized as a continuing entity charged with reviewing, maintaining in accordance with Community Rating System, Flood Mitigation Assistance, Disaster Mitigation Act and Program for Public Information requirements, and periodically reporting on the progress towards and revisions to the plan to the St Johns Fire District.

Effective this 13th Day of May, 2019



Colleen Walz, Fire Chief



Eric P. Britton, Commission Chair

Action Report for the St. John's Fire District

The St. John's Fire District is a special purpose district located in Charleston County, SC. The St. John's Fire District is a full service fire department providing fire suppression, EMS fire response (non-transport), HAZMAT, marine rescue, confined space, prevention, and inspection services. As we are a specialized service, all other functions of government are accomplished by Charleston County and three municipalities (Kiawah, Seabrook, and Rockville) within our jurisdiction.

The following are proposed projects to be undertaken/ continued in the St. John's Fire District for hazard mitigation during 2019 - 2020 and their status through April 2019 (A Status of "Continuing" refers to activities, which are regularly evaluated and conducted on an ongoing basis as part of established departmental processes. These activities span the entire 5-year planning cycle and have no specified end date.)

(Abbreviations for "Type" are as follows: "PA" is Preventive Activities, "PP" is Property Protection Activities, "NB" is Natural and Beneficial Functions/Resource Preservation Activities, "ES" is Emergency Services Activities, "SP" is Structural Projects Activities, "PI" is Public Information Activities, and "GIS" is Geographic Information System Activities.)

St. John's Fire District					
<i>Mitigation Action and Description</i>	<i>Type</i>	<i>Funding Source</i>	<i>Goals and Objectives</i>	<i>Status</i>	<i>Milestones Achieved and Future Plans</i>
	<i>Priority</i>	<i>Responsible Agency</i>		<i>Implementation Schedule</i>	
Community Risk Reduction through Public Education and Proactive programs	PA, PP, PI	General Fund Grant Funding	2.1, 2.2, 3.2	Ongoing	Continue bi-weekly citizen SAFE program. Participation in 50% of county events that promote safety and disaster awareness.
	2	Fire Prevention Division		In Place	Participate in 50% of the child safety seat events in the county. Offer child safety seat course to qualify more installers/ inspectors in the county. Increase involvement at the County level with building plans review 20% by Dec. 2019.
Natural disaster preparation and response	ES, PA, PI	General Fund Grant Funding	1.1, 1.2, 1.3, 1.5, 1.6, 3.1, 3.2	Ongoing/New	Update preparation and response to natural disaster policies by Dec 2018. Consider flood mitigation processes to minimize future flood damage to our existing facilities by Dec 2020.
	2	Administration, Operations, Training		In place/In process	Institute a drone program that will assist with real-time information of post disaster situations that

					have little to no vehicle access By June 2019.
Emergency Medical service delivery enhancement	ES	General Fund Grant Funding	1.5, 2.1	New	Department wide EMT Basic certification for Operations personnel to 75% by Dec 2019.
	1	Operations, Training		Continuing process	Implement medical squad response units for more efficient response to medical incidents. Purchasing of advanced medical care equipment for response and training.
Active Shooter/ Act of Violence response	ES	General Fund Grant Funding	2.1	New	Training for all uniformed department personnel in active shooter/ act of violence response by Dec 2018.
	1	Operations, Training		In Process	Purchase, and place in service ballistic vests for apparatus and command vehicles by Dec 2018.
Provide speakers to civic groups regarding District operations	ES, PI	General Fund	2.1, 2.2	In Place	We provide speakers and public education for all requested events as well as standing annual events. This is facilitated via the Fire Marshal Division
	1	Fire Prevention Division		Continuing process	
Support "Hazard Awareness Week"	ES, PI	General Fund	1.1, 1.2, 1.3, 1.5, 2.1, 2.2	In Place	We participate annually in this event. Now it is a combined event with Kiawah and Seabrook islands
	2	Administration		Continuing process	
Seek funding for retrofitting critical facilities to enhanced hazard resistance if funding sources become available	ES, PP	Grant Funding	1.2, 1.3, 1.6, 2.3, 3.2	Deferred	Will always consider upgrading facilities to protect against damage. Will attempt to fund through grants as necessary
	1	Administration			
Include construction practices that are sensitive to flood, seismic and hurricane considerations on all new or upgraded facilities	ES, PI	General Fund	1.1, 2.1, 2.3, 3.1	In place	UPDATE: In the design of our new facilities we have addressed considerations for seismic and flood damage prevention.
	1	Administration Fire Prevention		Continuing process	

Continue Terrorist Response Training	ES	General Fund Grant Funding (HMGP)	2.1, 2.2, 2.3, 3.1, 4.1	In Place	Continue development of regional response team through training opportunities identified by the CC HAZMAT office
	2	CC HAZMAT Coordinator Training Division, CCSO		Continuing process	

7.31 – St. Paul’s Fire District Commission

Resolution for Adoption

A RESOLUTION FOR THE ADOPTION OF THE REVISED CHARLESTON REGIONAL HAZARD MITIGATION PLAN BY ST. PAULS FIRE DISTRICT COMMISSION

Resolution No. 2019-01

WHEREAS the St. Pauls Fire District has experienced the effects of natural and man-made hazard events; and

WHEREAS the Charleston Regional Hazard Mitigation and Public Information Plan Committee has prepared a recommended *Charleston Regional Hazard Mitigation Plan*; and

WHEREAS the recommended *Charleston Regional Hazard Mitigation Plan* has been widely circulated for review by residents / business organizations / professional organizations of the unincorporated and incorporated areas of Charleston County, state, federal, regional and local government agencies and has been supported by those reviewers; and

WHEREAS the County of Charleston originally adopted the *Charleston Regional Hazard Mitigation Plan* in 1999 and readopted it in 2004, 2008, and 2013 and is required to adopt the amended version of this plan on a five-year cycle for the County to remain eligible for certain Federal programs in which St. Pauls Fire District participates, and

NOW THEREFORE be it resolved that

1. The *Charleston Regional Hazard Mitigation Plan* is hereby adopted as an official plan of the St. Pauls Fire District, and
2. The Charleston Regional Hazard Mitigation and Public Information Plan Committee is recognized as a continuing entity charged with reviewing, maintaining in accordance with Community Rating System, Flood Mitigation Assistance, Disaster Mitigation Act and Program for Public Information requirements, and periodically reporting on the progress towards and revisions to the plan to St. Pauls Fire District and Charleston County Council.

Effective this 18th Day of April, 2019

Signed:  Chairman, St. Pauls Fire District Commission

Action Report for the St. Paul's Fire District

The following are proposed projects to be continued in the St. Paul's Fire District for hazard mitigation during 2018-2019 and their status through April 2019

The St. Paul's Fire District is a Special Purpose Tax District located in Charleston, SC. The District was established as an emergency service District for the purposes of fire protection and suppression, first responder medical response, hazardous materials response, and response to man-made and natural disasters.

The District has no ordinance adopting authority and is a rural agriculture area of low to moderate-income levels, and low population (12,707 per 2000 Census). Due to these factors, the District is very limited in its resources and authority regarding Hazard Mitigation Planning. The District's role would be mostly supportive in regards to Non-Emergency Services Activities. The District would be proactive and reactive regarding Emergency Services, with utilizing additional resources through Charleston County Emergency Action Plans.

(Abbreviations for "type" are as follows: "PA" is Preventive Activities, "ES" is for Emergency Services Activities, and "PI" is Public Information Activities)

Hazard Mitigation Goals and Objectives	
Goal 1: Mitigate natural hazard damage	
Objective 1.1	Minimize future flood damage
Objective 1.2	Minimize future earthquake damage
Objective 1.3	Minimize future hurricane damage
Objective 1.4	Minimize future wildfire damage
Objective 1.5	Minimize future tornado-related loss of life
Objective 1.6	Reduce existing flood damage
Goal 2: Increase public preparedness and protection	
Objective 2.1	Protect the lives of our citizens from natural and man-made hazards
Objective 2.2	Educating citizens regarding steps to take to reduce vulnerabilities
Objective 2.3	Promote long-term prosperity
Goal 3: Improve infrastructure	
Objective 3.1	Improve hazard resistance of infrastructure
Objective 3.2	Reduce vulnerability of our infrastructure to natural and man-made hazards
Goal 4: Increase environmental well being	
Objective 4.1	Preserve environmental resources
Objective 4.2	Improve water quality
Objective 4.3	Preserve open space
Objective 4.4	Encourage recreational activities

St. Paul's Fire District Hazard Mitigation Actions

Mitigation Action and Description	Type	Funding Source	Goals and Objectives	Status	Milestones Achieved and Future Plans
	Priority	Lead Agency		Implementation Schedule	
Support Adoption of any Charleston County or Incorporated Town (within SPFD) standards, regulations, codes, or programs regarding Hazard Mitigation Activities	PA	General Fund	2.1, 1.1-1.5	Ongoing	We have an active fire inspection program that is also used in public education of codes and safe practices in local churches, community centers and business. In the past year added two public fire and life safety educators.
	2	Administration/ Department <i>Fire Inspectors</i>		Continuous Process	
Continue membership in the Emergency Council, which supports the Charleston County Emergency Plan.	ES	General Fund	1.1-1.6, 2.1-2.3, 4.1	Ongoing	Purchasing new 800 radios in 2018/2019 budget year with county partnership program. Provide equipment and manpower as needed or that may be requested by local agencies.
	1	Commission Chairman / <i>Fire Chief</i>		Continuous Process	
Work with local jurisdictions to form multi-disciplined task forces of specially trained police, fire and EMS personnel to respond to any natural or man-made disasters.	ES	General Fund	2.1, 2.3, 3.1, 3.2	Ongoing	We are training with Charleston County Ems and sheriff department with the active shooter program. Department has secured a high water vehicle and a boat to provided rescue services to the public trapped by flood waters.
	1	Administration / <i>Fire Chief</i>		Continuous Process	
Provide speakers to civic groups regarding District operations, and the many supporting programs through Charleston County Government.	PI	General Fund	2.2	Ongoing	We have public fire education speakers that are called on by the community to speak at schools, local businesses, local community centers and churches. We also provide a smoke trailer for public education at community events and schools on fire

St. Paul's Fire District Hazard Mitigation Actions					
Mitigation Action and Description	Type	Funding Source	Goals and Objectives	Status	Milestones Achieved and Future Plans
	Priority	Lead Agency		Implementation Schedule	
	3	Administration Department <i>Fire Inspectors</i>		Continuous Process	prevention and exit drills. In addition our fire and life safety educators provides information on earthquake and hurricanes.
Seek funding for retrofitting Commission-owned facilities for enhanced hazard-resistance, if funding becomes available	PA	Grant Funding (HMGP)	1.2, 1.3, 1.6, 2.3, 3.2, 4.3	Ongoing	This would be beyond our budget capability currently seeking funding for that addresses the concerns.
	1	Administration / <i>Commission</i>		Continuous Process	
Continue participating in the Project Impact Program for Public Information (PPI) to achieve maximum public outreach.	PI	General Fund	2.2, 3.2	Ongoing	We have public fire education speakers that are called on by the community to speak at schools, local businesses, local community centers and churches.
	1	Building Inspection Services/ Project Impact committee members		Continuous Process	

The St. Paul's Fire District shall provide support to the many activities and projects that will benefit the residents of the District. Additional recommended projects may be added to this action plan as they are made available and recommended to the St. Paul's Fire District Commission. Some projects that are being undertaken by other jurisdictions may not necessarily be listed here but may affect the St. Paul's Fire District.

Section 8 Appendices

This section provides additional documentation to the *Charleston Regional Hazard Mitigation Plan*. It includes the following subsections:

- A.1 Overview of the Public Information Plan (PIP)
- A.2 Overview of the Community Rating System
- A.3 Overview of Project Impact
- A.4 Participation
- A.5 Public Meeting Notices
- A.6 Previous Yearly Meeting Minutes
- A.7 Hazard Mitigation Plan Summary of Changes 2019
- A.8 Impact Statements
- A.9 Complete Hazard Histories
- A.10 Flood Zone Descriptions
- A.11 Flooding Extent
- A.12 Liquefaction Potential Maps
- A.13 Wildfire Intensity Maps

A.1 – Overview of the Public Information Plan (PIP)

The Public Information Plan is a dynamic document with its purpose to act as a guidebook for appropriate Committees pertaining to the *Charleston Regional Hazard Mitigation Plan* and Project Impact to be able to update both efficiently and accurately the guidelines, procedures, and projects on educating the public and broadcasting and sharing new information critical to the area. To achieve this, the Plan outlines criteria necessary for the Committee to make these decisions such as the community needs assessment, the flood hazard and insurance assessment, and the repetitive loss assessment. With this Plan, the Committees can create outcomes and opportunities for public education, including but not limited to, expos, access to information electronically, brochures, and community wide access and education through the participation of sixteen (16) jurisdictions within Charleston County.

Below is the Public Information Plan in full:

Public Information Plan

**2017-
2018**

Appendix A.1 to the Charleston Regional Hazard Mitigation Plan



Charleston County
Building Inspection Services
4045 Bridge View Drive STE A311
North Charleston, SC 29405
843-202-6940

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Link to the Charleston Regional Hazard Mitigation Plan:

<http://www.charlestoncounty.org/departments/building-inspection-services/files/Hazard-Mitigation-Plan.pdf>



Charleston County, South Carolina

2017-2018 Public Information Plan

Purpose

The Public Information Plan is a dynamic document with its purpose to act as a guidebook for appropriate Committees pertaining to the *Charleston Regional Hazard Mitigation Plan* and Project Impact to be able to update both efficiently and accurately the guidelines, procedures, and projects on educating the public and broadcasting and sharing new information critical to the area. To achieve this, the Plan outlines criteria necessary for the Committee to make these decisions such as the community needs assessment, the flood hazard and insurance assessment, and the repetitive loss assessment. With this Plan, the committees can create outcomes and opportunities for public education, including but not limited to, expos, access to information electronically, brochures, and community wide access and education through the participation of sixteen (16) jurisdictions within Charleston County.

Background

The Charleston County area has historically survived numerous natural and man-made disasters with resilience and an urgent need to prevent or minimize the impact of future events. The community resistance to prevent problems made it very easy to create a community-wide program to educate residents and reduce the impact of future events. In 1987, the creation of a hazard mitigation plan was developed to support an application to participate in the FEMA Project Impact Program. Charleston County was selected as a Project Impact community in December of 1988. As originally created, the program required the establishment of a hazard mitigation plan. The frame work of implementing the program was an advisory committee including both a Hazard Mitigation Plan Committee and a Public Information Committee which continues on today as one joint committee.

The **goals** of this plan include but are not limited to:

1. Protecting the lives of our citizens to the best of our abilities from natural and man-made environmental hazards.

2. Assessing the extent of our vulnerability to natural and man-made environmental hazards.
3. Establishing cooperative relationships between the public, private and non-profit sectors to enhance our preparedness, response, recovery, and mitigation for hazard events.
4. Educating our citizens regarding their vulnerability to natural hazards and steps which may be taken to reduce that vulnerability.
5. Reducing vulnerability of our infrastructure and built environment to natural and man-made environmental hazards through specific mitigation projects that will also consider the historic and environmental resources of our area.

The *Charleston Regional Hazard Mitigation Plan* has been a multi-jurisdictional plan since the Project Impact program was utilized to promote the outreach program and assist with implementing the Action Plans of the *Charleston Regional Hazard Mitigation Plan*. In 2012, the Hazard Mitigation & Public Information Plan Committees, which were once separate, were combined and became the Hazard Mitigation & Public Information Plan Committee. In 2013, the *Charleston Regional Hazard Mitigation Plan* refined the roles of the overall Committee to comply with the Program for Public Information requirements of the 2013 Community Rating System. For the 2016-2017 update of the *Charleston Regional Hazard Mitigation Plan*, the Committee voted to change the name from Program for Public Information to Public Information Plan. Because the Public Information Plan is included as an appendix of the the *Charleston Regional Hazard Mitigation Plan*, it is voted on and adopted by all jurisdictions' Councils and will be updated yearly. The *Charleston Regional Hazard Mitigation Plan* is formally adopted by all jurisdictions on a 5- year cycle and Charleston County Council is notified of the annual updates between formal adoptions. The most recent formal adoptions took place in 2013 and the next is set to occur later in 2017. Please see the attachments (pages 497-513) following this document for each jurisdiction's adopting resolution.

Charleston County has participated in the Community Rating System (CRS) since 1994. The Community Rating System is a part of the National Flood Insurance Program (NFIP). Currently, Charleston County is a CRS Class 4, providing residents of Charleston County up to a 30% discount on flood insurance premiums. In an effort to increase public awareness and education, the County has implemented a Public Information Plan based on the past four years of work created and implemented by the Committee and the County. The final draft of the Public Information Plan was submitted to the insurance liaison of FEMA Region V requesting any comments on the draft document. The document will be formally adopted by the Hazard Mitigation & Public Information Plan Committee during the next adoption of the *Charleston Regional Hazard Mitigation Plan* later in 2017 or a special meeting will be held to formally adopt the Public Information Plan portion of the *Charleston Regional Hazard Mitigation Plan*.

Hazard Mitigation & Public Information Plan Committee

The Hazard Mitigation & Public Information Plan Committee is a large group of individuals working to ensure that the Public Information Plan maintains an effective system of providing the public with valuable information in regards to local hazards and mitigation efforts. The Public Information Plan is a program to provide information to target audiences and the public in general, about local hazards; how to prepare for, what to do in the event of, and how to recover from, potentially dangerous events that could affect our area. The Committee has been in place since the inception of the Project Impact program resulting in the Committee building on their experiences and their knowledgebase of the best methods for informing the public. The following tables identify current members of the Charleston Regional Hazard Mitigation & Public Information Plan Committee. This Committee is responsible for amending the *Charleston Regional Hazard Mitigation Plan* which includes the duties of amending the Public Information Plan. These members provide perspectives from different jurisdictions, areas of study or interests, government and non-government agencies, real estate and insurance agencies, in addition to stakeholders and concerned citizens from flood-prone areas. In order to be included in the *Charleston Regional Hazard Mitigation Plan*, each jurisdiction has designated members assigned to the Committee to represent different areas concerned within Charleston County. The *Charleston Regional Hazard Mitigation Plan* encompasses sixteen (16) jurisdictions, all of which participate in the CRS Program. Table 1 lists the jurisdictional designated members of the Committee, what jurisdiction they represent and their associated CEO.

Table 1: Designated Members of the Committee

Jurisdiction	CEO	Designated Member
Town of Awendaw	Miriam Green, Mayor	D. William Wallace, Town Administrator
Town of Hollywood	Jackie Heyward, Mayor	Edward Holton, Zoning Administrator
Town of James Island	Bill Woolsey, Mayor	Ashley Kellahan, Town Administrator
Town of Lincolnville	Charles Duberry, Mayor	Charles B. Duberry, Mayor
Town of McClellanville	Rutledge B. Leland, III, Mayor	Michelle McClellan, Town Clerk
Town of Meggett	Harry V. Herrington, Mayor	Stephanie Smith, Town Administrator
Town of Ravenel	Opal N. Baldwin, Mayor	Mark Bloomer, Planning Administrator
Town of Rockville	Riley A. Bradham, Mayor	Carl H. Simmons, Director, Building Inspection Services
Town of Seabrook Island	Ronald Ciancio, Mayor	Randy Pierce, Town & Zoning Administrator
City of Charleston	John Tecklenberg, Mayor	Laura Cabiness, Director, Public Service Dept.
City of Folly Beach	Tim Goodwin, Mayor	Eric Lutz, Building Official
Town of Kiawah Island	Craig Weaver, Mayor	Stephanie Tillerson, Town Administrator
City of Isle of Palms	Dick Cronin, Mayor	Douglas Kerr, Director, Building, Planning, & Zoning
Town of Mt. Pleasant	Linda Page, Mayor	Hillary Repik, Stormwater Manager
City of North Charleston	R. Keith Summey, Mayor	James Whittaker
Town of Sullivan's Island	Patrick O'Neal, Mayor	Randy Robinson, Building Official
Unincorporated Charleston County	Jennifer Miller, Administrator	Carl H. Simmons, Director, Building Inspection Services

With such a diverse group of Committee members, the Charleston Regional Hazard Mitigation & Public Information Plan Committee aspires to evaluate public information needs from all areas of interest. Stakeholders involved in the Charleston Regional Hazard Mitigation & Public Information Plan Committee come from various businesses, organizations and other government

agencies outside the community that hold special interest in the hazard mitigation process of Charleston County. Also, other stakeholders involved in the Committee represent floodplain residents, emergency responders, utility companies, business organizations, trade associations, environmental organizations, insurance agencies and lenders as well as major employers of the area. The Charleston Regional Hazard Mitigation & Public Information Plan Committee includes forty (40) stakeholder members, which makes up more than half of the voting Committee of fifty-six (56). Table 2 lists individual non-government stakeholder members of the Charleston Regional Hazard Mitigation & Public Information Plan Committee.

Table 2: Stakeholder Members of the Committee

Name	Representing
Shawn Engelman, Deputy Chief of Administration	James Island PSD
Chris Seabolt, Fire Chief	James Island PSD
Gary Alford, Assistant District Manager of Operations	North Charleston District and Sewer District
Ken Fischer, Manager	St. Andrews PSD
Christie Holderness, District Manager	St. Andrews PSD
Gavin Gilcrease, Administrative Assistant Chief	St. John's Fire District
Mike Rakoske, Assistant Chief of Administration	St. Paul's Fire District
Kent Scarborough, Safety Director	Charleston Water System
Ronnie Freeman, Safety Director	Mt. Pleasant Water Works
Ryan Henderson, Safety Compliance Director	Charleston Co Parks & Recreation Commission
Susan Klugman, CFO	St. Andrews Park & Playground Commission
Gary McJunkin, Director	Cooper River Parks & Playground Commission
Angela McJunkin, Director Code Enforcement	Cooper River Parks & Playground Commission
Michael Reidenbach, Security & Emergency Management	Charleston County School District
Sean Hughes, Facility Director	Charleston County School District
Woody Doossche, Safety Manager	Charleston County School District
Dana Henderson, Director of Risk Management	Charleston County School District
Randy Beaver, Dir. Envir Health & Safety	College of Charleston
Jordan Bradway, Emergency Manager	Roper St. Francis
Anne Sass, Grants Director	Roper St. Francis
Peter DiNicola, Director of Plant Operations	Roper St. Francis
Scott Cave, Certified Business Continuity Consultant	Atlantic Business Continuity Services
Mike Horton	Davis and Floyd
Robert George, Director of Conservation	SC Aquarium
Justin Healy, Owner	Shutter Services & Sales
William Salters, Coastal Services Project Manager, Planning	SC DHEC - OCRM
Amanda Ritsema, Hospital Preparedness Program Coordinator	SC DHEC
Aleta Riesberg, Real Estate Agent	Anchorline Properties
Chris Silcox, Insurance Agent	C.T. Lowndes & Co.
Debbie Eckard, District Manager, Education Coordinator	Charleston Soil & Water Conservation District
Cedric Green, Vice President	SCANA
Tim Mobley, VP, Engineering and Operations	Berkeley Electric Cooperative
Stewart Weinberg	Floodplain Resident
Bill West	Floodplain Resident
Thomas Payne	Floodplain Resident
Aleen Kinter	Floodplain Resident
Julie Hensley	Floodplain Resident
Nicole Elko	Floodplain Resident
Robert Cochran	Floodplain Resident
Henry Dingle	Floodplain Resident

Table 3 is a listing of other participating partners involved in the Charleston Regional Hazard Mitigation & Public Information Plan Committee. Though these are not Stakeholder members of the Committee, they still have a significant place in reaching the goals of the Committee. Also included in this category are Charleston County staff members, including the Public Information Officer, that provide assistance to the Committee and other jurisdictional government members and special district officials that have a special interest in flood and hazard related issues (i.e., public service district officials, parks and recreation commission members, sewer districts, etc.).

Table 3: Other Participating Partners of the Committee

Name	Representing
*Jody Muldrow, Planning Administrator	Town of Awendaw
*John Porcelli, Building Official	Town of James Island
Mark Johnson, Public Works	Town of James Island
James Hackett, Code and Safety Officer	Town of James Island
*Larry Brown, Town Council	Town of Lincolnville
Charles Gannt, Fire Chief	Town of Lincolnville
*Henry Holst, Town Council	Town of Rockville
*John Gregg, Mayor Pro-Tem	Town of Seabrook Island
John Turner, Town Council	Town of Seabrook Island
Tom O'Brien, Deput Director Public Service	City of Charleston
*Mark Wilbert, Emergency Management	City of Charleston
*Aaron Pope, Zoning Administrator	City of Folly Beach
Bob Maibach, (Fire) Training Officer	City of Isle of Palms
*Linda Tucker, Town Administrator	City of Isle of Palms
Desiree Fragoso, Assistant Administrator	City of Isle of Palms
*Bruce Spicher, Building Official	Town of Kiawah Island
Katherine Hendricks, Assistant Town Administrator	Town of Mt. Pleasant
*Rob Rogerson, Floodplain Manager	Town of Mt. Pleasant
Emily Raby, Stormwater	Town of Mt. Pleasant
Michael Hardy, Staff Engineer	City of North Charleston
Eyda Arroyave, Planning and Zoning Assistant	City of North Charleston
*Darbis Briggman, Chief Building Official	City of North Charleston
Benjamin Brown, Inspector	City of North Charleston
*William Barfield, Emergency Preparedness Coordinator	City of North Charleston
*Joe Henderson, Zoning Administrator	Town of Sullivan's Island
*William Horne	Charleston County Building Inspection Services
Cindy Cahill	Charleston County Building Inspection Services
Niki Grimball	Charleston County Building Inspection Services
Eric Adams	Charleston County Transportation
Taylor Hall	Charleston County Transportation
*Brock Clary	Charleston County EMD
Chris Wannamaker	Charleston County Public Works
Shawn Smetana	Charleston County Public Informaiton Officer
<i>* Denotes other participating partners that are considered alternative voting members in the absence of the designated member.</i>	

Participation in the Charleston Regional Hazard Plan and Public Information Committee requires attendance of at least one voting member and associated stakeholders. Because of the diverse nature of the Committee, at least two representatives from each jurisdiction are included in the Committee and more than half of the Committee's members are non-government stakeholder members. This diversity allows the Committee to take into account all perspectives of different areas, groups and interests affected by local hazards. Participation from every Committee member is essential in creating and maintaining an effective Public Information Plan because all of the

members have an interest and knowledge of hazard mitigation and the importance of public outreach to produce a better outcome after an event.

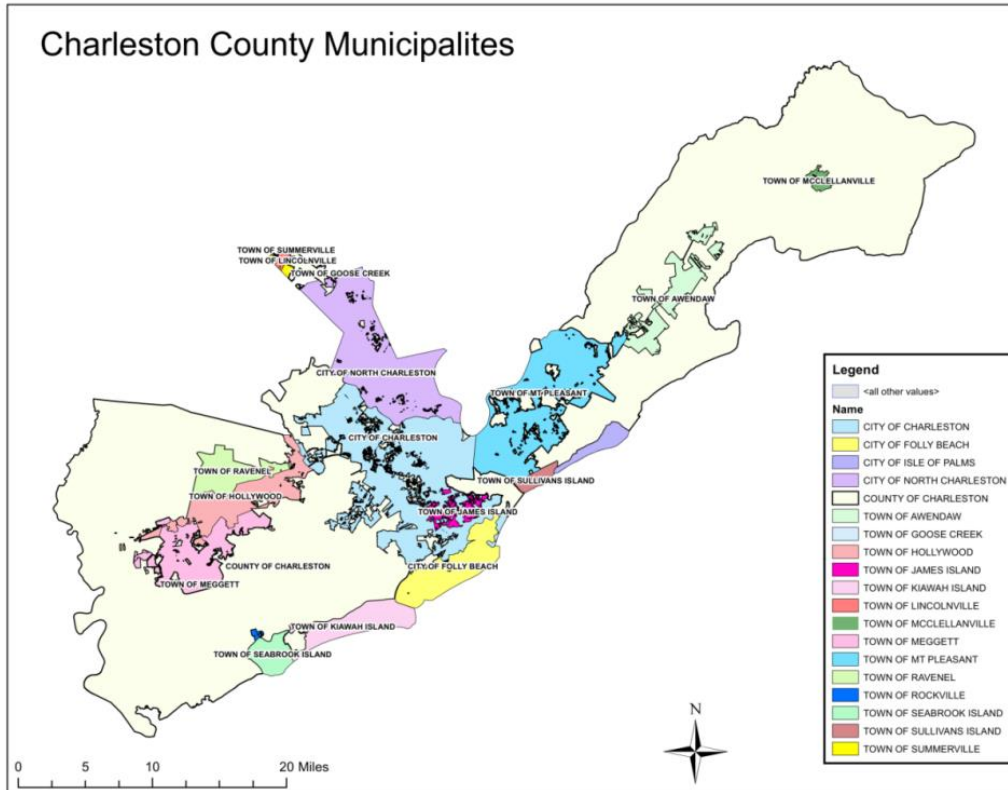
The Committee has met at least twice a year since the creation of the Public Information Plan in 2012. At these meetings, outreach topics are discussed and modified if necessary, target audiences and areas are addressed and outreach projects are reviewed. These messages and topics have been adjusted over the years to suit the area's current informational needs and are listed in a later section of this document. This year's meetings were held on June 13, July 18 and August 22, 2017.

Community Needs Assessment

Charleston County is located along the southeast coast of South Carolina and is subject to many different hazards, from localized flooding to major hurricanes and earthquakes. It encompasses approximately 916 square miles of land, marshes, rivers, and wetlands with a coastline that stretches nearly 100 miles along the Atlantic Ocean.

The Charleston region's population is growing 3 times faster than the U.S. at a rate of 13.2 percent since 2010 to an estimated 2016 population of 396,484, with a median age of 37 and a median household income of approximately \$53,437. The labor force consists of around 40,742 companies. Around 89.7 percent of Charleston County residents have a high school degree or higher level of education, and 17.2 percent of the population below poverty level.

Charleston County consists of the unincorporated areas and the municipalities of the Town of Awendaw; Town of Hollywood; Town of James Island; Town of Lincolnville; Town of McClellanville; Town of Meggett; Town of Ravenel; Town of Rockville; Town of Seabrook Island; the City of Charleston; City of Folly Beach; City of Isle of Palms; Town of Kiawah Island; Town of Mount Pleasant, City of North Charleston; and Town of Sullivan's Island.



The *Charleston Regional Hazard Mitigation Plan* and this Public Information Plan also address the vulnerabilities of the Region to each of the major types of hazards facing the region. Each of the major hazard types are discussed in terms of:

- Types of buildings that are most vulnerable to particular hazards
- Estimation of the total number of buildings vulnerable to flood/hurricane damage
 - 78,355 buildings in the region are vulnerable to such damage based on their location in *Special Flood Hazard Area*
 - 47,169 buildings of the total number listed above are also vulnerable due to their date of construction
- Estimated potential building/property losses due to earthquakes and tornadoes
- The types of hazards that pose a threat and in what manner
- Known flood damages
- Past flood impacts
- Emergency warning needs
- Critical facilities
- Natural and beneficial functions of floodplains
- Development and population trends
- Economic impact of hazard events

The overall determination from this section is that the Charleston Region is potentially vulnerable to loss as a result of a hazard event to a relatively high degree, particularly considering the increasing number of residents not necessarily familiar with the types of hazards facing the region and how best to prepare and protect themselves from these hazards. Since tourism plays such a predominant role in the local economy and is often negatively affected by large-scale hazard events with national media coverage, the potential economic losses associated with a hazard event are potentially high.

Flood Hazards

Flood hazards are of particular importance to the Charleston County area because flooding is caused by many different environmental factors in this area. For example, a heavy rainstorm along with a particularly high tide can easily shut down roads in certain areas. Additional exposure to flooding comes from hurricanes, the fact that much of the area is considered below sea level, seasonally high rainfall amounts and construction of new developments which decreases the wooded areas all create the potential for flooding issues. Many drainage projects have occurred over the past few years to reduce the effect that the drainage system has on flood potential.

Flood Insurance Assessment

A flood insurance assessment has been performed for Charleston County to evaluate the participation in current flood insurance coverage, determine new avenues for public outreach to inform residents of the importance of flood insurance coverage and assess where increased coverage is essential. The Charleston area community sits near the coast, experiences heavy rains at times, and is below sea level making the area very susceptible to flooding in some areas more than others. Since 2012, the Charleston area has suffered an estimated \$19,237,750 in damages from flooding. The purpose of performing a flood insurance assessment in the Charleston area is aimed at hazard mitigation while reducing repetitive loss, increasing awareness and preparation, and continuing to evaluate ways to protect the lives of citizens from natural and man-made environmental disasters.

The process to assess flood insurance coverage started with an evaluation of each jurisdiction's total valuation of site-built structures, determining what flood zone structures were in (for both residential and commercial) and preparing a total number of structures located within the Special Flood Hazard Areas as documented in Table 4 below.

Table 4: Site-Built Structures Valuation Per Jurisdiction

Jurisdiction	Total Value "A" Zones Site-Built Structures (mil\$)	Total Value "V" Zones Site-Built Structures(mil\$)	Total Value Site-Built Structures Not in the SFHA (mil\$)	Total Value of Site-Built Structures Not Flood-Zone Coded** (mil\$)
City of Charleston	5,777,921,273	750,627,390	3,801,446,549	3,473,368,792
City of North Charleston	690,481,090	19,600,400	4,258,804,696	4,017,936,428
Folly Beach	163,347,899	248,011,799	15,877,700	0
Hollywood	157,939,002	0	200,490,924	188,179,624
Isle of Palms	1,052,711,587	399,688,099	8,672,200	6,216,400
James Island	506,022,901	41,931,600	330,248,700	327,591,300
Kiawah Island	1,631,621,801	97,644,200	89,768,300	0
Lincolnton	19,268,100	0	7,526,800	6,266,600
McClellanville	68,063,993	9,266,899	3,345,200	785,100
Meggett	116,305,400	345,400	20,585,600	14,424,500
Ravenel	17,022,300	0	99,536,501	94,945,001
Rockville	7,344,600	9,521,100	3,552,000	3,552,000
Seabrook Island	641,314,800	59,571,700	12,919,700	0
Sullivans Island	190,601,414	246,197,000	2,784,200	0
Summerville	26,357,000	0	79,418,500	57,263,800
Town of Awendaw	34,256,493	13,677,800	38,118,000	35,788,800
Town of Mt Pleasant	4,432,269,912	472,292,400	3,784,325,856	3,454,453,256
Unincorporated Chas County	1,967,776,836	314,573,404	1,471,134,243	1,381,493,543
Total Region	17,500,626,401	2,682,949,191	14,228,555,669	13,062,265,144

Of these totals, another table was prepared to determine the total number of structures that were site-built prior to 1985 within each jurisdiction to evaluate the percentages of structures located within a Special Flood Hazard Area and constructed prior to 1985. Table 5 below represents pre-1985 structures located within Special Flood Hazard Areas.

Table 5: Percentages of Homes within SFHA's per Jurisdiction

Jurisdiction	Pre-1985 Site-Built Residential Buildings in SFHA	Pre-1985 Commercial Buildings in SFHA	Total Pre-1985 Site-Built Buildings in SFHA	% of All Site-Built Buildings In Jurisdiction Constructed Pre-1985 and in SFHA	Pre-1985 Mobile Homes in SFHA	Total Site-Built Buildings Pre-1985 & Mobile Homes in SFHA
City of Charleston	12,946	1,896	14,842	61.4	44	14,886
City of North Charleston	1,693	527	2,220	13.21	278	2,498
Folly Beach	923	50	973	99.18	0	973
Hollywood	93	10	103	12.13	11	114
Isle of Palms	2,129	14	2,143	99.72	0	2,143
James Island	2,444	34	2,478	59.11	9	2,487
Kiawah Island	1,629	25	1,654	100	0	1,654
Lincolnton	92	7	99	63.46	27	126
McClellanville	163	23	186	98.41	0	186
Meggett	199	18	217	88.93	18	235
Ravenel	34	5	39	11.11	19	58
Rockville	58	2	60	85.71	1	61
Seabrook Island	1,150	7	1,157	99.57	0	1,157
Sullivans Isle	636	15	651	100	0	651
Summerville	0	0	0	0	0	0
Town of Awendaw	79	7	86	32.58	6	92
Town of Mt Pleasant	2,362	260	2,622	33.54	3	2,625
Unincorporated Charleston County	6,046	279	6,325	44.68	333	6,658
All Regions	32,676	3,179	35,855	avg 61.26%	749	36,604

An analysis was performed to determine the average amount of coverage in each jurisdiction, and includes data on the number of policies in force and the number of structures in the Special Flood Hazard Areas. Table 6 is a chart representing this information. Overall, the average amount of

coverage is around \$266,000 though the number of policies for each jurisdiction ranges from 19 policies to 23,908. The population of each of these jurisdictions ranges drastically explaining the wide range of differences in the number of policies in force.

Table 6: Flood Insurance Coverage Assessment

Jurisdiction	Residential structures in the SFHA (site built)		Commercial Structures in the SFHA (site built)		Total Structures in the SFHA (including site-built and mobile homes)		# Policies in Force	Premium	Total Insurance in Force Pre/Post FIRM	Average Coverage
	A/AE Zone	V/VE Zone	A/AE Zone	V/VE Zone	A/AW Zone*	V/VE Zone				
Town of Awendaw	223	34	17	3	296	38	65	\$36,943	\$18,857,000	\$290,107.69
Unincorporated Charleston County	10,771	1,149	560	80	12,445	1,276	19814	\$13,249,722	\$5,446,787,400	\$274,895.90
City of Charleston	21,421	1,373	2,950	270	24,465	1,646	23908	\$22,398,374	\$6,313,609,000	\$264,079.35
City of Folly Beach	971	1,143	41	37	1,012	1,180	1664	\$2,774,574	\$419,436,600	\$252,065.26
Town of Hollywood	446	0	26	0	506	0	312	\$139,026	\$44,095,000	\$141,330.13
City of Isle of Palms	3,345	1,030	230	82	3,575	1,112	4019	\$4,544,008	\$1,127,285,200	\$280,488.98
Town of Kiawah Island	3,453	68	56	7	3,509	75	2212	\$1,135,098	\$636,363,800	\$287,687.07
Town of McClellanville	298	22	56	1	355	23	222	\$279,905	\$59,043,600	\$265,962.16
Town of Meggett	552	2	34	1	642	3	262	\$159,855	\$72,081,500	\$275,120.23
Town of Mount Pleasant	13,852	1,216	701	220	14,569	1,437	14898	\$8,067,500	\$4,306,565,100	\$289,070.02
City of North Charleston	2,128	1	834	18	3,789	19	1751	\$1,448,891	\$415,501,500	\$237,293.83
Town of Ravenel	92	0	19	0	192	0	31	\$19,302	\$8,816,900	\$284,416.13
Town of Rockville	37	37	1	1	39	38	19	\$41,655	\$5,286,500	\$278,236.84
Town of Seabrook Island	2,149	89	34	3	2,183	92	1063	\$645,897	\$300,248,000	\$282,453.43
Town of Sullivan's Island	493	535	17	12	510	547	879	\$1,819,441	\$266,405,500	\$303,077.93
Town of Summerville	200	0	1	0	201	0	167	\$76,603	\$43,947,800	\$263,160.48
Town of Lincolnville	165	0	24	0	255	0	n/a	n/a	n/a	n/a
Town of James Island	2,885	190	68	1	2,972	191	n/a	n/a	n/a	n/a
Totals	63,481	6,889	5,669	736	71,515	7,677	71286	\$56,836,794	\$19,484,330,400	\$266840.34 average

Because the Charleston area includes roughly 72,000 existing policies, it is important to keep the public aware of the importance of flood insurance because this area is still growing drastically. Thousands of new homes are constructed or added on to every year and new residents are moving to the area every day. Keeping new and existing residents informed about flood hazards and flood insurance is an essential part of public information activities due to the vast nature of the hazards in our area.

In conclusion, the Committee along with assistance from Charleston County employees, have determined some items that are necessary to improve flood insurance coverage after evaluating the flood insurance assessment. This plan includes:

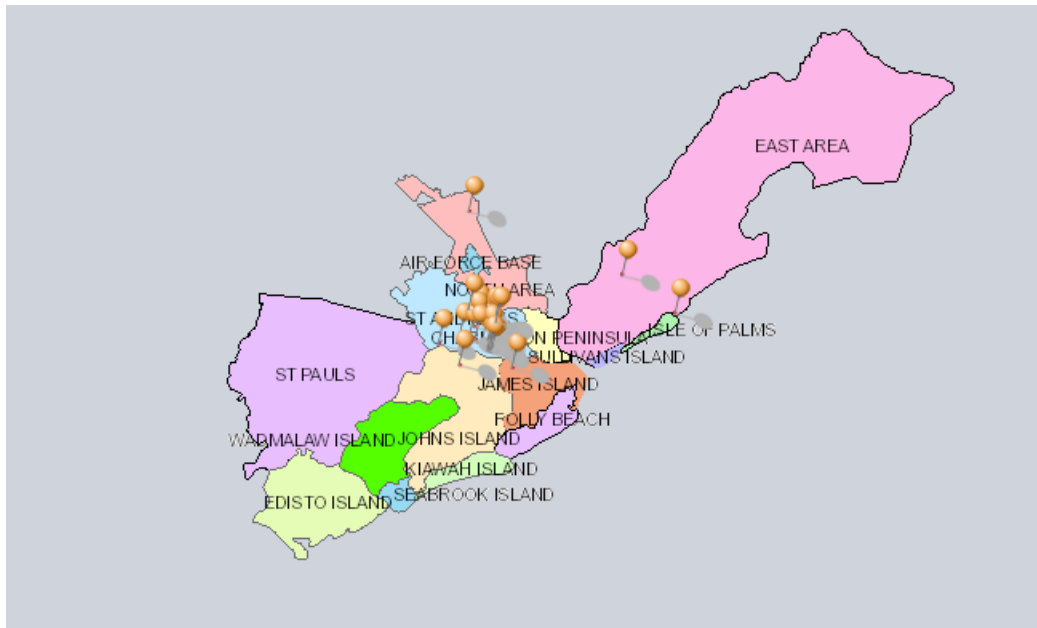
1. Have a home evaluation:
 - a. Review existing elevation certificate
 - b. Most Pre-FIRM homes do not have elevation certificate
 - i. Get an elevation certificate
2. Areas that may lower the lowest floor elevation:
 - a. Enclosures below BFE without flood vents
 - i. crawl space
 - ii. garage
 - iii. storage
 - iv. areas under stairs
 - v. elevator shaft
 - b. Unpermitted living area below BFE
3. After evaluation and elevation certificate review, areas that may need retrofitted:

- a. Elevate Finished floor or lowest horizontal structural member
 - i. Homes built Pre-Firm
 - ii. BFE changed with map updates
 - b. Additional flood vents in enclosure to equal 1 square inch per 1 square foot
 - c. Remove unpermitted living space below BFE
 - d. Raise mechanical equipment/ductwork
 - e. Install flood vents in elevator shaft
4. After retrofit:
- a. Get new elevation certificate
 - b. Get new rate on insurance

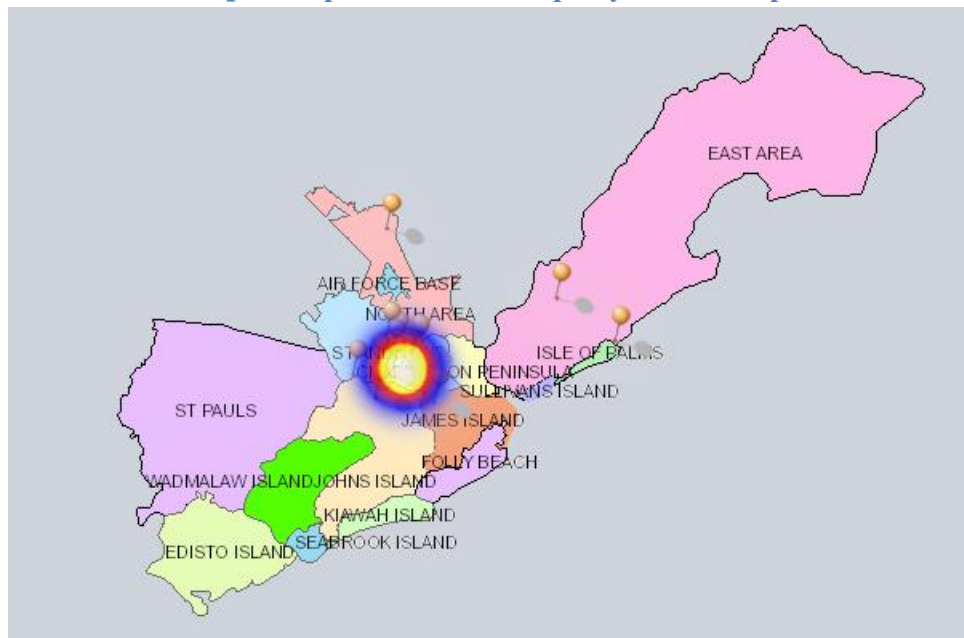
Repetitive Loss Properties

Repetitive loss properties are a serious issue in communities across the United States. Repetitive loss properties drain funds that are needed for preparation of possible catastrophic events, initial rise in the National Flood Insurance's annual revenue losses, and subsequently cause a burden on the National Flood Insurance Program. According to 2017 Repetitive loss data, Unincorporated Charleston County has 27 repetitive loss properties. A thorough review of the specific underlying causes of the repetitive loss properties has been completed, indicating that the majority of properties all had a similar issue- they were equipped with a very poor drainage system surrounding each property. In an effort to increase awareness and work towards reducing this issue, drainage improvement plans have been included in the 2017-2018 *Charleston Regional Hazard Mitigation Plan*. In addition to the drainage improvement projects, individualized outreach continues to take place for these properties to inform residents, affected citizens and/or businesses of the improvement plans in effect to reduce the drainage issues affecting their properties. Maps 1 below identify the locations of repetitive loss properties and Map 2 is a heat map identifying the concentration areas where repetitive loss occurs.

Map 1: Repetitive Loss Map



Map 2: Repetitive Loss Property “Heat Map”



Target Audiences

Based on discussion and agreement from the members of the Hazard Mitigation & Public Information Plan Committee the target audiences and outreach methods are based on providing the most effective means in disseminating the topics and messages established by the Committee with the goal of reaching and informing the public to the greatest extent possible. The target audiences established by the Committee include the following:

- General Public
- Residences and businesses in the Special Flood Hazard Areas (SFHA)
- Newcomers to the area/ tourists
- Real Estate and Insurance Agents/ Real Estate Buyers & Sellers
- Repetitive Loss Area Residents
- Non-English speaking community
- Design Professionals/ Contractors
- Others as determined by the Committee

Outreach Methods

The Committee also established outreach methods that they found to be most effective. The methods include the involvement of local government but other outreach methods will be completed by non-government stakeholders of the Committee. The established outreach methods include the following:

- Mailers and/ or email
- Expos
- Presentations to specific groups (homeowners' associations, construction associations, school programs)
- Printed Materials (brochures, flyers, booklets, etc.) in public places, expos and presentations
- Social media (Facebook, Twitter, YouTube, Web)
- Charleston County Website
- Newspaper, radio, TV, phonebook ads
- Billboards
- School fairs, conferences and/or demonstration projects
- Training for general public (i.e., CERT and Neighborhood Association Officers)

Existing Public Information Efforts

The Public Information Plan within the *Charleston Regional Hazard Mitigation Plan* has become a roadmap for all community information systems for Project Impact programs. Charleston County became a Project Impact community in 1988 and has set the stage for establishing effective public information methods. Table 7 below describes existing public information activities occurring within Charleston County by different departments, jurisdictions, agencies and businesses.

Table 7: On-Going Public Information Activities

Activity	Type of Organization	Funding Mechanism
Mailing hazard brochures to all residents	Local Jurisdictions, FEMA, SC DNR, US ACOE	General Fund Grant Funding
Providing literature to citizens at offices/places of business	Local Jurisdictions, FEMA, SC DNR, US ACOE, USGS, American Red Cross, S. C. Sea Grant Consortium, DHEC OCRM, media providers	General Fund Grant Funding Donations
Television Advertisements	FEMA, media providers, Corporate sponsors	General Fund Grant Funding Donations
Participating in Hazard Awareness Weeks	Local Jurisdictions, American Red Cross, Corporate sponsors, US ACOE; National Weather Service	General Fund
Newspaper advertisements	Local Jurisdictions, FEMA, American Red Cross, SC DOT, DHEC OCRM	General Fund
Providing speakers for schools/groups	Local Jurisdictions, US ACOE, SC DNR, DHEC OCRM, FEMA, American Red Cross, SC DOT, S.C. Sea Grant Consortium, USGS; National Weather Service	General Fund Grant Funding
Mailing hazard brochures to floodplain residents	Local Jurisdictions	General Fund
Participating in hazard-related/product expos	Local Jurisdictions, American Red Cross, media providers, National Weather Service	General Fund Grant Funding
Providing courses for school children re: hazard preparedness	FEMA, Earthquake Education Center, State Fire Marshal, SC EPD, Local Jurisdictions,	General Fund
Providing hazard-related information on internet web pages	Local Jurisdictions, FEMA, NOAA NWS, SC DNR, US ACOE, USGS, American Red Cross, SC DOT, Sea Grant Consortium, media providers	General Fund
Providing post-disaster educational services, such as but not limited to, literature distribution, media announcements, speaking to groups of residents, etc.	American Red Cross, Local Jurisdictions, FEMA, ACOE, SC DOT, media providers	General Fund Grant Funding

Topics and Messages

The Hazard Mitigation & Public Information Plan Committee has established ten topics with ten or more messages each. These topics and messages were chosen and formulated based on the region’s vulnerabilities to hurricanes, tropical storms and associated flooding. Below is a listing of each topic and associated messages:

1. Know Your Flood Hazard

1. Determine if your property is in the Special Flood Hazard Area (SFHA) Zone “A” “AE” or “VE”. Contact your local government for a flood zone determination.
2. Check for historical flooding records in your area with your local government or media outlets.
3. Check for existing elevation certificates with your local government or insurance agent.

4. If you need an elevation certificate contact a local land surveyor.
5. Check the depth of the Base Flood Elevation (BFE) above or below building's first floor or above existing grade on a vacant parcel.
6. Get a FIRMette of your location (www.msc.fema.gov) or look at a flood map at your local government offices to determine proximity to a flood hazard area.
7. Check to see if your property is in an area subject to wave action ("V" Zone) or coastal erosion. Contact your local government for assistance.
8. Know the proximity of property to evacuation routes.
9. Determine if property is protected by man-made structures such as levees or dams.
10. Check for localized drainage issues that could result in flooding in your neighborhood.

2. Insure Property For Your Flood Hazard

1. Flood insurance is available through the National Flood Insurance Program; contact your insurance agent for details.
2. All developed properties within the designated flood hazard area should have flood insurance for buildings and contents. Federally backed mortgages must have flood insurance.
3. Most homeowner's insurance policies do not cover flood damage so you will likely need a separate policy.
4. Renters contents are not covered by the building owner's insurance and renters should purchase contents only flood insurance.
5. Property owners should inquire about any discounts that may apply in purchasing flood insurance.
6. If your flood insurance premium increases significantly, make sure your agent is using the correct information to rate your policy.
7. Know when building(s) were constructed, as 'grandfathering' may apply in reducing flood insurance costs.
8. Do not procrastinate; a 30-day waiting is typically required for flood insurance to take effect.
9. Ask questions from insurance agents concerning specific policy information.
10. Research building permit records for history of property improvements.

3. Protect People from the Hazard

1. Be aware of roadways susceptible to flooding during heavy rainfall events, do not drive through flooded areas, flowing or standing water.
2. Pay attention to media (TV, radio, internet) for emergency warnings and instructions.
3. Select an out-of-town contact for family members' in the event local telephone service is disrupted.
4. Designate a location/place where family or people you are responsible for can rendezvous once an evacuation order is issued.
5. Get an evacuation route map for each vehicle and evacuate early if a flood threat is pending.
6. Avoid contact with downed power lines.
7. Check government web sites (fema.gov, charlestoncounty.org) for flood safety information.
8. Stay away from areas subject to flooding during heavy rainfall events – do not wade through standing water.
9. Avoid contact of flood waters as this water may contain toxic materials or venomous animals or insects.
10. Get a weather radio to obtain flood-related weather reports at all times.

4. Protect Your Property from the Hazard

1. Shut off gas service to a building if a flood is imminent.
2. Disconnect electricity at the main disconnect if a flood is imminent.
3. Replace utility machinery above the required flood elevation.
4. Elevate the lowest habitable floor area above the required flood elevation.
5. Landscape in a hazard resistant manner.
6. Make plans for evacuating pets in the event of a flood, as most shelters do not accept pets.
7. Install backflow prevention on plumbing systems susceptible to flooding.
8. Sandbag areas subject to flooding.
9. Provide hurricane protection against wind borne debris for windows and doors.
10. Move valuables to the highest level of a building or evacuate with these when a flood is imminent.
11. Use flood resistant materials in areas below the expected flood elevation to minimize damages.

5. Build Smart

1. Hire design professionals who are familiar with local hazards in preparing construction plans.
2. Consult with your local building department concerning permit requirements.
3. Place buildings in areas with lower flood potential.
4. Obtain permits before you build – permits are required even if the property owner does the work himself/herself.
5. Only hire licensed contractors.
6. Ensure that building inspections are properly arranged and completed.
7. If you are renovating a building, determine if you are performing a substantial improvement (\geq 50%).
8. Check the local flood ordinance for construction requirements.
9. Minimize the use of structural fill in constructing buildings.
10. Obtain a firm written quote from the contractor detailing exact work to be performed; the exact cost and schedule of start and completion of project.

6. Protect Natural Floodplain Functions

1. Protect wildlife habitat areas.
2. Protect dunes as these moderate flooding and erosion.
3. Preserve wetlands – they clean the water, protect us from flooding and provide wildlife habitat.
4. Do not dump anything into the storm drainage system as these discharge into our coastal waters.
5. Every property should plant only native plants, particularly along water bodies.
6. Obtain permission from the SC DHEC before doing any work near a wetland or dune area.
7. Minimize clearing near wetlands and/or water bodies.
8. Establish buffers and set buildings back from wetlands and/or water bodies.
9. Maintain on-site wastewater treatment systems, such as pumping out of septic tanks, every 3 to 5 years.
10. Don't dump boat sewage into waterways. Use pump-out stations to protect water quality and wildlife habitats.

7. Hurricane Preparedness/Safety

1. Know your evacuation route; obtain published maps.
2. Attach plywood or install commercially manufactured hurricane shutters over windows and patio doors.

3. Evacuate early and follow established evacuation routes when there is a potential hurricane threat.
4. Move valuables and furniture to higher areas of the dwelling.
5. Avoid low lying areas. Seek shelter in the highest areas.
6. Avoid driving if dangerous flooding conditions are imminent.
7. Stay alert to weather advisories and local media broadcast updates.
8. Monitor the track of all hurricanes.
9. Download a copy of the Charleston County Hurricane Guide at www.charlestoncounty.org
10. Make sure you have an emergency kit on-hand and that it is properly supplied.
11. Do not leave anything outside that is not property anchored. Store items in a garage or shed on an elevated area if possible.

8. General Hazard Preparedness

1. Inventory and photograph your home and business contents and put important papers and insurance policies in a safe place.
2. Have an emergency kit on hand. Check government web sites (fema.gov, American Red Cross, charlestoncounty.org) for items to include.
3. Listen to emergency broadcasts from local media outlets as to when it is safe to return or contact local government authorities prior to returning to property after the storm has passed.
4. Have an emergency generator. Make certain it is properly installed.
5. Have contact information available to properly reconnect utility services (electrical and gas) and licensed contractors you may need if you have damages.
6. Have property inspected determine the extent of damages.
7. Have insurance agent contact information readily available to file a claim. Understand how to file a claim.
8. If you smell gas upon your return immediately contact your utility company or emergency personnel. If your property has been flooded or otherwise damaged, do not turn on any electrical switches and/or appliances and do not occupy the dwelling until you are told it is safe to do so.
9. Annually inspect home or business for ordinary objects that may pose a hazard during a flood event and have these objects properly secured.
10. Post a note telling others when you left and your destination.
11. Consider volunteering to help flood victims.
12. Develop a disaster plan.

9. Flood Education

1. Include flooding topics as part of school curriculum in science or social studies classes.
2. Gather information on preparing for floods at expos and other public events.
3. Schedule presentations for your neighborhood association or organization to which you belong on hazard event preparations.
4. Attend business community planning workshops to learn how to protect your business from hazard events.
5. Educate youth on hazard events and environmental issues.
6. Listen to the media regarding hurricane season and proper preparation.
7. Attend training seminars for personnel concerning regulatory changes, construction methods, construction materials, etc.
8. Encourage youth to research on hazard related topics and share what they learn with others.
9. Look at social media sites (Facebook, You Tube) for information on hazard preparations and environmental protection.
10. Search the internet for hazard related information.

10. Site Drainage

1. Remove standing water with portable sump pump once flood waters have receded.
2. Remove wet insulation and drywall.
3. Allow crawl space to dry and then check for mold, mildew and rot.
4. If crawl space is damaged make needed repairs but obtain permits first.
5. Check for damage to electrical components and utility lines (gas and electric) and contact licensed trade person to complete repairs - obtain permits first.
6. Maintain floor level of crawl space above adjacent grade to reduce water getting into the crawl space.
7. Use flood resistant materials in crawl space areas.
8. Do not store valuables in crawl space areas.
9. Make sure your crawl space is properly vented or engineered to reduce moisture related damage.
10. Grade site to provide runoff from crawl space and building.

Outreach Projects

Table 8 below represents proposed and continuing outreach projects established by the Hazard Mitigation & Public Information Plan Committee. These outreach projects serve all different audiences and address multiple topics and messages. When the Committee meets, they determine if projects will be continued depending upon their effectiveness. Some outreach projects are completed by Charleston County staff while other outreach projects are offered by stakeholders. The topics cover many different CRS activities including: Activity 340, Activity 350, Activity 370, Activity 510, Activity 540 and Activity 610.

Table 8: Outreach Projects

Topics (please see PPI document pages 16-20 for list of messages for each topic):		Target Audiences (PPI document pages 14-15):					
1. Know your flood hazard. 2. Insure property for your flood hazard. 3. Protect people from the hazard. 4. Protect your property from the hazard. 5. Build smart. 6. Protect natural floodplain functions. 7. Hurricane preparedness/safety. 8. General hazard preparedness. 9. Flood education. 10. Site drainage.		1. General Public 2. Residents and businesses in the Special Flood Hazard Areas (SFHA) 3. Newcomers to the area/ tourists 4. Real Estate and Insurance Agents/ Real Estate Buyers & Sellers 5. Repetitive Loss Area Residents 6. Non-English speaking community 7. Design Professionals/ Contractors 8. Others as determined by the Committee					
CRS #1	Project Impact	CRS #2	CRS #4	CRS #3	CRS #5	CRS #6	CRS #7
OP#	PPI PROJECT INFORMATION/ DESCRIPTION	TOPIC # (refer to legend)	TARGET AUDIENCE (refer to legend)	OUTCOME	ASSIGNMENT	SCHEDULE/ DISTRIBUTION	STAKEHOLDER
OP# 1	Charleston County HMP Committee Meetings (7/25/12, 8/7/13, 7/8/14, 9/24/14, 9/23/15, 8/31/16, 9/28/16, 6/13/17; scheduled this year for 7/18/17 and 8/22/17). Annual meetings advertised in the paper and open to the public. Committee and public have the opportunity to weigh in on outreach activities and messages that the County will portray in the Hazard Mitigation Plan and outreach activities.	1 - 10	1, 4, 8 (Hazard Mitigation Committee members)	A comprehensive, annually updated regional hazard mitigation plan	Carl Simmons and Building Inspection Services staff members; HMP and PPI Committee members and the public	Annual meetings, 2-3 times per year, advertised and open to the public.	Charleston County
OP# 2	Monthly: Asst. Director Jim Houser Speaks with Tri-County Home Builders Association, 7/17/13, 8/21/13, 9/18/13, 10/16/13, 11/20/14, 1/15/14, 2/19/14, 3/9/14, 4/16/14, 5/21/14, 6/18/14, 1/21/15, 2/18/15, 3/18/15, 4/15/15, 5/20/15, 6/17/15, 7/15/15, 8/19/15, 9/16/15, 10/14/15, 1/20/16, 2/17/16, 4/20/16, 5/18/16, 8/17/16, 10/19/16, 11/16/16, 1/18/17, 2/15/17, 3/15/17, 4/19/17, 5/17/17, 6/21/17	1 - 10	7	Increased compliance with all building codes and regulations; educate professional on mitigation techniques.	Jim Houser, Assistant Director or Carl Simmons, Director of Building Inspection Services	Regular monthly meetings on the 3rd Wednesday of every month starting in Sept. 2013 to present.	Tri-County Home Builders Association
OP#3	Charleston County Press Release: Charleston County Launches New Emergency Notification Program for Citizens. The updated system will allow the County to reach citizens with location specific information at multiple addresses and across multiple platforms 11/18/14	1, 3-4, 7-8	1, 3	Notify all citizens of Charleston County of warnings through home and cell phones, text messages, emails and fax; increase awareness of hazards and staying safe.	Charleston County Emergency Management Department	Launched Nov. 2014, continued and website still active, maintained and operating daily.	Charleston County
OP# 4	Annual MUSC Hurricane Awareness Day 5/23/12, 5/22/13, 5/20/14, 5/28/2015, 5/26/16 and 5/31/17). Building Inspection Services staff set up a booth at the expo and informed citizens about hazards and provided brochures conveying all messages (brochures provided: OP#12, 13, 14, 15, 16, 19/19a, 26, 33; FRP # 3, 9, 10, 11, 14, 15, 16, 17; CPI #4, 6, 7, 8, 12, 13)	1 - 10	1, 2, 3, 4, 5, 6, 7	Increase understanding and information to public on hazards that affect our area and ways to prepare their homes and themselves for hazards.	Building Inspection Services Staff	Participate in the expo annually beginning 5/23/12, 5/22/13, 5/20/14, 5/28/15, 5/26/16, 5/31/17	MUSC
OP# 5	"Living In a Flood Zone" Roundtable Discussion with Charleston County Council Member Anna Johnson 1/22/14, 10/28/15, 3/11/16, 5/24/17. Presentation, public meeting, and one-on-one information session. Annual participation (brochures provided: OP# 12, 13, 14, 15, 16, 19/19a, 26, 33; FRP 10, 11, 13, 14; CPI #4, 6, 7, 8, 9, 12, 13)	1 - 5, 9, 10	1, 2, 3, 5, 7	Increased number of map info inquiries from property owners and actions taken by public to mitigate flood hazards	Council Member Anna Johnson and Building Inspection Services staff	Public meeting and information session held on 1/22/2014, 10/28/15, 3/11/16, 5/24/17	Charleston County Council
OP# 6	Building Inspection Services staff participated at the County Square at the Black Expo annually where they talked to residents about mitigating risks to their property and protecting themselves in the event of hazards - 3/15/14, 3/15/15, 3/12/16, 3/11/17. (Brochures provided: OP# 12, 13, 14, 16, 17, 18, 19/19a, 20, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33; FRP # 3, 8, 9, 12, 17, 18; CPI #4, 5, 6, 7, 8, 12)	1 - 10	1, 2, 3, 4, 5, 8 (African American community)	Increased understanding of flood risk and ways to mitigate it by the entire community.	Building Inspection Services staff	Annually attended expo since 2014. 3/15/14, 3/15/15, 3/12/16, 3/11/17	Black Expo
OP#7	Project IMPACT Mini-Grant (STOMP award)- awards given to teachers/ sponsors seeking to fund a special lesson on hazard mitigation and/or environmental protection. Annual program since 2015; teachers are required to submit details of project and photographs. Award dates: 2/4/2015, 2/10/16, 1/6/17	3, 8, 9	8 (other) Teachers and other educational-type leaders and students or children under the age of 18	Support local schools/ programs in informing children about hazards and mitigation efforts that can be taken.	Building Inspection Services Staff	Annually awarded mid-school year for project completion by the end of the school year. Award dates: 2/4/15, 2/10/16, 1/6/17	Project Impact
OP# 8	Annual Rain Barrel Sale and advertisement to promote harvesting rainwater, reducing runoff and promoting water quality protection. Started May 2014 and continued annually.	6, 10	1	Increased use of rain barrels and promote water quality protection.	Charleston County Stormwater Management department	Annual program advertised to the public, started May 2014 and continues in May of every year.	Charleston County
OP #9	Annual: Community Disaster Awareness Day - participated in annually to educate residents of Charleston County area on the hazards in the area and how to prepare for them. (Brochures provided: OP #12, 13, 14, 15, 16, 17, 19, 23, 24, 25, 26, 27, 31, 32, 33; CPI #4, 5, 8, 10; FRP #8, 9, 12, 13, 14, 16)	1-4, 7-9	1, 2, 4, 5	Increase understanding and information to public on hazards that affect our area and ways to prepare their homes and themselves for hazards.	Building Inspection Services Staff	6/22/10, 6/12/14, 6/11/15, 5/26/16, 6/15/17	Project Impact
OP# 10	Annual: Summer Countywide Hurricane Billboards on Interstates and Major Roads	1, 3, 4, 7 - 10	1	Increased Public Awareness of Hurricanes	Charleston County Emergency Management Department	2014, 2015, 2016, 2017	Project Impact
OP# 11	Annual Expo: Lowcountry CERT Hurricane Expo 6/1/13, 5/18/14, 6/1/14, 5/9/15, 6/4/16, 5/7/17. Building Inspection Services staff set up a booth at the expo, answer questions from the public and handout 10+ brochures informing of hazards and ways to protect their property and themselves. (Brochures provided: OP# 12, 13, 14, 15, 16, 17, 19/19a, 20, 21, 22, 23, 24, 27, 30, 31, 32, 33; FRP # 3, 9, 10, 11, 14, 15, 16, 17; CPI # 4, 6, 7, 12, 13)	1 - 10	1, 2, 3, 4, 5, 6, 7	Increased understanding of flood and hurricane risk and ways to mitigate it by the entire community	Building Inspection Services Staff	Annually attended expo 6/1/13, 6/1/14, 6/4/16	Lowcountry CERT; Lowe's
OP# 12	County-wide mailer/ brochure: "Flooding: The Risk Is Real. Are You Prepared?"	1 - 10	1, 2, 3, 4, 5, 7	Increased understanding of flood risks and ways to mitigate.	Building Inspection Services Staff	Available year-round; recently updated to include more messages and topics. Available in office, at libraries and taken to Expos attended. Mailed out to ALL flood zone residents and provided to all jurisdictions to reproduce and make available in their offices.	Project Impact
OP# 13	Brochure: "A Homeowner's Guide to Flood Protection"	1-5, 9-10	1, 2, 3, 5	Improved public knowledge about the importance of obtaining permits and hiring licensed contractors.	Building Inspection Services Staff	Available year-round; recently updated to include more messages and topics. This brochure is available in office, at libraries and taken to Expos attended.	Project Impact
OP# 14	Brochure: "Safeguard Your Personal Property from Flooding"	1, 3, 4	1	Improved knowledge about how to protect personal valuables from flooding by the general public	Building Inspection Services Staff	Available year-round; recently updated to include more messages and topics. This brochure is available in office, at libraries and taken to Expos attended.	Project Impact
OP# 15	Brochure: "If your home or business has been flooded"	1, 2, 4, 5, 6	1, 2, 3, 5, 7	Improved knowledge about what to do if your home or business is flooded	Building Inspection Services Staff	Available year-round; this brochure is available in offices and taken to Expos attended.	FEMA
OP# 16	Brochure: "NFIP Nothing Can Dampen the Joy of Home Ownership...."	1, 2, 4, 6, 9	1, 2, 3, 4, 5, 7	Increased number of flood insurance policies	Building Inspection Services Staff	Available year-round; this brochure is available in offices and taken to Expos attended.	FEMA
OP# 17	Brochure: "Stay Safe: A Guide for Visitors to Charleston"	1, 3, 7	1, 2, 3, 5, 7	Increased number of visitors/newcomers educated about local hazards and how to stay safe	Building Inspection Services Staff	Available year-round; recently updated to include more messages and topics. This brochure is available in office, at libraries and taken to Expos attended.	Project Impact and Charleston Area Convention and Visitors Bureau
OP# 18	Brochure: "Increased Cost of Compliance Coverage"	1, 2, 5	1	Improved public knowledge about the cost of compliance coverage.	Building Inspection Services Staff	Available year-round; this brochure is available in offices and taken to Expos attended.	FEMA

OP# 19	Brochure: "Flood Preparation and Safety"	1 - 4, 9	1	Increased knowledge of flood hazards and ways to mitigate them.	Building Inspection Services Staff	Available year-round; this brochure is available in offices and taken to Expos attended.	FEMA
OP# 19a	Brochure: "Flood Preparation and Safety - Spanish"	1 - 4, 9	1, 6	Increased knowledge of flood hazards and ways to mitigate them (Spanish speaking).	Building Inspection Services Staff	Available year-round; this brochure is available in offices and taken to Expos attended.	FEMA
OP# 20	Brochure: "Prepare for emergencies now: Information for People with Disabilities"	1, 3, 4, 8	1, 8 (people with disabilities and those that care for them)	Increased knowledge about how people with disabilities are affected by hazards, how they can mitigate them, and how to protect themselves.	Building Inspection Services Staff	Available year-round; this brochure is available in offices and taken to Expos attended.	FEMA/ Red Cross
OP# 21	Brochure: "NOAA Extreme Weather Information Sheet"	1, 3, 8	1	Improved disaster and inclement weather preparedness by the general public.	Building Inspection Services Staff	Available year-round; this brochure is available in offices and taken to Expos attended.	National Coastal Development Center
OP# 22	Brochure: "Marine Vessel Cleaning and Maintenance"	8	1, 8 (boat owners)	Reduction of water and sediment-related pollution in the port environment.	Building Inspection Services Staff	Available year-round; this brochure is available in offices and taken to Expos attended.	Project Impact/ United States Environmental Protection Department
OP# 23	Brochure: "Protect your Windows and Doors from Winaborne Debris"	1, 2, 7	1	Increased public knowledge of how to protect doors and windows in the event of a hurricane/tropical storm.	Building Inspection Services Staff	Available year-round; recently updated to include more messages and topics. This brochure is available in offices and taken to Expos attended.	Project Impact
OP# 24	Brochure: "Hazard Resistant Landscaping"	1, 4, 6, 7	1	Decreased landscape clippings before hurricanes/storms and increased usage of landscaping techniques that help prevent flooding.	Building Inspection Services Staff	Available year-round; recently updated to include more messages and topics. This brochure is available in office and taken to Expos attended.	Project Impact/ Clemson Extension Services
OP# 25	Brochure: "Earthquakes: Are You Ready?"	1, 2 - 4, 8	1	Increased knowledge of earthquakes and how to stay safe during one.	Building Inspection Services Staff	Available year-round; recently updated to include more messages and topics. This brochure is available in office and taken to Expos attended.	Project Impact/ Charleston Southern University Earthquake Education Center
OP# 26	Brochure: "Just Let Rain Go Down The Drain (No Dumping)"	1, 7, 10	1	Increased knowledge of the importance of keeping drainage channels clear and greater compliance.	Building Inspection Services Staff	This brochure is available in offices and taken to Expos attended.	Charleston County Solid Waste and South Carolina Department of Health and Environmental Control (SCDHEC)
OP# 27	Brochure: "South Carolina Hurricane Guide"	1 - 5, 7 - 9	1	Increased knowledge of hurricanes and protection recommendations.	Building Inspection Services Staff	This brochure is available in offices and taken to Expos attended. Updated annually.	South Carolina Emergency Operations Division/ SCE&G
OP# 28	Brochure: "South Carolina Earthquake Guide"	1 - 5, 7, 8	1	Increased knowledge of earthquakes and how to stay safe during one.	Building Inspection Services Staff	This brochure is available in offices and taken to Expos attended.	South Carolina Emergency Management
OP# 29	Brochure: "The Charleston Earthquake Tour"	3-5, 8	1	Increased knowledge of earthquakes and how to stay safe during one; history and lesson learned during previous earthquakes explained.	Building Inspection Services Staff	Available year-round; recently updated to include more messages and topics. This brochure is available in office and taken to Expos attended.	College of Charleston
OP#30	Brochure: "A Boat Owner's Guide to Storm Preparation"	3, 4, 7, 8	1, 8 (boat owners)	Improved knowledge about how to prepare boats for a storm.	Building Inspection Services Staff	Available year-round; recently updated to include more messages and topics. This brochure is available in offices and taken to Expos attended.	Project Impact
OP#31	Brochure: "Tornadoes: Are You Ready?"	3, 4, 5, 8	1	Increase knowledge about tornadoes and how to stay safe during one.	Building Inspection Services Staff	Available year-round; recently updated to include more messages and topics. This brochure is available in office and taken to Expos attended.	Project Impact
OP#32	Brochure: "Hurricanes & Tropical Storms: Are You Ready?"	1-5, 7-8	1, 2, 3, 5	Increase knowledge of hurricanes and tropical storms and how to stay safe during one.	Building Inspection Services Staff	Available year-round; recently updated to include more messages and topics. This brochure is available in office and taken to Expos attended.	Project Impact
OP#33	Brochure: "Shopping for Your Dream Home? Know & Prepare for Flood Risk Before You Buy"	1-5, 9	1, 2, 3, 5	Increase knowledge of flood insurance and flood risks for potential homebuyers and how to protect their homes after purchase.	Building Inspection Services Staff	Available year-round; recently updated to include more messages and topics. This brochure is available in office and taken to Expos attended.	Project Impact
OP#34	Brochure: "Your Family Disaster Supplies Kit"	1-5, 7-9	1, 2, 3, 5	Increase awareness about supplies that people should have on hand in the event of a disaster.	Building Inspection Services Staff	Available year-round; this brochure is available in offices and taken to Expos attended.	FEMA/ Red Cross
OP#35	Brochure: "Preparing your Pets for Emergencies Makes Sense"	1, 3-4, 7-9	1, 3	Increase knowledge about protecting your pets during an event or in an evacuation.	Building Inspection Services Staff	Available year-round; this brochure is available in offices and taken to Expos attended.	FEMA
OP#36	Brochure: "Safety First! Disaster Preparedness"	1-5, 7-9	1, 2, 3, 5	Inform residents about how to prepare homes for disasters and staying safe during a storm.	Building Inspection Services Staff	Available year-round; this brochure is available in offices and taken to Expos attended.	International Codes Council ICC
OP#37	Guide Book: "Floodplain Management in South Carolina Quick Guide"	1-10	1, 2, 3, 4, 5, 6, 7, 8 (local area building, zoning and emergency government departments)	Inform residents of the objectives of floodplain management, purchase of flood insurance, regulations affecting building in a flood zone.	Building Inspection Services Staff	Available year-round; this brochure is available in offices and taken to Expos attended.	SC Department of Natural Resources
OP#38	Brochure: "Floody the Flood Dog (children's flood word search)"	1, 3, 7-9	1, 3, 8 (children of the area)	Inform children about flood risks and staying safe in an event.	Building Inspection Services Staff	Available year-round; recently updated to include more messages and topics. This brochure is available in office, at libraries and taken to Expos attended. Also distributed to school district camp locations, reaching 330 students.	Project Impact

OP #39	Annual: Charleston Home and Remodel Expo ; 2017 was first year of the expo; will attend in following years	4, 5, 7-10	1, 2, 3, 4, 5, 6, 7	Inform public about mitigation measures that can be taken during renovations; inform about flood insurance, property protection and staying safe.	Building Inspection Services Staff	Plan to attend Expo annually, this was the first year 3/3/17-3/5/17	Project Impact
OP #40	Preliminary FEMA Flood Map Presentations and Open Houses ; conducted throughout the County, North Charleston, City of Charleston, Mt. Pleasant, Johns Island (City of Chas and Unincorp), James Island (City of Chas, Unincorp and Town of James Island); Town of Seabrook, Town of Kiawah	1, 2, 6	1-5, 7	Inform public of new flood designation, review flood zones and hazards, purchase of flood insurance, changes in flood zones, when maps will go into effect; how new data was collected.	Building Inspection Services Staff	3/20/17, 3/21/17, 3/22/17, 5/24/17, 5/30/17 (and continuing upon request by different jurisdictions)	FEMA, Project Impact
OP #41	Brochure: "Call 811 Before You Dig. It's the Law."	3, 4, 5, 8	1, 2, 6, 7	Inform public and contractors on the safety of utility lines and digging when building a home. Double sided; English and Spanish language.	Building Inspection Services Staff	Available year round; this brochure is available in offices and taken to Expos attended. Recently updated.	Project Impact
OP #42	Brochure: "Standby Generator Safety"	3, 4, 7	1, 7	Inform the public on how to safely operate a generator	Building Inspection Services Staff	Available year-round; this brochure is available in offices and taken to Expos attended.	Project Impact, SCE&G
OP #43	Brochure: "Benefits of Building Permits"	4, 5	1, 4, 7	Inform public on what building permits are used for, what requires building permits and the benefits behind them	Building Inspection Services Staff	Available year-round; this brochure is available in offices and taken to Expos attended.	International Codes Council ICC
OP #44	Brochure: "Building Green - Living Better"	1, 4, 5, 6, 8	1-5, 7	Inform public on the benefits of building green, living with your environment and how to design a home	Building Inspection Services Staff	Available year-round; this brochure is available in offices and taken to Expos attended.	International Codes Council ICC
OP #45	Brochure: "Facts About Open Burning"	3, 6, 8	1	Inform public on the hazards of open burning and other ways to reduce waste	Building Inspection Services Staff	Available year-round; this brochure is available in offices and taken to Expos attended.	Project Impact
OP #46	Brochure: "Recreational Boater Education Booklet"	6, 8	1, 8 (fisherman and boaters)	Inform the public on ways to reduce marine debris, minimize sewage impact, and tips for sustainable fishing, boat maintenance and boat fueling	Building Inspection Services Staff	Available year-round; this brochure is available in offices and taken to Expos attended.	Project Impact
OP #47	Brochure: "Help Mow Down Pollution!"	6, 8	1, 4	Inform the public of the pollution from gas powered mowers and offers alternatives	Building Inspection Services Staff	Available year-round; this brochure is available in offices and taken to Expos attended.	Project Impact
OP #48a	Brochure display in upstairs Building Inspection Services Administrative office (Brochures provided: OP #12-38, 41-47)	1-10	1-8	Inform public of all hazards in area, flood insurance, property protection, building codes, safety, contractors, natural benefits.	Building Inspection Services Staff	Available year-round	FEMA, Project Impact, SC DNR, NFIP, ICC, SC DHEC
OP #48b	Brochure display in downstairs Building Inspection Services Inspector and Plan Review office (Brochures provided: OP #12-38, 41-47)	1-10	1-8	Inform public of all hazards in area, flood insurance, property protection, building codes, safety, contractors, natural benefits.	Building Inspection Services Staff	Available year-round	FEMA, Project Impact, SC DNR, NFIP, ICC, SC DHEC
OP #49	Brochure display in local jurisdiction offices: Awendaw (Brochures provided: OP #12-14, 17, 23, 25, 33)	1-10	1-8	Inform public of all hazards in area, flood insurance, property protection, building codes, safety, contractors, natural benefits.	Building Inspection Services Staff	Available year-round	FEMA, Project Impact, SC DNR, NFIP, ICC, SC DHEC
OP #50	Brochure display in local jurisdiction offices: Seabrook (Brochures provided: OP #12, 131 23, 25, 33)	1-10	1-8	Inform public of all hazards in area, flood insurance, property protection, building codes, safety, contractors, natural benefits.	Building Inspection Services Staff	Available year-round	FEMA, Project Impact, SC DNR, NFIP, ICC, SC DHEC
OP #51	Brochure display in local jurisdiction offices: Ravenel (Brochures provided: OP #12-14, 17, 21, 23, 25, 33, 41, 42)	1-10	1-8	Inform public of all hazards in area, flood insurance, property protection, building codes, safety, contractors, natural benefits.	Building Inspection Services Staff	Available year-round	FEMA, Project Impact, SC DNR, NFIP, ICC, SC DHEC

OP#26 is a brochure titled “Just Let the Rain Go Down.... The Drain”. This brochure addresses drainage system maintenance and the regulations that prohibit dumping (CRS Activity 540). See attachment below of the brochure.

Attachment: OP#26 “Just Let the Rain Go Down.... The Drain”

Other Ways To Help

PROJECT IMPACT is a program working to reduce the severity of and the costs associated with flooding and other hazardous events. Through proactive prevention, partnerships between local governments, businesses and residents help to make this happen by developing projects to assist communities preparing for these hazard events.

The *Project Impact Drainage Awareness Program* is one way YOU can directly reduce the likelihood of flooding in your neighborhood and protect your waterways from pollution. Elements of this program include:

- Storm Drain Marker Project** - contact the Charleston Area Project Impact office at (843) 720-6940 or SCDHEC Trident District Office at (843) 740-1590 for information and materials to mark storm drains to alert people not to use them as dumps.
- Reporting Abuses** - use the Litter Watch Hotline, (843) 720-7111, to report littering or dumping in drainage ways, or call the local DHEC office, (843) 740-1590 to report dumping into storm drains. Both of these activities are illegal and offenders can be prosecuted and fined! Or, organize and participate in litter watch and storm drain monitoring programs.

Learn More About It

Education - representatives from Project Impact, SCDHEC and the Charleston County Litter Enforcement staff are available to speak to groups or neighborhood associations. Give them a call to learn more about these programs.


Involvement - get involved in your neighborhood and the community. Set a good example by letting just the rain go down the storm drain

Learn more about it. The EPA website, www.epa.gov is full of information on Nonpoint Source (NPS) Pollution. And, check www.scdhec.net for resources on water quality, solid waste and litter.


Don't Dump Here...



It Ends Up Here!






Paid for with SCDHEC Grant Funding to Charleston County Solid Waste.



*Designed by Charleston County Solid Waste on recycled paper, of course!
Special thanks to Charlynn J.M. Knight from Knight Gallery (843) 723-0140.*

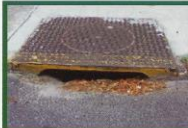
Just Let Rain Go Down The Drain...

CHARLESTON COUNTY SOLID WASTE

13 Rosemary Street
Charleston, SC 29403-3844
(843) 720-7111
www.charlestoncountysc.org


What's A Storm Drain?



It's the grate or opening next to the curb or sidewalk in to which all the water drains after a storm. In some suburban areas or rural settings, the storm drain system may include open ditches that channel water into waterways, creeks and rivers.


Where Do They Go?

The water entering these systems flows to a body of water such as a river, lake or harbor, or even our beautiful marshes. The storm water is not treated or screened in any way before it is released into the body of water. So, whatever goes "down the storm drain" goes directly into Lowcountry waters.




So What's the Problem?

Sometimes storm drains and ditches are carelessly used as dumps or sewers. When we put our trash into our storm drains, we can clog up the drainage system. The next time it rains the water has no place to go, causing flooding of our roads, neighborhoods and homes. Equally serious is the pollution caused by pouring oil, paint or other liquid wastes into the storm drains. Used oil from a single oil change can pollute up to one million gallons of fresh water.



Is This Really A Bad Thing?

YES! The Lowcountry already is affected by tidal influences that can slow storm water drainage. Clogging up the system with leaves, yard waste or litter can lead to serious flooding and erosion. Storm drain cleaning and improvement projects are expensive. Pollution impacts the numbers and health of fish and wildlife, and causes loss of wildlife habitat. Toxins, bacteria and viruses from illegal dumping into storm water can lead to health risks caused by eating contaminated fish or swimming in contaminated waters. Fertilizers and pet wastes getting into storm water change the nutrient levels in our waterways, which can lead to the introduction of invasive species of plants or insects. Any degree of system abuse leads to a decline in quality of life and water, and harm to the ecosystem.



What's The Solution?

- Dispose of used oil at your nearest GOFER (Give Oil For Energy Recovery) collection tank. They're everywhere! Call the Charleston County Recycling Center at (843) 720-7111 for a location nearest you.
- Properly dispose of antifreeze, paints and other household chemicals; **do not** put them in storm drains or ditches. Charleston County residents can take household hazardous materials to the Household Hazardous Materials dropsite at Bees Ferry Landfill, 1344 Bees Ferry Road.
- Clean up spilled brake fluid, oil, grease and antifreeze. **Do not** hose them into the street. An absorbent material like kitty litter soaks up spills, and can be thrown into the trash.
- Keep litter, pet wastes, leaves and debris out of street gutters and storm drains. NEVER sweep yard clippings down the storm drain.
- Clean up after your pets. Pet waste can be bagged and put in your trash, flushed down the toilet (but NOT with kitty litter), or buried at least five inches deep in your garden.
- Apply lawn and garden chemicals sparingly and according to directions. Call the Clemson University Extension Service for advice, (843) 722-5940. Don't apply chemical before a heavy rainfall. Sweep, don't wash, excess off paved surfaces.
- Control soil erosion on your property by planting ground cover and stabilizing erosion-prone areas.
- Water your lawn and garden only when necessary, and then use slow soak methods such as drip irrigation or soaker hoses to reduce runoff.
- Backwashing and draining swimming pools must be done carefully to prevent water pollution and flooding. Keeping the chlorine residual to an almost non-detectable presence prior to discharging is important to protect water quality. Any solid material should be removed prior to discharge.
- Before washing your car, pull it up on the lawn or gravel area to reduce runoff. Use a bucket of water or pistol grip nozzle. The best practice is to go to a commercial car wash, where excess water is properly treated.

Displayed in OP#12, Open Space Preservation (CRS Activity 420) is also an area of great importance to the Charleston community. This area plays host to many beautiful natural habitats,

from the shoreline to marshlands and swamplands to forests. Located within the “Flooding: It Is Real. Are you at Risk?” brochure, natural floodplain conservation is addressed. See attachment below that is available to the public.

Attachment: OP#12 “Flooding: It Is Real. Are you at Risk?”

When Flooding is Imminent

- Begin implementing your emergency plan.
- Remind your family to stay inside and away from all flood waters and downed power lines.
- Listen to local media updates and alerts.
- Move valuables to higher areas.
- Securely anchor or store outdoor furniture.
- Sandbag areas subject to the entry of water.
- If evacuations are ordered, follow instructions, shut off gas and electricity, evacuate promptly, and securely lock your home or business.

During the Flood

- Stay inside. Avoid contact with all flood waters and downed power lines.
- Turn around, don't drown. Never drive through flooded areas or any water.
- Do not wade through any water as it may contain toxic materials or venomous animals or insects.
- Check local media and official websites such as FEMA.gov and CharlestonCounty.org for emergency notifications.
- If your dwelling begins to flood, shut off electricity and gas connections.

After the Flood

- Upon returning from an evacuation, if your building is flooded or otherwise damaged, do not:
 - occupy dwelling until officially notified it is safe.
 - turn on any electrical switches or appliances until you verify that there are no issues or the power company authorizes you to do so.
- If you smell gas, immediately contact your utility company or emergency personnel.
- Contact your insurance agent if you have damage.
- Contact your local jurisdiction for a damage assessment.
 - Remove standing water with a sump pump.
 - Remove wet insulation, drywall, flooring and rugs.
 - Hire contractors only after verifying they are properly licensed.
 - Obtain proper permits for all work.
 - Refer questions or complaints about contractors and permits to the state and/or your local jurisdiction.

Charleston County Building Inspection Services
4045 Bridge View Drive, Suite A311
North Charleston, SC 29405
(843) 202-6930
BuildingServices@CharlestonCounty.org
www.CharlestonCounty.org



FLOODING

The Risk Is Real.

Are You Prepared?

A flood can be devastating.
You don't have to live near
water to be at risk.
The time to prepare is now.



Charleston County Hurricane & Emergency Evacuation Routes

Be Prepared

1. Know Your Flood Hazard

Contact your local jurisdiction to see if your property is in a Special Flood Hazard Area or subject to flooding.

Check historical flooding records in your area with your local government or media outlets.

Know your evacuation routes.

Schedule a site visit by your local jurisdiction to gauge your flood risk and learn flood protection measures.



2. Build Responsibly & Protect Your Property

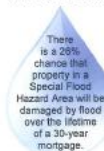
Obtain permits, even if you do the work yourself. Report construction done without permits to your local jurisdiction.

Hire design professionals, who are familiar with local hazards, to prepare construction plans. Verify your contractor is licensed with South Carolina and/or your local jurisdiction.

Set buildings back from water and wetlands. Use flood resistant material. Elevate the lowest habitable floor and place utility machinery per local requirements. Install backflow prevention on plumbing systems susceptible to flooding.

Libraries, government offices, and the internet have extensive information on flood prevention measures.

Federal aid may be available for retrofitting, relocating, or demolishing structures with repetitive flooding. Contact your jurisdiction or Charleston County Building Inspection Services at (843) 202-6930 to learn more.



3. Purchase Flood Insurance

Usually, homeowners insurance does not cover floods. Only flood insurance covers floods. Flood insurance is available to owners and renters of residential and commercial properties under the National Flood Insurance Program (NFIP) and can be purchased through a licensed insurance agent.

NFIP policies can cover the building, the contents, or both. All properties in the Special Flood Hazard Area, with a federally backed mortgage, must have flood insurance. Everyone else should have flood insurance.

Visit FloodSmart.gov or contact your insurance agent for details. Your agent may require an elevation certificate to get you a quote. If you do not have an elevation certificate, contact your local jurisdiction to see if it is on file. If not, contact a surveyor, engineer or architect to prepare one.



Prepare now in case of a future event. Inventory and photograph your building's contents and store this information in a safe place.

4. Protect People from the Hazard

Be notified when there is an emergency. Register for CodeRED Emergency Phone and Text Alerts at SCDem.org. Download the FEMA and Charleston County Emergency Management Department apps. Follow @ChasCountyGov and @SCCEMD on Twitter and follow the Facebook.com/EMDChasCo/ page. Monitor local media for the latest information and official instructions.

Create an emergency kit with supplies for at least three days. You may also consider creating a more portable kit to take with you in case of evacuation.

Develop an emergency plan and keep copies of it in your supply kit and share it with your family.

Your plan should include:

- A strategy for family communication. Appoint an out-of-town relative as a point person for everyone in your household to contact. Find out how your family's schools and workplaces will communicate with you during an emergency.
- Details on how you will safely shelter in place or evacuate. Keep evacuation route maps in each car and incorporate these routes into your plan.
- Requirements of household members with special needs.
- Caring for your pet(s) if you shelter in place or evacuate. Know that most shelters prohibit pets.

To learn more about preparing your emergency supply kit and emergency plan visit FEMA.gov or Ready.gov or SCDem.org.

5. Keep Drainage Channels Clear

Keep drainage channels and catch basins free from obstructions to reduce flooding during heavy rains. Residents are asked to maintain the channels near their property by removing or reporting obstructions such as trash and tree limbs.



Request a ditch cleaning or report dumping violations, before a storm occurs, by contacting your local jurisdiction.

6. Protect Natural Floodplain Functions

Wetland areas and oceanfront sand dunes help protect property from flooding. Preserve these areas. Keep them clean and do not walk on sand dunes.

Report disturbances to beachfront and wetland areas to the Office of Ocean and Coastal Resource Management of the South Carolina Department of Health and Environmental Control at (843) 953-0200.

Help support natural floodplain functions by using landscaping to establish vegetative buffers using local native plants and minimal amounts of fertilizer.

Flood Protection Assistance (Activity 360) and Flood Insurance Promotion (Activity 370)

A Coverage Improvement Plan is included within this Public Information Plan to further incorporate the promotion of flood insurance purchase throughout the county. Because this is an area of mixed economic statuses, all avenues of outreach methods should be utilized including direct mailers to citizens, availability of brochures at all jurisdictional offices, participation at expos and other events pertaining to disasters, public awareness or even remodeling shows, really is the most effective way to get information out to the community. This plan has been, and continues to be, implemented on many levels to get the information out to citizens that purchasing flood insurance is essential. In order for the Coverage Improvement Plan portion of this Public Information Plan to qualify for Activity 370 credit, a draft of this document was submitted to the FEMA Region V insurance liaison for review and comment.

Because flooding is one of the top ranked issues that the Hazard Mitigation & Public Information Plan Committee has identified, several outreach projects have been developed to inform the public about the importance of flood insurance and assist the public with information pertaining to flood protection. This assistance comes in many forms; from one-on-one contact to help a homeowner with flood protection measures to presenting at a hurricane expo about flood insurance. Many of the public information outreach activities listed in Table 8 on pages 479-481 address flood protection. In addition to these OP outreach projects, CPI (Coverage Improvement Plan- Activity 370) projects have been established to encourage residents and special groups to promote the purchase of flood insurance. These projects are identified, along with topics, target audiences, assignments and schedule of distribution in Table 9 on page 485.

Other outreach methods have been addressed to directly inform people at expos and special presentations. Table 10 (page 486) is a listing of last year's direct contact presentations to the public addressing flood protection assistance, including property protection advice, protection advice provided after a site visit, financial assistance advice, and advisor training (CRS Activity 360) as well as flood insurance promotion (CRS Activity 370). Charleston County currently has six Certified Floodplain Managers on staff that are qualified to provide financial assistance advice. The attached brochure on page 483, "Flooding: The Risk is Real. Are you Prepared?" publicizes the department's flood protection financial advice services. This brochure has been distributed county-wide annually through mailings, is available at all participating jurisdictions' offices and is distributed at all expos attended.

As with all projects identified in this document, the Coverage Improvement Plan will be evaluated annually by the Hazard Mitigation & Public Information Plan Committee for changes and updates that need to be made to existing projects and addition or deletion of projects as the Committee sees fit.

Table 9: Coverage Improvement Plan (CPI) Projects

Topics (please see PPI document pages 16-20 for list of messages for each topic):

1. Know your flood hazard.
2. Insure property for your flood hazard.
3. Protect people from the hazard.
4. Protect your property from the hazard.
5. Build smart.
6. Protect natural floodplain functions.
7. Hurricane preparedness/safety.
8. General hazard preparedness.
9. Flood education.
10. Site drainage.

Target Audiences (PPI document pages 14-15):

1. General Public
2. Residences and businesses in the Special Flood Hazard Areas (SFHA)
3. Newcomers to the area/ tourists
4. Real Estate and Insurance Agents/ Real Estate Buyers & Sellers
5. Repetitive Loss Area Residents
6. Non-English speaking community
7. Design Professionals/ Contractors
8. Others as determined by the Committee

CPI#	Coverage Improvement Plan Implementation Projects	Topics/ Messages	Target Audience	Outcome	Assignment	Schedule/ Distribution	Stakeholder
CPI#1	SC Department of Insurance Disaster Expo 6/8/13, 5/31/14, 5/30/15. Brochures provided: OP#12, 13, 14, 15, 16, 19/19a, 26, 33; FRP # 3, 9, 10, 11, 14, 15, 16, 17; CPI #4, 6, 7, 8, 12, 13	1-10	1-8	Increase number of flood insurance policies	Charleston County Building Inspection Services	Annually attended Expo- 6/8/13, 5/31/14, 5/30/15	SC Dept of Insurance and Charleston County
CPI #2	Area Flood Insurance Reform Public Presentations: Discussion at Zeus' Restaurant 9/17/13; Seabrook Property Owners Assoc. 12/3/13; Fort Johnson Estates 5/6/14; Edisto Community Association 5/15/14; Lions Club 3/10/15; continuous upon request of organization or association; OP #12, 16, 33; FRP # 14, 15; CPI #4, 5, 6, 8, 12 were taken to the events	1-5, 9	1-4, 7-8	Increase awareness and number of flood insurance policies	Charleston County Building Inspection Services	Presentations offered year-round and when requested.	Charleston County
CPI#3	Roundtable discussion with Council Member Anna Johnson on "Disaster Protection and Fair Housing" 10/28/15; types of insurance, including flood insurance, were discussed and promoted by Council member; CPI #4, 5, 6, 7, 8, 10, 12, 13; FRP# 10, 12, 14, 15, 17; OP# 12, 13, 14, 16, 19, 19a, 20, 23, 30	2	1-3	Inform residents about flood insurance and it's coverage	Anna Johnson and Building Inspection Services	This is one of several annually attended Roundtable discussions, see OP list for others.	Charleston County
CPI#4	Brochure: "Protecting Your Business from Flooding"	1-5, 7-9	1-3, 5	Increase knowledge about how to protect your business or belonging in the event of a flood	Charleston County Building Inspection Services	This brochure is available in offices and taken to Expos attended.	FEMA
CPI#5	Brochure: "Benefits of Flood Insurance Versus Disaster Assistance"	1, 2, 6, 9	1-3	Increase awareness and number of flood insurance policies	Charleston County Building Inspection Services	This brochure is available in offices and taken to Expos attended.	FEMA
CPI#6	Brochure: "Your Homeowner's Insurance Doesn't Cover Floods"	1, 2, 4, 5	1-5	Inform residents about insurance coverage and promote purchase of flood insurance policies	Charleston County Building Inspection Services	This brochure is available in offices and taken to Expos attended.	FEMA
CPI#7	Brochure: "Your Homeowner's Insurance Doesn't Cover Floods (Spanish)"	6	1-5	Inform residents about insurance coverage and promote purchase of flood insurance policies	Charleston County Building Inspection Services	This brochure is available in offices and taken to Expos attended.	FEMA
CPI#8	Brochure: "Why You Need Flood Insurance"	1, 2, 4, 6	1-5	Increase awareness and number of flood insurance policies	Charleston County Building Inspection Services	This brochure is available in offices and taken to Expos attended.	FEMA
CPI#9	Brochure: "NFIP Mandatory Purchase Requirement: Policies, Processes and Stakeholders"	1, 2, 4, 6, 8	1-5	Increase awareness and number of flood insurance policies	Charleston County Building Inspection Services	This brochure is available in offices and taken to Expos attended.	FEMA
CPI#10	Brochure: "Myths and Facts About the National Flood Insurance Program"	1, 2, 5, 8	1	Increase awareness and number of flood insurance policies	Charleston County Building Inspection Services	This brochure is available in offices and taken to Expos attended.	FEMA
CPI#11	Charleston County Building Inspection Services employees offer technical assistance and financial advice on flood zone information and flood insurance information to customers and phone inquires	1-4, 7	1-5, 9	Increase awareness and number of flood insurance policies	Charleston County Building Inspection Services	Continuous in-office activity- see TA Table for occasions.	Charleston County
CPI #12	Brochure: "Preferred Risk Policy- For Homeowners and Renters"	1, 2, 4, 6, 9	1, 3, 7	Increase number of flood insurance policies	Charleston County Building Inspection Services	This brochure is available in offices and taken to Expos attended.	FEMA
CPI#13	Brochure: "Preferred Risk Policy- For Homeowners and Renters (Spanish)"	1, 2, 4, 6, 9	6	Increase number of flood insurance policies	Charleston County Building Inspection Services	This brochure is available in offices and taken to Expos attended.	FEMA

Table 10: Direct Contact Offering Flood Protection Assistance and Promoting Flood Insurance

Event/Project	Date	Hrs.	People reached directly	People reached via media	Expo	Hazard(s) Addressed
Director Carl Simmons made a presentation to the Headquarters HOA.	1/13/2016	2	45+			Discussion on the benefits of being prepared for floods and flooding.
Director Carl Simmons conducted a public meeting with the Town of Rockville, SC.	1/16/2016	3	15			Discussed the importance of code changes, the effect they have on community. Mitigation - preventative ideas, suggestions, being prepared for floods and flooding
Director Carl Simmons made a presentation to the Board of Directors - Headquarters Island	3/3/2016	2	10		No	Discussion with Headquarters Island Board of Director regarding Flood Zone Remapping
Charleston County Floodplain Management Coordinator Cindy Cahill participated in the 'County Square' within the Black Expo, a regional event targeting African American community members and gave information on flooding, flood insurance, building safety, and hazard mitigation/preparedness alongside multiple Charleston County departments	3/12/2016	5	175		Yes	Flooding, hurricane awareness, emergency management, environmental conservation, building safety, mitigation, flood insurance
Homebuilder April 20, 2016 to discuss code related issues with the Trident Home Builders Association	4/20/2016	2	15		No	building safety, earthquake resistance, wind resistance, life safety, flooding, sustainability, energy conservation, flooding, mitigation
Isle of Palm HurricaneExpo (Disaster Prep Expo) - Certified Floodplain Manager Cindy Cahill	5/18/2016	3	30	100,00	Yes	flooding, mitigation, outreach, life safety, hurricane preparedness, building safety, community coordination, storm surge, flood insurance, natural hazards
MUSC Hurricane EXPO - Certified Floodplain Manager Cindy Cahill	5/25/2016	5	225	15,000	Yes	flooding, mitigation, outreach, life safety, hurricane preparedness, building safety, community coordination, storm surge, flood insurance, natural hazards
Travelers Institute Hurricane Preparedness Event - Certified Floodplain Manager Cindy Cahill	5/26/2016	2	85		No	flooding, mitigation, outreach, life safety, hurricane preparedness, building safety, community coordination, storm surge, flood insurance and hurricane resistance.
James Island Hurricane EXPO - Certified Floodplain Manager C. Cahill and Technical Service Coordinator Pamela Mecke attended	6/4/2016	3.5	50		No	Offered information hurricane preparedness, flooding, childrens activity booklet on hazards, flood insurance, mitigation
Charleston Regional Hazard Mitigation Plan Project Committee meeting concerning the 2016-2017 Hazard Mitigation Plan updates	8/31/2016	1.5	30		No	Multiple communities and jurisdictions met to review updates to the Hazard Mitigation Plan and discuss the PPI program for all hazards in the county.
MUSC Hurricane EXPO - Charleston County EMD & 211	9/29/2016	5	400		Yes	flooding, mitigation, outreach, life safety, hurricane preparedness, building safety, community coordination, storm surge, flood insurance, natural hazards
Charleston Regional Hazard Mitigation Plan Project Committee meeting concerning the 2016-2017 Hazard Mitigation Plan updates	9/28/2016	1.5	25		No	Multipal communities and jurisdictions met and adopted the 2016-2017 Hazard Mitigation Plan and the PPI program for all hazards in the county.

Also of great public benefit, County Council previously held a Round Table discussion open to the public to inform citizens about flood insurance. Flood insurance has been promoted on several occasions by Council Member Johnson in these presentations and discussions of area flood hazards and mitigation (CRS Activity 370). See below attachment for the News Release documenting one of these meetings (see OP report backup and CPI backup for other meeting documents).

Attachment: Round Table Discussion Promoting Flood Insurance

News Release



**October 16, 2015
Release Number: 3982**

Charleston County Councilwoman Anna Johnson's October 28 Round Table Meeting: Disaster Protection and Fair Housing

Charleston County Councilwoman Anna B. Johnson of District 8 will hold her monthly round table discussion on **Wednesday, October 28**. The meetings normally are held at 12:30 p.m. on the fourth Wednesday of every month at the John's Island Regional Library located at 3531 Maybank Highway on Johns Island.

Our guest speakers this month will be Charleston County Community Services Director Johnna Murray, Charleston County Building Services Director Carl Simmons and St. John's Fire Department Deputy Chief Stanley.

Charleston County Building Services:

We will discuss what type of insurance you need and how much it covers.

- Flood/Wind/Fire Insurance
- Earthquake Insurance
- Homeowners Insurance
- Liability Insurance
- Auto Insurance

Technical Assistance (370TA)

Another very important aspect of flood insurance promotion is providing technical assistance to individuals and promoting flood insurance through this assistance. The Charleston County Building Inspection Services Director, Assistant Director, Administrative Services Manager, Floodplain Management Coordinator, Floodplain and Plan Review Assistant and a Permit Specialist, all of who are Certified Floodplain Managers. These individuals can provide assistance and advice and have assisted individuals on numerous occasions with information about their properties and the importance of flood insurance as well as financial assistance options. Table 11 below lists technical assistance records for the last year. In addition to this technical assistance, flood-related inspections are also provided as a courtesy to residents as requested to inform them about their flood determination. Standard Operating Procedure “I.2 Flood Zone Related Inspections,” for the Charleston County Building Inspection Services department details the procedures for conducting these inspections. The below information is taken from this Standard Operating Procedure:

I. Other Flood-Related Inspections

A. Community Rating System Inspections

1. These inspections are performed at the request of a property owner who indicates they need assistance with a flooding problem
2. Field inspectors are to offer suggestions to property owners as to potential options to help minimize flood losses on the property.
3. Field inspectors are to document the inspections on their daily inspection lists and the CRS flood protection assistance forms.
4. A copy of the inspection documentation is to be maintained by the Administrative Staff for the Community Rating System recertification.

Flood protection assistance and flood insurance promotion are essential in a county like Charleston because of the multiple hazards that can lead to flooding in our area. A heavy rainfall, an exceptionally high tide, a tropical storm, hurricane or other weather event, all pose an imminent risk to the area. Not all homes in the area are located within Special Flood Hazard Areas but most could benefit from carrying flood insurance or offer information regarding protection against floods as most homeowner policies do not include flooding as a covered event and people do not know what measures they can take to prevent issues in the future.

Overall, in the joint efforts of the Committee, County departments and stakeholders, flood insurance promotion has been identified as a key to the success of most implemented outreach programs. Identifying target audiences and outreach methods are a major part of the Committee’s goal and objectives. The Committee will continue to evaluate the effectiveness of each program and adjust or add new programs as it requires. This flood insurance assessment will be evaluated annually as a part of the *Charleston Regional Hazard Mitigation Plan* and the Public Information Plan included in it.

Table 11: Technical Assistance Related to Flood Insurance Promotion

Date	Name	Address	Location	Parcel ID (PID)	Current Flood Zone	BFE	Ins. Info Given	CBRS Zone	Past Flood or Repetive Loss	Sensitive or Wetland	300 Flood Protection Assistance financial assistance advice discussed	370 flood zone info discussed	Findings and recommendations
1/7/16	Buyer	7064 MAYBANK HWY.	Charleston County	1510000273	X	N/A	Yes	No	No	No	No	Yes	Buyer looking for flood zone info and elevations. Discussed flood insurance
1/8/16	Christine	1846 OVERDELL DR	City of Charleston	350-01-00-097	VE	13	Yes	No	No	No	No	Yes	owner looking to get removed from VE zone, discussed her elev cert and talking to engineering firm and HOA current ins 4000
1/11/16	Buyer	1967 Calver Ave	Charleston County	350-13-00-108	VE	13	Yes	No	No	No	Yes	Yes	Buyer looking for flood zone info and elevations. Discussed flood insurance
2/2/16	Dan	1945 Swift Av	Charleston County	350-13-00-021	AE	12	Yes	No	No	No	Yes	Yes	Buyer looking for flood zone info and elevations. Discussed flood insurance
3/9/16	Austin	9226 Tibwin Rd	Charleston County	745-00-00-200	X	N/A	Yes	No	No	No	No	Yes	Buyer looking for flood zone info and elevations. Discussed flood insurance
3/15/16	Debbie	1866 Cestus Lane	Charleston County	355-14-00-149	AE	11	Yes	No	No	No	Yes	Yes	Owner need historic flood info for insurance. Discussed flood ins and elevation
3/31/16	Tracey Kampmeyer	773 Creekside Dr	Charleston County	452-01-00-040	AE	14	Yes	No	No	No	Yes	Yes	Owner need historic flood info for insurance. Discussed flood ins and elevation
4/20/16	Wanda Krupinski	2623 Seabrook Island Rd	Seabrook	147-07-00-008	AE	13	Yes	No	No	No	Yes	Yes	Buyer wanted info on what could and couldn't be done if buying home. Did site visit with Carl, discussed options, alternatives, 50% rule, etc.
5/2/16	Kyke	3918 Beehive Rd	Charleston County	614-00-00-275	X	N/A	No	No	No	No	No	Yes	Buyer looking for flood zone info.
5/6/16	Janice Harper	1414 DUPRE CREEK LN	Charleston County	617-15-00-035	AE	9	Yes	No	No	No	No	Yes	Has a buyer that wants to enclose bottom area for master bedroom. I told her only parking, storage and access. No living area below DFE. Garage at 7.5
5/6/16	Kathy McKay	3124 Marshall	Sullivan's Island	529-12-00-097	VE	17	Yes	No	Yes	No	Yes	Yes	Property tax lists home as 1991 const. With Hugo NFIP ruled home as non substantial imp. Didn't have to raise. Now NFIP wants house raised due to post firm. Talked to Carl. Referred them to Auditor/Assessors office.
5/11/16	Danny	914 GADSDENVILLE RD	Awendaw	614-00-00-249	VE	16	Yes	No	No	No	Yes	Yes	wanted to put mobile home in VE zone
6/2/16	Kris Fowler	421 Woodland Shores	Charleston County	343-11-00-079	AE	11	Yes	No	Yes	No	Yes	Yes	House is in a hole, everything runs towards it. Slab on grade and can't really raise it. Gave info on flood resistant mat and raising ceiling to be able to raise floors in future. Did site visit with Carl, discussed options, alternatives, 50% rule, etc.
6/6/16	Linthouse	1028 Wappoo Rd	Charleston County	351-16-00-016	X	N/A	Yes	No	No	No	No	Yes	Wanted to know flood zone, X, went over non-flood zone ins.
6/27/16	Lynn	33 S Hampton Dr	City of Charleston	352-06-00-020	AE	13	Yes	No	No	No	Yes	Yes	prospective buyer, reviewed elevation cert, provided info on areas to lower ins, referred to City for official info.
6/30/16	Shep	4484 Betsy Kerrison PKWY	Charleston County	204-00-00-010	AE	14	Yes	No	No	No	No	Yes	prospective buyer wanted to know flood zone and building requirements
8/8/16	Sherry Long	8149 Bing Hill	Charleston County	120-00-00-134	X	N/A	Yes	No	No	No	No	Yes	Verifying the LOMC for the property was valid
8/9/16	Yvonne	3737 Belvedere d	Charleston County	249-00-00-035	AE	12	Yes	No	No	No	No	Yes	prospective buyer wanted to know flood zone and building requirements
8/30/16	Stanley	591 Oyster Rake	Seabrook	207-02-00-051	AE	13	No	No	No	No	No	Yes	Insurance agent needed historical FIRM
9/7/16	Gerald Tiller	492 Romain Rd	McClellanville	744-00-00-204	VE	17	Yes	No	No	No	Yes	Yes	Owner verifying if property is still in VE zone and building requirements. Discussed elevatio, breakaway wall, parking, storage, access, etc.
9/8/16	Wanda Krupinski	2937 Deer Point Dr	Seabrook	149-05-00-148	AE	13	Yes	No	No	No	Yes	Yes	Buyer wanted info on what could and couldn't be done if buying home. Did site visit with Carl, discussed options, alternatives, 50% rule, etc.
9/10/16	Ashley, Ash Agency	1009 Embassy Row Way	Seabrook	147-01-00-082	AE	13	Yes	No	No	No	No	Yes	Insurance agent needed historical FIRM
9/9/16	Andrea Rodgers, Agent/Owned Realty	2420 Seabrook Island Rd	Seabrook	147-02-00-016	AE	13	Yes	No	No	No	No	Yes	Insurance agent needed historical FIRM
9/12/16	Christian Reed	3384 Fairview Rd	Charleston County	388-09-00-026	X	N/A	No	No	No	No	No	Yes	prospective buyer wanted to know flood zone and building requirements
9/14/16	Darren Weathers	1111 Bulow Point Rd	Charleston County	287-00-00-323	AE	7	No	No	No	No	No	Yes	Town of Mt. Pleasant planning needed flood zone for prospectivebuyer of property, Rob was at EMI, Sent flood map with location and referred them to Rob for official info.
9/14/16	Chris Johnson	1578 Holton Pl	City of Charleston	415-03-00-061	AE	14	Yes	No	No	No	No	Yes	Owner needed flood map to send to FEMA to be removed from flood zone. Referred them to the City for a letter of Determination.
9/15/16	Ashley, Ash Agency	4511 Ventura Dr	North Charleston	410-09-00-017	AE	11	No	No	No	No	No	Yes	Insurance agent needed flood zone, referred her to North Charleston
9/19/16	Joette - Nationwide	2554 Birkenhead Dr	Charleston County	309-13-00-116	AE	11	No	No	No	No	No	Yes	Insurance agent needed historical FIRM
10/14/16	Mike Shilling	7979 Little Britton Rd	Charleston County	094-00-00-069	X, AE	12,13	Yes	No	No	No	No	Yes	Prospective Buyer, discussed flood zones, mortgage flood ins, sent FIRM map, etc.

Hazard Disclosure (CRS Activity 340)

Real estate agencies provide hazard disclosure to prospective homeowners. Charleston County works with real estate agents to provide them with any information that they need to provide prospective homebuyers and sellers with to give them an accurate picture of what they are purchasing and what kind of flood insurance they will be required to or should purchase. There is a real estate agent on the Charleston Regional Hazard Mitigation & Public Information Plan Committee to provide valuable perspective and information to the Committee regarding this topic. Full disclosure is a necessary part of any real estate purchase. See Table 11 above for some instances where Charleston County assisted both real estate agents and prospective buyers and sellers with information regarding flood zones and flood insurance.

Also as a part of the Standard Operating Procedures for Charleston County, real estate transaction-related inspection services are provided. Standard Operating Procedure “1.2 Flood Zone Related Inspections” details the inspections below:

- A. Special Requirements for Voluntary Flood Inspections for Real Estate Transactions per ordinance Article VII (fee-based)**
 - 1. Property records are to be investigated to determine what permits were obtained for the property and applicable flood ordinance requirements based on the dates of these permits prior to inspections being conducted.
 - 2. Inspections are conducted primarily for floodplain management-related elements, based on the date of construction of the building.
 - 3. Any work done without applicable permits is to be noted on the inspection report and photographed.
 - 4. The Department Director will need to approve and sign any letters mailed to the requester of the inspection.

OP#33 brochure has been added to the outreach project list detailing flood insurance and flood risks for prospective and new homeowners. See brochure below.

Attachment: OP#33 “Shopping for Your Dream Home? Know & Prepare for Flood Risk Before You Buy”

Local Jurisdiction Contact Information

Charleston County (unincorporated) (843) 202-6730
 Towns of Awendaw, Hollywood, James Island, Lincolnville, McMillenville, Murrells, Faversham, Rockville and Seabrook Island

City of Charleston (843) 724-7320
 City of Folly Beach (843) 386-2447
 City of Isle of Palms (843) 866-9912
 City of North Charleston (843) 740-2549
 Town of Kiawah Island (843) 768-9166
 Town of Mt. Pleasant (843) 884-5154
 Town of Sullivan's Island (843) 883-3198

Charleston County Building Inspection Services
 4045 Bridge View Drive, Suite A311
 North Charleston, SC 29405
 (843) 202-6730
 BuildingServices@CharlestonCounty.org
 www.CharlestonCounty.org

Shopping for Your Dream Home? Know & Prepare for Flood Risk Before You Buy

Know the Risk & Impact of Flooding

Floods are the most frequent and costly natural hazard in the United States. Given the Lowcountry's low elevation, coastal location and frequency of heavy precipitation, tropical storms and hurricanes flooding is a very serious threat to everyone in the region. Even those not living close to the water are at risk.

The force of moving water or waves can destroy a building. Even standing water can float a building, collapse walls, or buckle a concrete floor. Water-soaked interiors, such as carpeting, clothing, upholstered furniture, and mattresses, may have to be thrown away after a flood. Personal items, such as photographs and heirlooms, may be destroyed.

Flooding threatens the public's health and safety. People drown. Stagnant water is a breeding ground for disease and pests. Excess moisture fosters the growth of mold and mildew. Flood waters carry toxic substances such as fertilizer, gasoline and oil. In addition, the prevalence of raw water is an added concern as it pollutes drinking water wells.

The financial and personal cost of flooding can be devastating. Too many families have lost their homes and belongings, and some have lost their lives, and they never saw it coming.

It doesn't take much—just a few inches of flood water can cause serious and permanent damage.

Get educated and be prepared. As you shop for or build your dream home, familiarize yourself about flood risks and what you can do to lessen those risks and protect your family and your home.



A Flood-Aware Homebuyer's Checklist

- Understand Your New Home's Flood Risk**
- Identify if your property is in a floodplain and its flood zone
 - Determine your elevation, flood depth, velocity and warning time
 - Find out if the property is subject to other hazards
 - Learn if the property or area has been flooded in the past
 - Ask if the home has been built or modified to current floodplain regulations and what building and zoning regulations are in effect
- Build & Buy Responsibly**
- If building, hire design professionals familiar with local hazards, including flooding
 - If purchasing an existing home, have it inspected by a professional home inspector
 - Obtain permits for construction, from your local jurisdiction, even if you do the work yourself
 - Hire contractors licensed by South Carolina and/or your local jurisdiction
 - Use flood resistant material as necessary
 - Inquire as to whether federal aid is available for retrofitting, relocating, or demolishing structures with repetitive flooding
- Get Insured**
- Purchase flood insurance—get started by contacting your insurance agent or visiting FloodSmart.gov
- Remain Aware of Flooding After Moving In**
- Create an emergency kit and Plan
 - Protect Natural Floodplains and support their function by landscaping with native plants and minimal fertilizer
 - Keep drainage channels and catch basins free from obstructions such as tree limbs and trash
 - Educate yourself about additional flood prevention measures to protect your family and home

Remain Aware of Flooding upon Moving In

Create an Emergency Kit and Emergency Plan
 As soon as you move in, make an emergency kit and plan. Your kit should contain supplies needed to shelter in place for at least three days. Your plan should include:

- A strategy for family communication.
- Monitoring local media for the latest news and official instructions.
- Details on how you will safely shelter in place or evacuate. Evacuation route maps should be in each car and incorporate these routes into your plan.
- Requirements of household members with special needs.
- Caring for your pet(s) if you shelter in place or evacuate. Most shelters prohibit pets.

To learn more about preparing your emergency supply kit and emergency plan visit FEMA.gov, Ready.gov or 3Cemid.org.

Protect Natural Floodplains & Keep Drainage Channels Clear
 Preserve wetland areas and oceanfront sand dunes as they protect property from flooding. Keep them clean and do not walk on sand dunes.

Help support natural floodplain functions by gardening with native plants and minimal fertilizer to establish vegetative buffers.

Keeping drainage channels and catch basins free from obstruction reduces flooding during heavy rains. Maintain the channels near your property and remove or report obstructions. Request ditch cleaning from or report dumping violations to your local jurisdiction, before a storm occurs.

Educate Yourself about Flood Prevention Measures
 Upon moving into your home, educate yourself about additional flood prevention measures to safeguard your new purchase, your family and your belongings. Libraries, government offices, and the internet have extensive flood hazard mitigation information.

Understand Your Potential New Home's Flood Risk

The entire Charleston region, whether you are near water or not, is at risk for flooding. When shopping for a home, learn how vulnerable your potential new property might be before you buy.

The County of Charleston and local jurisdictions regulate construction and development to protect buildings from flood damage. Filing of dirt and similar projects are prohibited in certain areas. Houses substantially damaged by fire, flood, or any other cause must be elevated to or above the regulatory design flood level when they are repaired.

Before you commit to buying a property, find out if it is located in a floodplain and determine its elevation. Learn about historical flooding in your new neighborhood. Inquire about the age of the home and if it has been built or modified to current floodplain regulations. In the Charleston area, most current floodplain regulations did not come into effect until the 1970s. As a result, homes built before then could be more vulnerable to flood damage.

Ask your real estate agent, contractor, builder and your local jurisdiction if the property is in a floodplain and the property's flood zone; if it has ever been flooded; what the flood depth, velocity, and warning time(s) are; if it is subject to any other hazards; and what building or zoning regulations are in effect.

Your potential new neighbors, homeowners association and library are also good resources for this information.

More information can be obtained on regulations, floodplains and flood zones from your local jurisdiction.



Build & Buy Responsibly

If you build a new home, hire architects, engineers and other design professionals familiar with flooding and other local hazards, to prepare your building plans.

The design professionals you hire should have knowledge of the area's floodplains, local building regulations and flood prevention measures. A building can be protected from most flood hazards, sometimes at a relatively low cost. New buildings can be set back an appropriate distance from water and wetlands. New construction and mechanical equipment (hot water heaters, air conditioning units, etc.) must be elevated to or above your local jurisdiction's design flood levels.

If you are buying an existing home, have your potential new home inspected by a professional home inspector as early as possible in the buying process. The inspector will examine all major components of the home and alert you if they find damage that may have been caused by past flooding and requires repair. The inspector may recommend retrofitting and other flood prevention actions you should take post-purchase, including regrading, constructing berms or building floodwalls.

Whether you are building your home, or preventing or correcting flood damage in an existing home, only hire contractors licensed by South Carolina and/or local jurisdictions who will use flood resistant material as appropriate. Obtain permits as required by your local jurisdiction for construction-related work, even if you do the work yourself.

Contact your local jurisdiction or Charleston County Building Inspection Services to see if federal aid is available for retrofitting, relocating, or demolishing structures with repetitive flooding.

Get Insured

Flood insurance is one of the best protection measures for a building. Usually, homeowners insurance does not cover floods. Only flood insurance covers floods. Flood insurance is available to owners and renters of residential and commercial properties under the National Flood Insurance Program (NFIP) and can be purchased through a licensed insurance agent.

NFIP policies can cover the building, the contents, or both. All properties in the Special Flood Hazard Area, with a federally backed mortgage, will be required to have flood insurance. Everyone should have flood insurance.

Typically, there is a 30-day waiting period from date of purchase before a policy goes into effect.

Premiums are determined by risk level, the amount of coverage, deductible, age of home, elevation and type of building. The average premium for a residential flood policy is less than \$2 a day. The cost of flood insurance is a drop in the bucket compared to the cost of flood damage.

Visit FloodSmart.gov or contact your insurance agent for more information. Ask if you qualify for any discounts.

Your insurance agent may require an elevation certificate to get you a quote. If you do not have an elevation certificate, contact your local jurisdiction to see if it is on file. If not, contact a surveyor, engineer or architect to prepare one.



Flood Protection Information (CRS Activity 350)

In an effort to provide flood protection information, Charleston County has partnered with the Charleston County Library system to introduce FEMA flood publications in all sixteen of the area's branch locations. Below is a list of the publications available at all sixteen branch locations.

Above the Flood: Elevating Your Floodprone House, FEMA-347, 2000
http://www.fema.gov/media-library-data/20130726-1443-20490-3026/fema347cvr_toc.pdf
 Catalog # R693.892 ABOVE

Answers to Questions About the National Flood Insurance Program, F-084, 2011
http://www.fema.gov/media-library-data/20130726-1438-20490-1905/f084_atq_11aug11.pdf
 Catalog # R368.122 ANSWERS

Coastal Construction Manual, FEMA-P-55, 2011
http://www.fema.gov/media-library-data/20130726-1510-20490-6719/fema55_volii_frontmater.pdf
 Catalog # R693.8 UNITE

Elevated Residential Structures, FEMA-54, 1984
<http://www.fema.gov/media-library-data/20130726-1509-20490-6744/fema54.pdf>
 Catalog # R693.8 UNITE

Mandatory Purchases of Flood Insurance Guidelines

Protecting Manufactured Homes from Floods and Other Hazards, FEMA P-85, 2009

http://www.fema.gov/media-library-data/20130726-1501-20490-6993/a_fema_p85_cvr_toc.pdf

Catalog # R693.8 PROTECTI

Mitigation of Flood and Erosion Damage to Residential Buildings in Coastal Areas, FEMA-257, 1994

<http://www.fema.gov/media-library-data/20130726-1505-20490-8508/fema257.pdf>

Catalog # R693.8 MITIGATI

Protecting Building Utilities from Flood Damage, FEMA P-348, 1999

http://www.fema.gov/media-library-data/20130726-1514-20490-7165/p_348.pdf

Catalog # R363.3493 PROTECTI

Protecting Floodplain Resources, FEMA-268, 1996

<http://www.fema.gov/media-library-data/20130726-1440-20490-5918/fema268.pdf>

Reducing Damage from Localized Flooding, FEMA 511, 2005

<http://www.fema.gov/media-library-data/20130726-1446-20490-0539/FEMA511-complete.pdf>

Catalog # R363.3493 REDUCING

Also of significant importance is the vast array of information available on the Charleston County website (charlestoncounty.org). A major project and source for citizens, this website includes flood insurance information, all brochures produced for the Public Information Plan and an extensive list of frequently asked questions. Important links include: *Charleston Regional Hazard Mitigation Plan*, floodmsart.gov, links to NFIP webpages and scsafefhome.com. This website is updated monthly with any new or updated information or brochures as they are produced. There are currently fourteen hazard information related brochures, along with activity sheets for children. Links to more information regarding flooding and other hazards are on this page as well. The website is a very important part of the Public Information Plan as it is typically the first place that citizens will use to gain more information. Below are screen shots of all of the brochures, informational pages and frequently asked questions on the Charleston County website.

Attachment: Charleston County Website

[Home](#)
[Online Services](#)
[Floodplain Management](#)
[Hazard Mitigation Plan](#)
[Forms](#)
[Permit Fees](#)
[Project Impact](#)

Floodplain Management

Helpful Links

- Charleston County Hurricane Guide

Frequently Asked Questions

- How do I know in which flood zone a property is located?
- Is Charleston County potentially subject to hurricane storm surge flooding?
- What do the flood zone designations on the Flood Insurance Rate Maps mean?
- Can all properties in Charleston County get flood insurance?
- What regulations apply to construction-related activities in Flood Zones?
- Is there a limit to how much work can be done to an existing structure in an Flood Zone?
- What are the special requirements for construction in "A, AE, AH, AO, A99" Flood Zones in Unincorporated Charleston County?
- What are the special requirements for construction in "V and VE" Flood Zones in Unincorporated Charleston County?
- Where can I get a "flood elevation certificate" to determine the actual elevation of my structure?
- Where can I get information on safety measures for flooding?
- How can I protect my property from flood-related damages?
- If someone is dumping trash into the drainage ditches or system in my neighborhood, what should I do?
- If my property has been flooded, what should I do?
- Does Charleston County have a plan to address preparing for floods and other hazard events?
- What if my property contains wetland areas or dunes?
- Where can I get real time information on water elevations for streams and rivers in Charleston County?

Contact

Building Inspection Services
 Lonnie Hamilton, III Public Service Building
 4045 Bridge View Drive
 North Charleston, SC 29405
 Phone: (843)202-6930
 Fax: (843)202-6936
 Email: buildinginservices@charlestoncounty.org
 Office Hours:
 Mon - Fri, 8am - 5pm
 Inspector Availability:
 7am - 8:30am
 4pm - 5pm

All Departments

[Home](#)
[Online Services](#)
[Floodplain Management](#)
[Hazard Mitigation Plan](#)
[Forms](#)
[Permit Fees](#)
[Project Impact](#)

Project Impact

What is Project Impact?

- Project Impact is an initiative originally sponsored by FEMA to assist local communities in becoming more disaster resistant.
- An on-going initiative in the Charleston County Area that performs projects which help make our community better able to resist damages due to hazard events.

How do I make my home or business more disaster resistant?

- Flood Hazard Information
- Project Impact flood hazard
- Hurricane Hazard Information
- Project Impact hurricane hazard
- Earthquake Hazard Information
- Project Impact earthquake hazard
- Tornado Hazard Information
- Project Impact tornado hazard
- Wildfire Hazard Information
- Project Impact wildfire hazard

Other Information
[S.C. Safe Home Program](#) (grants/tax credits for retrofitting homes for enhanced wind resistance)

Flood Inundation Maps

- Slosh Model Category 1
- Slosh Model Category 3 (15 mph)
- Slosh Model Category 3 (25 mph)
- Slosh Model Category 5

If you need more assistance with or specific information related to Flood Inundation Maps, Flood Stage Forecast, or Slosh models please contact Building Inspection Services at 843-202-6940.

Project Impact educational brochures

- Generator Safety Brochure
- Hazard Resistant Landscaping Brochure
- Boat Owner's Guide to Storm Preparation
- Damaged Collections, Antiques & Other Valuables
- Build A Dune Brochure
- Earthquake Brochure
- Flood Safety Brochure
- Drainage Awareness Campaign Brochure
- After a Disaster: Hiring a Contractor

Project Impact for kids (and teachers!)

- Flyer of programs for schools
- Mini-grant application
- Lowcountry Science Fair Awards Information
- "Beat the Brainiac" school assemblies
- Project Impact Scout Patch Program

Activity Sheets

- Earthquake
- Flood
- Fire
- Hurricane

Want more information?

- Hazard information
- FEMA For Kids

Floodplain Management Planning (CRS Activity 510)

Because the *Charleston Regional Hazard Mitigation Plan* is a multi-jurisdictional plan, every jurisdiction's action plans are included. All jurisdictional action plans include public information activities. See below a sample of activities included in the action plans.

PP	Continue providing information to citizens regarding hazard safe interior rooms (PPI)	Building Inspection Services	General Fund	Minimize future tornado-related loss of life; Educating citizens regarding vulnerability to hazards and steps which may reduce vulnerability.	2
PI	Provide hazard related information to all residents through the AT&T yellow pages telephone book (PPI)	Building Inspection Services	General Fund	Protecting the lives of citizens from natural hazards; reduce existing flood damage; minimize future flood damage; minimize future hurricane damage; educating citizens regarding their vulnerability to natural hazards and steps to take to reduce vulnerability; improve water quality.	1
PA	Conduct or co-sponsor training workshops regarding the International Building-related, flood, and Fire Prevention Codes and Regulations, and on sustainable construction / landscaping practices, when there is interest in these workshops (PPI)	Building Inspection Services	General Fund self-supporting through workshop revenues	Educating citizens regarding vulnerability to natural hazards and steps to reduce vulnerability; minimize future flood damage; minimize future earthquake damage; improve hazard resistance of infrastructure; minimize hurricane damage; preserve environmental resources	1
PA, PP, PI, NB	Continue providing information to citizens regarding propane tank anchoring, hazard safe interior rooms, boat anchoring and maintenance, generator safety, riparian buffer zones, hazard resistant landscaping, and artifact protection, among other issues (PPI)	Building Inspection Services Project Impact Community Partners	General Fund Grant Funding	Educating citizens regarding vulnerability to natural hazards and steps to reduce vulnerability; minimize future flood damage; minimize future earthquake damage; minimize future hurricane damages; preserve environmental resources	2

NB	Continue to distribute literature on to citizens through government offices and at expos (PPI)	Building Inspection Services Project Impact	Partner donations Grant Funding	Educating citizens regarding vulnerability to hazards and steps to reduce vulnerability; minimize future flood damage; preserve environmental resources; improve water quality; improve hazard resistance of infrastructure; preserve open space; encourage recreational activities; minimize future hurricane damage; improve water quality; improve air quality	2
PI	Mail an outreach project to floodplain residents to those property owners whose property is located in the special flood hazard area (PPI)	Building Inspection Services Project Impact	General Fund	Protecting the lives of citizens from natural hazards; educating citizens regarding their vulnerability to natural hazards and steps to take to reduce vulnerability; minimize future flood damage; minimize future hurricane damage; improve water quality	1

Flood Response Preparations

Flood response preparation projects were established and have been maintained by the Hazard Mitigation & Public Information Plan Committee since the inception of the Public Information Plan. These projects are aimed at informing the public before, during and after a hazardous incident. Table 12 below is a listing of projects and what topics are addressed that were established by the Charleston Regional Hazard Mitigation & Public Information Plan Committee as Flood Response Preparation (FRP) projects. These projects cover a range of outreach methods from media releases to inform the public to brochures that assist in preparation measures, to bags to be delivered to residents with information while damage assessments are being conducted. Attached at the end of this document (pages 514-519) are procedures for how information will be disseminated in the event of a flood. These procedures are updated and revised as necessary annually. Also included in Table 12 are details describing distribution schedules, assignment, projected outcomes, topics and target audiences for each project.

Table 12: Flood Response Preparation Activities (FRP)

Topics (please see PPI document pages 16-20 for list of messages for each topic):				Target Audiences (PPI document pages 14-15):		
1. Know your flood hazard. 2. Insure property for your flood hazard. 3. Protect people from the hazard. 4. Protect your property from the hazard. 5. Build smart. 6. Protect natural floodplain functions. 7. Hurricane preparedness/safety. 8. General hazard preparedness. 9. Flood education. 10. Site drainage.				1. General Public 2. Residences and businesses in the Special Flood Hazard Areas (SFHA) 3. Newcomers to the area/ tourists 4. Real Estate and Insurance Agents/ Real Estate Buyers & Sellers 5. Repetitive Loss Area Residents 6. Non-English speaking community 7. Design Professionals/ Contractors 8. Others as determined by the Committee		
FRP #	Flood Response Project Name	Topics Covered	Target Audience	Outcome	Assignment	Distribution
FRP #1	FRP Instructions for Distribution	1-6, 8-9	1-7	Inform the public about flood response after an event	Building Inspection Services Department	Distributed within 48 hours post flood event; instructions are kept up-to-date throughout the year and ready for distribution in the event of a flood.
FRP #2	Media Information Post Flood	1-9	1-7	Inform the public about flood response after an event	Building Inspection Services Department	Immediately following flood event; information is kept up-to-date throughout the year and ready in the event of a flood.
FRP #3	Chas. Co. Area Project Impact (Bag)	8	1-8	Inform public about several topics post-event- includes several fliers, information sheets, insurance info, contact info for post-event activities	Building Inspection Services Department	Distributed during damage assessment within 48 hours post flood event and at expos
FRP #4	NFIP Flood Insurance Claims Handbook FEMA F-687	1-6	1-2, 5	Inform affected residents about insurance claims process post event	FEMA	Post flood event; kept in-house in the event of a flood.
FRP #5	NFIP Flood Insurance Claims Handbook FEMA F-687S (Spanish)	1-6	1-2, 5-6	Inform affected Spanish speaking residents about insurance claims process post event	FEMA	Post flood event; kept in-house in the event of a flood.
FRP #6	NFIP Summary of Coverage FEMA F-679/November 2012	1-6	1-5	Inform public and policy holders about the benefits and coverage available with flood insurance	FEMA	Pre and post flood event; kept in-house.
FRP #7	NFIP Summary of Coverage FEMA F-679S (Spanish) /November 2012	1-6	6	Inform Spanish speaking community about benefits and coverage available with flood insurance	FEMA	Pre and post flood event; kept in-house.
FRP #8	Brochure: "Need A Contractor?"	1-5, 8	1-3	Inform public about what to look for in a selecting a contractor	Building Inspection Services Department	Available year-round in BIS offices, expos and at events.
FRP #9	Brochure: "Build Back Safer and Stronger"	3-5	1-3, 7	Increase knowledge of how to protect homes from future flood damage	FEMA	Available year-round in BIS offices, expos and at events.
FRP #10	Brochure: "Preparation and Preservation of Damaged Collections, Antiques and Other Valuables"	1-6, 8	1, 3, 8 (business owners and collectors)	Increase knowledge of how to protect valuables from flood damage	Building Inspection Services Department	Available year-round in BIS offices, expos and at events.
FRP #11	Brochure: "Increased Cost of Compliance Coverage"	2, 5, 8-9	1-5	Improved public knowledge about the cost of compliance coverage	FEMA	Available year-round in BIS offices, expos and at events.
FRP #12	Brochure: "Building Codes: How They Help You"	5, 8	1-5, 7-8	Inform public about how building codes can protect property and lives	International Codes Council	Available year-round in BIS offices, expos and at events.
FRP #13	County-wide mailer/ brochure: "Flooding: Are you Prepared?"	1, 9	1-5, 7-8	Inform public about flood risks, how to prepare and stay safe, who to contact if your home is damaged, financial advice services available, general flood information/ facts	Building Inspection Services Department	Updated annually and mailed to residents, started in 2012; also available in BIS offices and at expos and events
FRP #14	Brochure: "Flood Preparation and Safety"	1, 9	1-5, 7-8	Informa public about how to prepare for a flood an stay safe	Building Inspection Services Department	Available year-round in BIS offices, expos and at events.
FRP #15	Brochure: "Flood Preparation and Safety (Spanish)"	1, 9	6	Inform Spanish speaking community about how to prepare for and stay safe in the event of a flood	Building Inspection Services Department	Available year-round in BIS offices, expos and at events.
FRP #16	Brochure: "Mold Tips on Prevention and Control"	1, 5, 8	1-3, 5, 7	Inform public about measures to be taken in homes to prevent mold growth	International Codes Council	Available year-round in BIS offices, expos and at events.
FRP #17	Brochure: "Window and Door Protection"	1, 4-5, 7-9	1-3, 5, 7	Inform the public about protective measures and options for building openings	Building Inspection Services Department	Available year-round in BIS offices, expos and at events.
FRP #18	Brochure: "Mold and Mildew"	1, 5, 8	1-3, 5, 7	Inform public about hazards associated with mold and mildew growth	Building Inspection Services Department	Available year-round in BIS offices, expos and at events.
FRP #19	Brochure: "Cleaning Up Info on Clean Up and Repair"	1, 3-5, 8	1-3, 5	Inform public about how to clean up property post event	Building Inspection Services Department	Available year-round in BIS offices, expos and at events.

Annual Evaluation

The Charleston Regional Hazard Mitigation and Public Information Committee meets at least twice per year to discuss and vote on annual updates to the *Charleston Regional Hazard Mitigation Plan* as well as Public Information needs and activities and insurance coverage improvement plan needs. These efforts are very important to keep current so that the public finds the best and most relevant information possible to protect their lives and homes. In these evaluations by the Committee, they will address any modifications that need to be made to the current outreach methods, add new target audiences or areas if necessary, change the topics and/or message as appropriate, and update the Plan as needed to suit the community. The Charleston County staff

will facilitate the meetings and will make revisions to the Plan as deemed necessary. Because the Plan is adopted annually to keep it as up-to-date as possible, a digital and hard copy are made available for Charleston County Council members as designated in the adoption ordinance after the Plan has been accepted by the Committee. The most recent Council acceptance of the revised 2016 *Charleston Regional Hazard Mitigation Plan* update was November 30, 2016 (included below). The next scheduled formal adoption will occur later in 2017 of the *Charleston Regional Hazard Mitigation Plan*.

Attachment: Charleston County Council Acceptance of Updated Plan

J. Elliott Summey - Chairman
A. Victor Rawl - Vice Chairman
Colleen T. Condon
Henry E. Darby
Anna B. Johnson
Teddie E. Pryor
Joseph K. Qualey
Herbert R. Sass, III
Henry D. Schweers



Beverly T. Craven, Clerk
(843) 858-4030
1-800-594-7832
FAX (843) 858-4035
E-mail: bcraven@charlestoncounty.org

CHARLESTON COUNTY COUNCIL
LONNIE HAMILTON, III PUBLIC SERVICES BUILDING
4045 BRIDGE VIEW DRIVE
CHARLESTON, SOUTH CAROLINA
29405-7464

November 30, 2016

Mr. Carl H. Simmons, Director
Building Inspection Services
4045 Bridge View Drive Suite A-311
North Charleston, SC 29405

RE: *Charleston Regional Hazard Mitigation Plan* Report

Dear Mr. Simmons:

Per your request, I have provided copies of the summary report on the *Charleston Regional Hazard Mitigation Plan* revisions for this year to the members of County Council and informed these Members that a complete copy of the 2016 Plan Update is available to Council Members and the general public on the Building Services Department webpage, and a printed copy of the Plan is available in Building Services, Room A-311 of the Lonnie Hamilton Services Building.

If you have any questions or need any additional information, please let me know.

Sincerely,

Handwritten signature of Beverly T. Craven in blue ink.
Beverly T. Craven
Clerk of Council

A link to the Charleston Regional Hazard Mitigation Plan:

<http://www.charlestoncounty.org/departments/building-inspection-services/files/Hazard-Mitigation-Plan.pdf>

Attachments (16): Each Jurisdiction's Adopting Resolution

A RESOLUTION FOR THE ADOPTION OF THE REVISED CHARLESTON REGIONAL HAZARD MITIGATION PLAN BY CHARLESTON COUNTY COUNCIL

Resolution No. 13-22

WHEREAS the County of Charleston has experienced the effects of natural and man-made hazard events; and

WHEREAS the Charleston Regional Hazard Mitigation Project Committee has prepared a recommended *Charleston Regional Hazard Mitigation Plan*; and

WHEREAS the recommended *Charleston Regional Hazard Mitigation Plan* has been widely circulated for review by residents / business organizations / professional organizations of the unincorporated and incorporated areas of Charleston County, state, federal, regional and local government agencies and has been supported by those reviewers; and

WHEREAS the County of Charleston originally adopted the *Charleston Regional Hazard Mitigation Plan* in 1999 and readopted it in 2004, again in 2008, and is required to adopt the amended version of this plan on a five-year cycle for the County to remain eligible for certain Federal programs in which Charleston County participates, and

NOW THEREFORE be it resolved that

1. The *Charleston Regional Hazard Mitigation Plan* is hereby adopted as an official plan of the County of Charleston, and
2. The Charleston Regional Hazard Mitigation Project Committee is recognized as a continuing entity charged with reviewing, maintaining in accordance with Community Rating System, Flood Mitigation Assistance, and Disaster Mitigation Act requirements, and periodically reporting on the progress towards and revisions to the plan to the Charleston County Council.

Effective this 7th Day of November, 2013.

**A RESOLUTION FOR THE ADOPTION OF THE REVISED
CHARLESTON REGIONAL HAZARD MITIGATION PLAN
BY AWENDAW TOWN COUNCIL**

Resolution No. 2013- 0 2-

WHEREAS the County of Charleston has experienced the effects of natural and man-made hazard events; and

WHEREAS the Charleston Regional Hazard Mitigation Project Committee has prepared a recommended *Charleston Regional Hazard Mitigation Plan*; and

WHEREAS the recommended *Charleston Regional Hazard Mitigation Plan* has been widely circulated for review by residents / business organizations / professional organizations of the unincorporated and incorporated areas of Charleston County, state, federal, regional and local government agencies and has been supported by those reviewers; and

WHEREAS the Town of Awendaw originally adopted the *Charleston Regional Hazard Mitigation Plan* in 1999 and readopted it in 2004, again in 2008, and is required to adopt the amended version of this plan on a five-year cycle for the Town of Awendaw to remain eligible for certain Federal programs in which Charleston County participates, and

NOW THEREFORE be it resolved that the Town of Awendaw does hereby declares that:

1. The *Charleston Regional Hazard Mitigation Plan* is hereby adopted as an official plan of the Town of Awendaw, and
2. The Charleston Regional Hazard Mitigation Project Committee is recognized as a continuing entity charged with reviewing, maintaining in accordance with Community Rating System, Flood Mitigation Assistance, and Disaster Mitigation Act requirements, and periodically reporting on the progress towards and revisions to the plan to the Charleston County Council and Awendaw Town Council

Effective this 7 Day of November, 2013

Attest:



Miriam C. Green, Mayor



Gregory Saxton, Town Clerk

TOWN OF HOLLYWOOD, SC

ADOPTION OF THE REVISED
CHARLESTON REGIONAL HAZARD MITIGATION PLAN
Resolution 18-2013-14

WHEREAS the County of Charleston has experienced the effects of natural and man-made hazard events; and

WHEREAS the Charleston Regional Hazard Mitigation Project Committee has prepared a recommended *Charleston Regional Hazard Mitigation Plan*; and

WHEREAS the recommended *Charleston Regional Hazard Mitigation Plan* has been widely circulated for review by residents / business organizations / professional organizations of the unincorporated and incorporated areas of Charleston County, state, federal, regional and local government agencies and has been supported by those reviewers; and

WHEREAS the Town of Hollywood originally adopted the *Charleston Regional Hazard Mitigation Plan* in 1999 and readopted it in 2004, again in 2008, and is required to adopt the amended version of this plan on a five-year cycle for the Town of Hollywood to remain eligible for certain Federal programs in which Charleston County participates, and

NOW THEREFORE be it resolved that:

1. The *Charleston Regional Hazard Mitigation Plan* is hereby adopted as an official plan of the Town of Hollywood, and
2. The Charleston Regional Hazard Mitigation Project Committee is recognized as a continuing entity charged with reviewing, maintaining in accordance with Community Rating System, Flood Mitigation Assistance, and Disaster Mitigation Act requirements, and periodically reporting on the progress towards and revisions to the plan to the Town of Hollywood. **Effective this 10th Day of December, 2013**

Mayor Jacquelyn S. Heyward

Councilmember John Dummer, III

Councilmember Althea Salters

Councilmember Kenneth L. Smalls Sr.

Mayor Pro Tem Herbert Townsend

Councilmember Ezell G. Middleton

Councilmember Annette Sausser

Attest:

Niema Gantt-Brown, Town Clerk-Treasurer

RESOLUTION # 2014-27

A RESOLUTION FOR THE ADOPTION OF THE CHARLESTON REGIONAL HAZARD MITIGATION PLAN

WHEREAS, the Town of James Island has experienced the effects of natural and man-made hazard events; and

WHEREAS, the Charleston Regional Hazard Mitigation Project Committee has prepared a recommended Charleston Regional Hazard Mitigation Plan; and

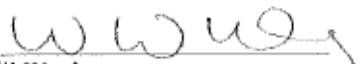
WHEREAS, the recommended Charleston Regional Hazard Mitigation Plan has been widely circulated for review by residents/business organizations/professional organizations of the unincorporated and incorporated areas of Charleston County, state, federal, regional and local government agencies and has been supported by those reviewers; and

WHEREAS, the Town of James Island is required to adopt the amended version of this Plan on a five-year cycle for the County to remain eligible for certain Federal programs in which Charleston County participates;

NOW THEREFORE, BE IT RESOLVED THAT:

1. The Charleston Regional Hazard Mitigation Plan is hereby adopted as an official Plan of the Town of James Island
2. The Charleston Regional Hazard Mitigation Project Committee is recognized as a continuing entity charged with reviewing, maintaining in accordance with Community Rating System, Flood Mitigation Assistance, and Disaster Mitigation Act requirements, and periodically reporting on the progress towards and revisions to the Plan to the Town of James Island.

Adopted this 16th day of October, 2014


Bill Woolsey
Mayor

ATTEST


Frances Simmons
Town Clerk

**A RESOLUTION FOR THE ADOPTION OF THE REVISED
CHARLESTON REGIONAL HAZARD MITIGATION PLAN BY
TOWN COUNCIL FOR THE TOWN OF McCLELLANVILLE, S.C.
Resolution No. 2013-5**

WHEREAS the County of Charleston has experienced the effects of natural and man-made hazard events; and

WHEREAS the Charleston Regional Hazard Mitigation Project Committee has prepared a recommended *Charleston Regional Hazard Mitigation Plan*; and

WHEREAS the recommended *Charleston Regional Hazard Mitigation Plan* has been widely circulated for review by residents / business organizations / professional organizations of the unincorporated and incorporated areas of Charleston County, state, federal, regional and local government agencies and has been supported by those reviewers; and

WHEREAS the Town of McClellanville originally adopted the *Charleston Regional Hazard Mitigation Plan* in 1999 and readopted it in 2004, again in 2008, and is required to adopt the amended version of this plan on a five-year cycle for the Town of McClellanville to remain eligible for certain Federal programs in which Charleston County participates, and

NOW THEREFORE be it resolved that

1. The *Charleston Regional Hazard Mitigation Plan* is hereby adopted as an official plan of the Town of McClellanville, and
2. The Charleston Regional Hazard Mitigation Project Committee is recognized as a continuing entity charged with reviewing, maintaining in accordance with Community Rating System, Flood Mitigation Assistance, and Disaster Mitigation Act requirements, and periodically reporting on the progress towards and revisions to the plan to the Town Council for the Town of McClellanville, S.C.

Effective this 7th Day of Oct, 2013

**A RESOLUTION FOR THE ADOPTION OF THE REVISED
CHARLESTON REGIONAL HAZARD MITIGATION PLAN BY
TOWN OF MEGGETT, MEGGETT TOWN COUNCIL**

Resolution No. 2013-04

WHEREAS the County of Charleston has experienced the effects of natural and man-made hazard events; and

WHEREAS the Charleston Regional Hazard Mitigation Project Committee has prepared a recommended *Charleston Regional Hazard Mitigation Plan*; and

WHEREAS the recommended *Charleston Regional Hazard Mitigation Plan* has been widely circulated for review by residents / business organizations / professional organizations of the unincorporated and incorporated areas of Charleston County, state, federal, regional and local government agencies and has been supported by those reviewers; and

WHEREAS the Town of Meggett originally adopted the *Charleston Regional Hazard Mitigation Plan* in 1999 and readopted it in 2004, again in 2008, and is required to adopt the amended version of this plan on a five-year cycle for the town to remain eligible for certain Federal programs in which Charleston County participates, and

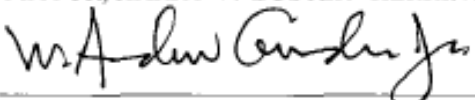
NOW THEREFORE be it resolved that

1. The *Charleston Regional Hazard Mitigation Plan* is hereby adopted as an official plan of the Town of Meggett, and
2. The Charleston Regional Hazard Mitigation Project Committee is recognized as a continuing entity charged with reviewing, maintaining in accordance with Community Rating System, Flood Mitigation Assistance, and Disaster Mitigation Act requirements, and periodically reporting on the progress towards and revisions to the plan to the TOWN OF MEGGETT, MEGGETT TOWN COUNCIL.

Effective this 28th Day of October 2013



MAYOR, HARRY V. "BUSTER" HERRINGTON III



W. ANDREW GOWDER JR., TOWN ATTORNEY

**A RESOLUTION FOR THE ADOPTION OF THE REVISED
CHARLESTON REGIONAL HAZARD MITIGATION PLAN BY
THE RAVENEL TOWN COUNCIL**

Resolution No. 2013-003

WHEREAS the County of Charleston has experienced the effects of natural and man-made hazard events; and

WHEREAS the Charleston Regional Hazard Mitigation Project Committee has prepared a recommended *Charleston Regional Hazard Mitigation Plan*; and

WHEREAS the recommended *Charleston Regional Hazard Mitigation Plan* has been widely circulated for review by residents / business organizations / professional organizations of the unincorporated and incorporated areas of Charleston County, state, federal, regional and local government agencies and has been supported by those reviewers; and

WHEREAS the Town of Ravenel originally adopted the *Charleston Regional Hazard Mitigation Plan* in 1999 and readopted it in 2004, again in 2008, and is required to adopt the amended version of this plan on a five-year cycle for the Town of Ravenel to remain eligible for certain Federal programs in which Charleston County participates, and

NOW THEREFORE be it resolved that

1. The *Charleston Regional Hazard Mitigation Plan* is hereby adopted as an official plan of the Town of Ravenel, and
2. The Charleston Regional Hazard Mitigation Project Committee is recognized as a continuing entity charged with reviewing, maintaining in accordance with Community Rating System, Flood Mitigation Assistance, and Disaster Mitigation Act requirements, and periodically reporting on the progress towards and revisions to the plan to the Ravenel Town Council.

Effective this 29th Day of October, 2013

**A RESOLUTION FOR THE ADOPTION OF THE REVISED
CHARLESTON REGIONAL HAZARD MITIGATION PLAN BY**

Town of Rockville Mayor and Council

Resolution No. 111813

WHEREAS the County of Charleston has experienced the effects of natural and man-made hazard events; and

WHEREAS the Charleston Regional Hazard Mitigation Project Committee has prepared a recommended *Charleston Regional Hazard Mitigation Plan*; and

WHEREAS the recommended *Charleston Regional Hazard Mitigation Plan* has been widely circulated for review by residents / business organizations / professional organizations of the unincorporated and incorporated areas of Charleston County, state, federal, regional and local government agencies and has been supported by those reviewers; and

WHEREAS the Town of Rockville originally adopted the *Charleston Regional Hazard Mitigation Plan* in 1999 and readopted it in 2004, again in 2008, and is required to adopt the amended version of this plan on a five-year cycle for the Town of Rockville, Charleston County, South Carolina to remain eligible for certain Federal programs in which Charleston County participates, and

NOW THEREFORE be it resolved that

1. The *Charleston Regional Hazard Mitigation Plan* is hereby adopted as an official plan of the Town of Rockville, and
2. The Charleston Regional Hazard Mitigation Project Committee is recognized as a continuing entity charged with reviewing, maintaining in accordance with Community Rating System, Flood Mitigation Assistance, and Disaster Mitigation Act requirements, and periodically reporting on the progress towards and revisions to the plan to the Town of Rockville and its Mayor and Council

Effective this 18 Day of November, 2013



Mayor, Town of Rockville

TOWN OF SEABROOK ISLAND

**RESOLUTION 2013-03, A RESOLUTION FOR THE ADOPTION OF
THE REVISED CHARLESTON REGIONAL HAZARD
MITIGATION PLAN**

ADOPTED October 22, 2013

WHEREAS, the Town of Seabrook Island has experienced the effects of natural and man-made hazard events; and

WHEREAS, The Charleston Regional Hazard Mitigation Project Committee has prepared a recommended *Charleston Regional Hazard Mitigation Plan*; and

WHEREAS, the recommended *Charleston Regional Hazard Mitigation Plan* has been widely circulated for review by residents/business organizations/professional organizations of the unincorporated and incorporated areas of Charleston County, state, federal, regional and local government agencies and has been supported by those reviewers; and

WHEREAS, the Town of Seabrook Island originally adopted the *Charleston Regional Hazard Mitigation Plan* in 1999 and readopted it in 2004 and is required to adopt the amended version of this plan on a five-year cycle for the Town to remain eligible for certain Federal programs in which the Town of Seabrook Island participates; and

NOW, THEREFORE, be it resolved that

1. The *Charleston Regional Hazard Mitigation Plan* is hereby adopted as an official plan of the Town of Seabrook Island.
2. The Charleston Regional Hazard Mitigation Project Committee is recognized as a continuing entity charged with reviewing, maintaining in accordance with Community Rating System, Flood Mitigation Assistance and Disaster Mitigation Act requirements, and periodically reporting on the progress towards and revisions to the plan to the Town Council for the Town of Seabrook Island.

Done this 22nd day of October, 2013.

TOWN OF SEABROOK ISLAND



Mayor



Resolution
Number 2013-09

City of Charleston
South Carolina

**A RESOLUTION FOR THE ADOPTION OF THE REVISED
CHARLESTON REGIONAL HAZARD MITIGATION PLAN BY**

The City of Charleston, South Carolina

Resolution No.

- WHEREAS** the County of Charleston has experienced the effects of natural and man-made events; and
- WHEREAS** the Charleston Regional Hazard Mitigation Project Committee has prepared a recommended *Charleston Regional Hazard Mitigation Plan*; and
- WHEREAS** the recommended *Charleston Regional Hazard Mitigation Plan* has been widely circulated for review by residents/business organizations/professional organizations of the unincorporated and incorporated areas of Charleston County, state, federal, regional, and local government agencies and has been supported by those reviewers; and
- WHEREAS** the City of Charleston originally adopted the *Charleston Regional Hazard Mitigation Plan* in 1999 and readopted it in 2004, again in 2008, and is required to adopt the amended version of this plan on a five-year cycle for the City of Charleston to remain eligible for certain Federal programs in which Charleston County participates, and

NOW THEREFORE be it resolved that

1. The Charleston Regional Hazard Mitigation Plan is hereby adopted as an official plan of the City of Charleston, and

2. The Charleston Regional Hazard Mitigation Project Committee is recognized as a continuing entity charged with reviewing, maintaining in accordance with Community Rating System, Flood Mitigation Assistance, and Disaster Mitigation Act requirements, and periodically reporting on the progress towards and revisions to the Mayor and City Councilmembers of the City of Charleston.

Effective this the 23rd Day of Oct. 2013



JOSEPH P. RILEY, JR.
MAYOR

ATTEST



VANESSA TURNER MAYBANK
CLERK OF COUNCIL



CITY OF FOLLY BEACH

Introduced by: Mayor Goodwin

Date: October 8, 2013

RESOLUTION NO. R45-13

A RESOLUTION BY THE FOLLY BEACH CITY COUNCIL ADOPTING THE REVISED CHARLESTON REGIONAL HAZARD MITIGATION PLAN.

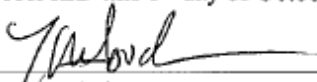
- WHEREAS,** the City of Folly Beach has experienced the effects of natural and manmade hazard events; and
- WHEREAS,** the Charleston Regional Hazard Mitigation Project Committee has prepared a recommended *Charleston Regional Mitigation Plan*; and
- WHEREAS,** the *Charleston Regional Mitigation Plan* has been widely circulated for review by residents/business organizations/professional organizations of the unincorporated and incorporated areas of Charleston County, state, federal, regional and local government agencies and has been supported by those reviewers; and
- WHEREAS,** the City of Folly Beach originally adopted the *Charleston Regional Mitigation Plan* in 1999 and readopted it in 2004, 2008, and is required to adopt the amended version of this plan on a five year cycle for the City of Folly Beach to remain eligible for certain Federal programs in which City participates;

NOW THEREFORE BE IT RESOLVED by the Folly Beach City Council, duly assembled, that

SECTION 1. Administration hereby approves and adopts the revised *Charleston Regional Mitigation Plan* as the official plan of the City of Folly Beach.

SECTION 2. *The Charleston Regional Hazard Mitigation Project Committee* is recognized as a continuing entity charged with reviewing, maintaining in accordance with Community Rating System, Flood Mitigation Assistance, and Disaster Mitigation Act requirements, and periodically reporting on the progress towards and revisions to the plan to the Folly Beach City Council.

RATIFIED this 8th day of October, 2013 at Folly Beach, South Carolina, in City Council duly assigned.



Tim Goodwin, Mayor

Mary E. Cunningham, CMC
Municipal Clerk

**A RESOLUTION FOR THE ADOPTION OF THE REVISED *CHARLESTON
REGIONAL HAZARD MITIGATION PLAN* BY
TOWN OF KIAWAH ISLAND**

Resolution No. 2013-4

WHEREAS the County of Charleston has experienced the effects of natural and man-made hazard events; and

WHEREAS the Charleston Regional Hazard Mitigation Project Committee has prepared a recommended *Charleston Regional Hazard Mitigation Plan*; and

WHEREAS the recommended *Charleston Regional Hazard Mitigation Plan* has been widely circulated for review by residents / business organizations / professional organizations of the unincorporated and incorporated areas of Charleston County, state, federal, regional and local government agencies and has been supported by those reviewers; and

WHEREAS the Town has annually adopted resolutions to approve its Action Plan outlining projects to be undertaken to proactively address hazard mitigation since; and

WHEREAS the Council for the Town of Kiawah Island originally adopted the *Charleston Regional Hazard Mitigation Plan* in 1999 and readopted it in 2004, again in 2008, and is required to adopt the amended version of this plan on a five-year cycle for the Town of Kiawah Island to remain eligible for certain Federal programs in which Charleston County participates, and

NOW THEREFORE be it resolved that

1. The *Charleston Regional Hazard Mitigation Plan* is hereby adopted as an official plan of the Town of Kiawah Island, and
2. The Charleston Regional Hazard Mitigation Project Committee is recognized as a continuing entity charged with reviewing, maintaining in accordance with Community Rating System, Flood Mitigation Assistance, and Disaster Mitigation Act requirements, and periodically reporting on the progress towards and revisions to the plan to the Council for the Town of Kiawah Island.

Effective this 3rd Day of December, 2013


The Honorable Charles R. Lipuma, Mayor

ATTEST:

Petra Reynolds, Town Clerk

RESOLUTION NO. R.13092

STATE OF SOUTH CAROLINA)	
)	A RESOLUTION ADOPTING THE
COUNTY OF CHARLESTON)	REVISED <i>CHARLESTON REGIONAL</i>
)	<i>HAZARD MITIGATION PLAN</i>
TOWN OF MOUNT PLEASANT)	

WHEREAS the Town of Mount Pleasant has experienced the effects of natural and man-made hazard events; and

WHEREAS the Charleston Regional Hazard Mitigation Project Committee has prepared a recommended *Charleston Regional Hazard Mitigation Plan (2013)*; and

WHEREAS the recommended *Charleston Regional Hazard Mitigation Plan* has been widely circulated for review by residents/business organizations/professional organizations of the unincorporated and incorporated areas of Charleston County, state, federal, regional and local government agencies and has been supported by those reviewers; and

WHEREAS the County of Charleston and Town of Mount Pleasant originally adopted the *Charleston Regional Hazard Mitigation Plan* in 1999 and readopted it in 2008, and is required to adopt the amended version of this plan on a five-year cycle for the Town to remain eligible for certain Federal programs in which the Town of Mount Pleasant participates, and

NOW THEREFORE be it resolved by the Mayor and Councilmembers of the Municipality of Mount Pleasant, in Council assembled, that the *Charleston Regional Hazard Mitigation Plan* is hereby adopted as an official plan of the Town of Mount Pleasant, and

BE IT FURTHER RESOLVED that the Charleston Regional Hazard Mitigation Project Committee is recognized as a continuing entity charged with reviewing, maintaining in accordance with Community Rating System, Flood Mitigation Assistance, and Disaster Mitigation Act requirements, and periodically reporting on the progress towards and revisions to the plan to the Mount Pleasant Council.

THIS RESOLUTION SHALL BE EFFECTIVE IMMEDIATELY UPON ITS ADOPTION.

SIGNED, SEALED AND DELIVERED THIS 11 DAY OF September, 2013.



William D. Swails, Mayor
Town of Mount Pleasant


ATTEST:



Christine Barrett
Clerk of Council

September 11, 2013

APPROVED AS TO FORM:



David G. Pagliarini
Corporation Counsel

**A RESOLUTION
AUTHORIZING THE MAYOR OR HIS DESIGNEE TO ADOPT THE REVISED
CHARLESTON REGIONAL HAZARD MITIGATION PLAN**

WHEREAS, the County of Charleston has experienced the effects of natural and man-made hazard events; and

WHEREAS, the Charleston Regional Hazard Mitigation Project Committee has prepared a recommended Charleston Regional Hazard Mitigation Plan; and

WHEREAS, the recommended Charleston Regional Hazard Mitigation Plan has been widely circulated for review by residents, business organizations, and professional organizations of the unincorporated and incorporated areas of Charleston County and the state, federal, regional, and local government agencies and has been supported by those reviewers; and

WHEREAS, the City of North Charleston originally adopted the Charleston Regional Hazard Mitigation Plan in 1999 and readopted it in 2004 and 2008; and the City is required to adopt the amended version of this plan on a five-year cycle for the City to remain eligible for certain federal programs in which Charleston County participates.

NOW, THEREFORE BE IT RESOLVED that the Charleston Regional Hazard Mitigation Plan is hereby adopted as an official plan of the City of North Charleston.

AND BE IT FURTHER RESOLVED that the Charleston Regional Hazard Mitigation Project Committee is recognized as a continuing entity charged with reviewing and maintaining – in accordance with the Community Rating System – Flood Mitigation Assistance and Disaster Mitigation Act requirements and periodically reporting on the progress towards and revisions to the plan to the City of North Charleston, with a copy of such agreement attached hereto and incorporated by reference as if set forth fully herein.

THE WITHIN RESOLUTION SHALL BE EFFECTIVE IMMEDIATELY UPON ITS RATIFICATION BY CITY COUNCIL.

Resolved in City Council this 24th day of October, in the Year of Our Lord, 2013 and in the 238th year of Independence of the United States of America.


R. KEITH SUMMEY, MAYOR

APPROVED AS TO FORM:


LEGAL COUNSEL

ATTEST:


ELLEN CLARK, MUNICIPAL CLERK

**A RESOLUTION FOR THE ADOPTION OF THE REVISED
CHARLESTON REGIONAL HAZARD MITIGATION PLAN BY
*The Town Council of the Town of Sullivan's Island***

WHEREAS the County of Charleston has experienced the effects of natural and man-made hazard events; and

WHEREAS the Charleston Regional Hazard Mitigation Project Committee has prepared a recommended *Charleston Regional Hazard Mitigation Plan*; and

WHEREAS the recommended *Charleston Regional Hazard Mitigation Plan* has been widely circulated for review by residents/business organizations/professional organizations of the unincorporated and incorporated areas of Charleston County, state, federal, regional and local government agencies and has been supported by those reviewers; and

WHEREAS the Town of Sullivan's Island originally adopted the *Charleston Regional Hazard Mitigation Plan* in 1999 and readopted it in 2004, again in 2008, and is required to adopt the amended version of this plan on a five-year cycle for the Town of Sullivan's Island to remain eligible for certain Federal programs in which Charleston County participates, and

NOW THEREFORE be it resolved that

1. The *Charleston Regional Hazard Mitigation Plan* is hereby adopted as an official plan of the Town of Sullivan's Island, and
2. The Charleston Regional Hazard Mitigation Project Committee is recognized as a continuing entity charged with reviewing, maintaining in accordance with Community Rating System, Flood Mitigation Assistance, and Disaster Mitigation Act requirements, and periodically reporting on the progress towards and revisions to the plan to the Town Council of The Town of Sullivan's Island.

Effective this 19th day of November, 2013.



Michael Perkis, Mayor

Attest:


Ellen Miller, Town Clerk

Attachment 1: FRP Instructions for Distribution

**Activity 330 – Flood Response Preparations (FRP)
Instructions for Distribution**

Current as of December 2015

Approximately half of the brochures are locally produced and hundreds to thousands of the flyers are already printed and ready for distribution. The other half are FEMA produced brochures and handouts. Additional copies of these brochures and flyers could be ordered or PDF versions of all flyers are saved and can be printed local or in-house.

The department has thousands of 'Project Impact' plastic bags with the Charleston County Building Services contact information. These bags have been and will be stuffed with the brochures and delivered by Building Inspectors and other members of Initial Damage Assessment teams to affected homes, which would occur within the first 48 hours or so following a flooding event/natural disaster. The content of these bags could be altered depending upon the disaster. For example, additional earthquake information could be included or unique driving instructions for certain areas could be provided by Emergency Management.

All bags have the Building Departments contact information as well as the locally produced brochures. FEMA produced brochures feature the appropriate contact information and instructions for filing claims, documenting damages, and the outline of a basic recovery operation.

Much of the preparation documents and flyers are distributed throughout the year at various outreach events, while the Flood Response packets feature more recovery and safety information following a flood.

Media Information Post Flood:

In the event of a major flooding event, please instruct the general public on the following:

Authority

Charleston County Emergency Management or the appropriate municipality's Emergency Management Department is the lead on emergency situations. The department will be in touch with the appropriate officials. Please follow instructions from the Emergency Operations Center and/or the Public Information Officer.

The Emergency Operations Center will publish the numbers of organizations to contact for assistance. The Red Cross and other groups will have information on supply distribution and additional assistance. Please instruct people not to attempt to return home until the Emergency Operations Center and local law enforcement have indicated it is safe to.

Driving with Flooded Roads

“TURN AROUND, DON'T DROWN” – Instruct public to avoid driving on streets where water is on roadway. The water is often deeper than it appears and flood water may have washed out the roadway surface. Six inches of water will reach the bottom of most passenger cars causing loss of control and possible stalling. A foot of water will float many vehicles. Two feet of rushing water can carry away most vehicles including sport utility vehicles (SUV's) and pick-ups. Do not attempt to drive through a flooded road. The depth of water is not always obvious. The road bed may be washed out under the water, and you could be stranded or trapped. Do not drive around a barricade. Barricades are there for your protection. Turn around and go the other way. Do not try to take short cuts. They may be blocked. Stick to designated evacuation routes. Be especially cautious driving at night when it is harder to recognize flood dangers.

Disaster Distress Hotline

SCRIPT: This is an important message from the U.S. Department of Health and Human Services. A disaster or tragedy often brings out strong emotions, such as anxiety, worry and anger, and people may want help in dealing with their feelings. The Disaster Distress Helpline (1-800-985-5990) provides confidential counseling, referrals, and other support, 24 hours a day, seven days a week. The number again: 1-800-985-5990.

Flood Recovery Tips

- Return home only when officials have declared the area safe.
- If safe to do so, take photos and document damage to home for your records.
- Before entering your home, look outside for loose power lines, damaged gas lines, foundation cracks or other damage. Never switch on the main if the building has been under water, wait for professional assistance.

- Parts of your home may be collapsed or damaged. Approach entrances carefully. See if porch roofs and overhangs have all their supports.
- Watch out for wild animals, especially poisonous snakes that may have come into your home with the floodwater.
- If you smell natural or propane gas or hear a hissing noise, leave immediately and call the fire department.
- If power lines are down outside your home, do not step in puddles or standing water.
- Keep children and pets away from hazardous sites and floodwater.
- Materials such as cleaning products, paint, batteries, contaminated fuel and damaged fuel containers are hazardous – use flashlights instead of lanterns and torches. Check with local authorities for assistance with disposal to avoid risk.
- During cleanup, wear protective clothing, including rubber gloves and rubber boots.
- Make sure your food and water are safe. Discard items that have come in contact with floodwater, including canned goods, water bottles, plastic utensils and baby bottle nipples. When in doubt, throw it out!
- Contact your local or state public health department to see if your water supply might be contaminated. You may need to boil or treat it before use. Do not use water that could be contaminated to wash dishes, brush teeth, prepare food, wash hands, make ice or make baby formula!

Flood Insurance Information

- Flooding damage is often not covered by basic homeowners or renters insurance. Flood insurance is a critical component of your security and recovery – flood insurance is available anywhere in Charleston County, though there is a 30 day waiting period in most cases. Don't be caught unprepared again – purchase flood insurance through the National Flood Insurance Program – it is highly likely you can purchase flood insurance through the same agent you purchase your auto or home insurance from.
- Contact your local agent for information concerning claims and required documentation.

Build Responsibly – Stay Safe...Get a building permit for repairs

- Without a building permit, there is no guarantee that the work being performed is safe, up to code, or done correctly. You also have no guarantee that the person performing the work is properly licensed, insured, or knowledgeable.
- If there is ever a problem with the repair/job, you as the homeowner have recourse against a properly licensed and insured contractor. If you don't get a building permit, you risk paying thousands of dollars for improper or incomplete work.
- Particularly after a disaster, there are dishonest people who try and take advantage of the situation. Even after a disaster or widespread event, proper and honest contractors will be licensed by Charleston County. Do not believe any claim by someone asking for your business who is not going to get a permit or who is not licensed.
- Some homeowners are finding when they try to sell or refinance their home, prospective buyers or lending institutions want proof that alterations are in compliance with local codes. Without a permit and inspection on record, there is no proof. The homeowner must then apply for a permit with no guarantee that the remodel will meet the codes, and

they face the possibility that the remodel must be redone or removed. This is costly and frustrating and could cause delays in refinancing or a lost sale of their home.

- Make sure you know your flooding risk before any rebuilding – if a building has been substantially damaged, the building requirements may change. Regardless of the extent of damage, there are likely building techniques or alternatives that will make any repair more flood resistant.

Important Messages concerning Flooding, Flood Hazards, and Flooding Information

Know Your Flood Hazard

Determine if your property is in the Special Flood Hazard Area (SFHA) Zone “A” “AE” or “VE”. Contact your local government for a flood zone determination.

Check for historical flooding records in your area with your local government or media outlets.

Check for existing elevation certificates with your local government or insurance agent

If you need an elevation certificate contact a local land surveyor.

Check the depth of the Base Flood Elevation (BFE) above or below building’s first floor or above existing grade on a vacant parcel.

Get a FIRMette of your location (www.msc.fema.gov) or look at a flood map at your local government offices to determine proximity to a flood hazard area.

Check to see if your property is in an area subject to wave action (“V” Zone) or coastal erosion.

Contact your local government for assistance.

Know the proximity of property to evacuation routes.

Determine if property is protected by man-made structures such as levees or dams.

Check for localized drainage issues that could result in flooding in your neighborhood.

Insure Property

Flood insurance is available through the National Flood Insurance Program; contact your insurance agent for details.

All developed properties within the designated flood hazard area should have flood insurance for buildings and contents. Federally backed mortgages must have flood insurance.

Most homeowner’s insurance policies do not cover flood damage so you will likely need a separate policy.

Renters contents are not covered by the building owner’s insurance and renters should purchase contents only flood insurance.

Property owners should inquire about any discounts that may apply in purchasing flood insurance.

If your flood insurance premium increases significantly, make sure your agent is using the correct information to rate your policy.

Know when building(s) were constructed, as ‘grandfathering’ may apply in reducing flood insurance costs.

Do not procrastinate; a 30-day waiting is typically required for flood insurance to take effect.

Ask questions from insurance agents concerning specific policy information.

Research building permit records for history of property improvements.

Protect People from the Hazard

Be aware of roadways susceptible to flooding during heavy rainfall events, do not drive through flooded areas, flowing or standing water.

Pay attention to media (TV, radio, internet) for emergency warnings and instructions.

Select an out-of-town contact for family members' in the event local telephone service is disrupted.

Designate a location/place where family or people you are responsible for can rendezvous once an evacuation order is issued.

Get an evacuation route map for each vehicle and evacuate early if a flood threat is pending.

Avoid contact with downed power lines.
Check government web sites (fema.gov, charlestoncounty.org) for flood safety information.
Stay away from areas subject to flooding during heavy rainfall events – do not wade through standing water.
Avoid contact of flood waters as this water may contain toxic materials or venomous animals or insects.
Get a weather radio to obtain flood-related weather reports at all times.

Protect Your Property from the Hazard

Shut off gas service to a building if a flood is imminent.
Disconnect electricity at the main disconnect if a flood is imminent.
Replace utility machinery above the required flood elevation.
Elevate the lowest habitable floor area above the required flood elevation.
Landscape in a hazard resistant manner.
Make plans for evacuating pets in the event of a flood, as most shelters do not accept pets.
Install backflow prevention on plumbing systems susceptible to flooding.
Sandbag areas subject to flooding.
Provide hurricane protection against wind borne debris for windows and doors.
Move valuables to the highest level of a building or evacuate with these when a flood is imminent.
Use flood resistant materials in areas below the expected flood elevation to minimize damages.

Build Smart

Hire design professionals who are familiar with local hazards in preparing construction plans.
Consult with your local building department concerning permit requirements.
Place buildings in areas with lower flood potential.
Obtain permits before you build – permits are required even if the property owner does the work himself/herself.
Only hire licensed contractors.
Ensure that building inspections are properly arranged and completed.
If you are renovating a building, determine if you are performing a substantial improvement ($\geq 50\%$).
Check the local flood ordinance for construction requirements.
Minimize the use of structural fill in constructing buildings.
Obtain a firm written quote from the contractor detailing exact work to be performed; the exact cost and schedule of start and completion of project.

Protect Natural Floodplain Functions

Protect wildlife habitat areas.
Protect dunes as these moderate flooding and erosion.
Preserve wetlands – they clean the water, protect us from flooding and provide wildlife habitat.
Do not dump anything into the storm drainage system as these discharge into our coastal waters.
Every property should plant only native plants, particularly along water bodies.
Obtain permission from the SC DHEC before doing any work near a wetland or dune area.
Minimize clearing near wetlands and/or water bodies.
Establish buffers and set buildings back from wetlands and/or water bodies.
Maintain on-site wastewater treatment systems, such as pumping out of septic tanks, every 3 to 5 years.
Don't dump boat sewage into waterways. Use pump-out stations to protect water quality and wildlife habitats.

Hurricane Preparedness/Safety

Know your evacuation route; obtain published maps.
Attach plywood or install commercially manufactured hurricane shutters over windows and patio doors.
Evacuate early and follow established evacuation routes when there is a potential hurricane threat.
Move valuables and furniture to higher areas of the dwelling.
Avoid low lying areas. Seek shelter in the highest areas.

Avoid driving if dangerous flooding conditions are imminent.
Stay alert to weather advisories and local media broadcast updates.
Monitor the track of all hurricanes.
Download a copy of the Charleston County Hurricane Guide at www.charlestoncounty.org
Make sure you have an emergency kit on-hand and that it is properly supplied.
Do not leave anything outside that is not properly anchored. Store items in a garage or shed on an elevated area if possible.

General Hazard Preparedness

Inventory and photograph your home and business contents and put important papers and insurance policies in a safe place.

Have an emergency kit on hand. Check government web sites (fema.gov, American Red Cross, charlestoncounty.org) for items to include.

Listen to emergency broadcasts from local media outlets as to when it is safe to return or contact local government authorities prior to returning to property after the storm has passed.

A.2 - Overview of the Community Rating System (CRS)

The Community Rating System (CRS) is a nation-wide program sponsored by the Federal Emergency Management Agency (FEMA) through the National Flood Insurance Program (NFIP). This program has been in existence since 1990 and has as its objectives reducing flood losses, facilitating accurate insurance ratings, and promoting awareness of flood insurance. The CRS program is administered by Insurance Services Office (ISO), the same organization which provides fire department rating services for insurance companies throughout the United States.

The CRS program is a voluntary program. It accomplishes its objectives by providing incentives in the form of flood insurance premium discounts for the citizens of communities which participate in the program. Participating in the CRS program involves performing activities which exceed minimal FEMA requirements for participating in the National Flood Insurance Program. Credit points are assigned according to a schedule, which is periodically revised, based on the types and level of activities performed by a community. These activities include but are not limited to such items as providing flood related information to citizens, conducting inspections and performing needed maintenance of drainage ways, providing emergency warning to the citizens in the event of a flood, and conducting floodplain management planning. The possible activities included in Section 6 of this *Charleston Regional Hazard Mitigation Plan* are categorized in accordance with the CRS program. The six categories of potential activities addressed are preventive measures, property protection activities, activities to promote natural and beneficial functions of floodplains/preserve resources, emergency service activities, structural projects, and public information activities.

There are 10 classifications to the CRS program (1 to 10) with premium reductions for the properties in the Special Flood Hazard Area (“AA” and “V” flood zones) ranging from 0% to 45% depending upon the rating received by the community. The lower the rating in the CRS program the higher the insurance premium reduction (e.g. a Class 1 community receives a 45% reduction whereas a Class 5 receives a 25% reduction and a Class 10 receives a 0% reduction). The participating communities within Charleston County are, as of October 1, 2018, Class 4, Class 5, Class 6, or Class 7 communities. Below is a table of the communities that participate:

Table A.2-1: CRS Community Ratings and Discounts

Community Name	Current CRS Class (October 1, 2018)	% Discount (SFHA/non-SFHA)
Town of Awendaw	7	15/5
City of Charleston	6	20/10
Charleston County	4	30/10
Town of Folly Beach	4	30/10
Town of Hollywood	7	15/5
City of Isle of Palms	6	20/10
Town of Kiawah Island	5	25/10
Town of McClellanville	7	15/5
Town of Meggett	7	15/5
City of Mount Pleasant	6	20/10
City of North Charleston	7	15/5
Town of Ravenel	6	20/10
Town of Rockville	7	15/5
Town of Seabrook Island	5	25/10

Town of Sullivan's Island	6	20/10
<i>The Town of Lincolnville does not participate in the CRS program.</i>		

The benefits of participating in the CRS program include but are not limited to reduced flood insurance rates, enhanced floodplain management planning, national recognition, incentives to maintain flood programs, and becoming qualified for certain types of federal assistance (e.g. Flood Mitigation Assistance grant funding, Hazard Mitigation Grant Program funding, and Pre-Disaster Mitigation Grant Program funding) as a result of having an approved hazard mitigation plan. One of the potentially most important benefits is the enhanced preparedness for hazard events that occurs through better educating the citizens and the community officials regarding how to address the inevitable hazard events that will occur.

To enhance further preparedness and mitigating efforts, participating CRS communities active in the Charleston Regional Hazard Mitigation Plan for 2013-2014 established a multi-jurisdictional Public Information Plan (PIP) under CRS Activity 330 as described in the CRS Coordinators' Manual of 2013. The current Public Information Plan (PIP) document can be found in *Appendix I*.

Additional information regarding the CRS program is available in the Charleston County Public Libraries, at the offices of all local jurisdictions within the Region, and through FEMA directly on their internet site at <http://www.fema.gov>.

A.3 – Overview of Project IMPACT

“Project Impact” is a Federal Emergency Management Agency (FEMA) sponsored initiative aimed at assisting communities in becoming more disaster resistant. “Project Impact” is intended to involve the public, private, and non-profit sectors in forming partnerships to achieve the goal of reducing the amount of loss associated with a hazard event. This initiative began in 1997 with seven pilot communities, and ultimately expanded to approximately 250 communities nation-wide. Charleston County was selected as the 1999 “Project Impact” community for the State of South Carolina. All of the local jurisdictions within the Charleston County Area have partnered together in this “Project Impact” initiative.

The four phases of the “Project Impact” initiative per the FEMA perspective are to build community partnerships, assess risks, prioritize needs, and build support and communicate what is being done to enhance hazard preparedness and response. The “Project Impact” initiative is intended to address any types of hazards which may strike a community. The Charleston Area “Project Impact” initiative is focused primarily upon floods, hurricanes, earthquakes, tornadoes, wildfires, hazardous material incidents and terrorism activities. This *Charleston Regional Hazard Mitigation Plan* addresses each of these types of hazards and serves as a mechanism for the assessing risks and prioritizing needs phases of “Project Impact”. This plan serves as the governing document for project selection associated with the Charleston County Area “Project Impact” initiative.

The goals of the Charleston County Area “Project Impact” initiative are incorporated into the goals of this *Charleston Regional Hazard Mitigation Plan*. Similarly, the proposed decision making organization for the “Project Impact” initiative mirrors the organization of this plan. “Project Impact” and this plan are therefore directly linked.

The Disaster Mitigation Act of 2000 uses the term “Predisaster Hazard Mitigation” (Title I) to define the “Project-Impact” type of initiative. The concepts of “Predisaster Hazard Mitigation” and “Project Impact” are to create a more disaster-resistant community through the implementation of projects and programs designed to prepare citizens and businesses in advance of a hazard event to minimize losses associated with these events. While the term “Project Impact” may be phased out over time and replaced with either “Predisaster Hazard Mitigation” or “Building a Disaster-Resistant Community”, the overall concept of preparing in advance for hazard events should remain into the future at the Federal level as a result of the Disaster Mitigation Act of 2000.

Anyone interested in becoming a partner in the Charleston County Area “Project Impact” initiative or seeking additional information about “Disaster Resistant Communities” is encouraged to contact Charleston County Building Services or any of the local jurisdictions within Charleston County for additional information.

A.4 - Participation

Below is a table detailing the participation of the jurisdictions and partners throughout the development of the 2019 plan.

Jurisdiction and Government Partner Participation in the Hazard Mitigation Plan Update				
JURISDICTION	2019 Meetings	Survey	Plan Review Comments	Brochures and Public Education
Charleston County Parks and Recreation Commission			X	X
Charleston County School District	X	X	X	X
Charleston Water System	X		X	X
City of Charleston	X	X	X	X
City of Folly Beach	X	X	X	X
City of Isle of Palms	X	X	X	X
City of North Charleston	X	X	X	X
College of Charleston				X
Cooper River Parks & Playground				
James Island Public Service District	X	X	X	X
Mount Pleasant Water & Sewer Commission	X	X	X	X
North Charleston District				
North Charleston Sewer District		X	X	X
Roper St. Francis Healthcare	X	X	X	X
SC Aquarium				
SC DHEC				
St. Andrews Parish Park & Playground Commission	X			
St. Andrews PSD		X		X
St. Johns Fire District	X	X	X	X
St. Paul's Fire District		X	X	X
Town of Awendaw	X	X	X	X
Town of Hollywood		X		
Town of James Island	X	X		X
Town of Kiawah Island	X	X	X	X
Town of Lincolnton				
Town of McCellanville	X	X	X	X
Town of Meggett		X		
Town of Mt. Pleasant	X	X	X	X
Town of Ravenel	X	X		
Town of Rockville				
Town of Seabrook Island	X	X	X	
Town of Sullivan's Island	X	X	X	X
Unincorporated Charleston County		X	X	X

A.5 – Public Meeting Notices 2019

TO: Meetings Notice Editor -

Clear Channel Communications
Charleston City Paper
The Chronicle
Citadel Communications
Moultrie News
North Charleston/Hanahan News
Post & Courier
Charleston Free times
Goose Creek Gazette
James Island Journal
West of
Summerville Journal Scene
WCIV-TV
WCSC-TV
WCBF-TV
WTAT-TV
WTMA 1250 AM

FROM: Building Inspection Services

DATE: May 30, 2019

RE: Notice of Public Meetings

Total Number of Pages Including This Sheet: 2

The Committee that developed and updates the Charleston Regional Hazard Mitigation Plan is meeting on June 13, 2017 at 2:30 pm in Conference Room B339 of the Lonnie Hamilton III Public Services Building (4045 Bridge view Dr., North Charleston, SC). The public and media are invited to attend all committee meetings. We appreciate you including this meeting in your notices of public meetings.

Thank you again for your assistance.

NOTICE OF PUBLIC MEETINGS

May 30, 2019

The public and media are always invited to attend the Charleston Regional Hazard Mitigation Plan Committee meeting to discuss the proposed revisions to the Charleston Regional Hazard Mitigation Plan for 2019-2020. For more information, please contact Building Inspection Services at 843-202-6940.

Thursday, June 13, 2:30pm-Charleston Regional Hazard Mitigation Plan Committee

The Hazard Mitigation Plan Committee developed and updates the Charleston Regional Hazard Mitigation Plan. This meeting will be held in Room B339 at the Lonnie Hamilton III Public Services Building at 4045 Bridge View Dr., North Charleston SC 29405.

TO: Meetings Notice Editor -
Clear Channel Communications
Charleston City Paper
The Chronicle
Citadel Communications
Moultrie News
North Charleston/Hanahan News
Post & Courier
Charleston Free times
Goose Creek Gazette
James Island Journal
West of
Summerville Journal Scene
WCIV-TV
WCSC-TV
WCBD-TV
WTAT-TV
WTMA 1250 AM

FROM: Building Inspection Services

DATE: July 3, 2019

RE: Notice of Public Meetings

Total Number of Pages Including This Sheet: 2

The Committee that developed and updates the Charleston Regional Hazard Mitigation Plan is meeting on July 17, 2019 at 2:30 pm in Conference Room B339 of the Lonnie Hamilton III Public Services Building (4045 Bridge view Dr., North Charleston, SC). The public and media are invited to attend all committee meetings. We appreciate your including this meeting in your notices of public meetings.

Thank you again for your assistance.

NOTICE OF PUBLIC MEETINGS

July 3, 2019

The public and media are always invited to attend the Charleston Regional Hazard Mitigation Plan Committee meeting to discuss the proposed revisions to the Charleston Regional Hazard Mitigation Plan for 2017-2018. For more information please contact Building Inspection Services at 843-202-6940.

Wednesday, July 17, 2:30pm-Charleston Regional Hazard Mitigation Plan Committee

The Hazard Mitigation Plan Committee developed and updates the Charleston Regional Hazard Mitigation Plan. This meeting will be held in Room B339 at the Lonnie Hamilton III Public Services Building at 4045 Bridge View Dr, North Charleston SC 29405.

TO: Meetings Notice Editor -
Clear Channel Communications
Charleston City Paper
The Chronicle
Citadel Communications
Moultrie News
North Charleston/Hanahan News
Post & Courier
Charleston Free times
Goose Creek Gazette
James Island Journal
West of
Summerville Journal Scene
WCIV-TV
WCSC-TV
WCBD-TV
WTAT-TV
WTMA 1250 AM

FROM: Building Inspection Services

DATE: August 6, 2019

RE: Notice of Public Meetings

Total Number of Pages Including This Sheet: 2

The committee that developed and updates the Charleston Regional Hazard Mitigation Plan is meeting on August 20, 2019 at 2:30 pm in Conference Room B339 of the Lonnie Hamilton III Public Services Building (4045 Bridge view Dr., North Charleston, SC). The public and media are invited to attend all committee meetings. We appreciate your including this meeting in your notices of public meetings.

Thank you again for your assistance.

NOTICE OF PUBLIC MEETINGS

August 6, 2019

The public and media are always invited to attend the Charleston Regional Hazard Mitigation Plan Committee meeting to discuss the proposed revisions to the Charleston Regional Hazard Mitigation Plan for 2017-2018. For more information please contact Building Inspection Services at 843-202-6940.

Tuesday, August 20, 2:30pm-Charleston Regional Hazard Mitigation Plan Committee

The Hazard Mitigation Plan Committee developed and updates the Charleston Regional Hazard Mitigation Plan. This meeting will be held in Room B339 at the Lonnie Hamilton III Public Services Building at 4045 Bridge View Dr, North Charleston SC 29405.

A.6 – Yearly Meeting Minutes 2019



**Charleston Area Hazard Mitigation Plan
Annual Meeting #1
Meeting Minutes
4045 Bridge View Dr, Rm B-339
June 13, 2019 2:30pm**

Attendees:

Property Protection/Preventative Activities: Buddy Smith (Town of Awendaw Citizen), Mark Cartwright* (Roper St. Francis Healthcare), John Porcelli* (Town of James Island)

Structural Projects: Aaron Pope* (Town of Folly Beach)

Natural Benefits: James Whittaker (City of North Charleston), Jody Muldrow* (Town of Awendaw), Stephen Julka (City of Charleston)

Emergency Services: Amanda Knight (Town of Mt. Pleasant), Shawn Engelman (James Island PSD/JIFD), Brock Clary (CCSD)

Others in Attendance: Katie Faith (Charleston County Building Services), Ronnie Freeman (Mt. Pleasant Water Works), Hillary Repik (Town of Mount Pleasant), Scott Cave* (Atlantic Business Continuity), Merrie Koester (USC Center for Science Education), Carl H. Simmons (Charleston County Building Inspection Services), Gavin Gilcrease* (St. John's Fire District), Michelle McClellan* (Town of

McClellanville), Joe Cronin* (Town of Seabrook Island), Douglas Kerr* (City of Isle of Palms), Max Wurthmann (Town of Sullivan's Island), Jennifer Hightower (Dominion Energy), Stewart Weinberg (City of Charleston), Ben Brown (City of North Charleston), John Gregg (Town of Seabrook Island), Ina Ivanova (Graduate student intern College of Charleston), Kevin O'Dell (Student intern College of Charleston)

*call in

Opening Comments and Introduction: Katie Faith thanked everyone for coming and/or calling in to this meeting. She gave some background information on Project Impact/Hazard Mitigation Plan, why we are all here and a synopsis of the purpose of the meeting – to discuss changes to HMP for 2019-2020 and action item. First, there was a motion to approve the minutes from the previous HMP/Project Impact meeting on February 19, 2019. The motion was seconded and approved by participants. Ms. Faith introduced Carl Simmons.

Presentation: Countywide Floodplain Management Changes and New Committee proposal (Carl Simmons): Mr. Simmons began by summarizing the effects of climate change and other factors on the issue of flooding. He listed challenges facing Charleston are including urban development, lack of current regulations, erratic changes in temperature and other extreme weather conditions, increased precipitation, sea level rise and many more. He discussed in depth the issues caused by loss of natural ground cover and increased urbanization. Mr. Simmons presented examples of cities dealing with run off, including Atlanta GA, Houston TX and others. He then suggested the creation of a “HMP Subcommittee for Improving Our Resistance to Flooding Countywide”. Mr. Simmons explained that this committee would work closely with Woolpert and set county wide standards (general guidelines and limits), tailored to each jurisdiction. Mr. Simmons discussed the importance of cooperation as seen in the 5yr update of the HMP. Next steps mentioned were drainage and watershed studies with Woolpert, evaluation of development regulations, and countywide 2D Model development plan to show flooding countywide. Mr. Simmons then discussed the Council meeting that is to take place tonight where he will suggest the combination of the two ordinances that are being introduced. Two of the main proposals in the ordinances are for “40% impervious surface limit for construction sites and Setbacks for riverine and oceanfront”. A meeting with Woolpert is planned in 3 months to track progress. Audience member asked if the proposed ordinance will affect all jurisdictions, Mr. Simmons clarified it is for Unincorporated County only, however he would then like to work with all municipalities to encourage adoption. Audience member brought up the Dutch Dialogues and their “Living with Water” Initiative. Mr. Simmons said he was familiar and has been communicating with their engineers to discuss customizing their experience to our needs. Audience member asked for several clarifications about the 40% limit on impervious surfaces. Mr. Simmons there are no uniform current limits but some areas such as Mount Pleasant do have them in effect, the proposed rule will apply to both business and residential properties, apply per parcel, but there are options such as roof gardens, the redevelopment clause includes building to current standards if you demolish a building, and that the definition of an impervious surface may become complicated base on the materials used. An audience member asked about wetlands and Mr. Simmons emphasized the importance of preserving the natural paths to the sea and not developing on wetlands. Ms. Faith asked if there were any recommendations/comments on the proposed committee. Audience member asked if this is in addition to all other projects. Ms. Faith stated this committee would be different from Project Impact. Audience members mentioned the benefit of TriCounty efforts and partnering neighborhoods and jurisdictions, but shared concerned over “analysis paralysis”, the importance of taking action, and the County serving as coordinator for all.

Ms. Faith said that committees can become disjointed and that a concerted effort is important as well as uniform buy-in. More discussions will be held in the future.

Changes to HMP for 2019-2020: Ms. Faith discussed the re-organization of the plan according to jurisdiction to achieve a better grasp on individual municipalities. Audience member shared that while this is a good idea, the plan lacks objective decision making, has too much fluidity in participation and not enough commitment, requested less subjective data and opinions and to breakdown the 5year plan into actionables per year. Ms. Faith clarified the goal is not to “project” for jurisdictions but to prompt each jurisdiction to recap the past year and major events and decide what to work on next, and stressed the importance of ownership. She also suggested the creation of a template with a general action plan outline

Action Items for 2019 HMP update:

Action Plan Updates for 2018-2019: Ms. Faith discussed the checklist: Action Plan Updates for 2018-2019 will be sent out. FEMA need clarification on why action items are missing, if they are completed they must be marked as such. Minor modifications and additions are ok, if there are any major new action items the entire HMP needs to be readopted

Adopting Resolutions: Re-Adoption needed for 5 year plan, particularly in order to claim grants and Irma funds; any delays in re-adoption will also lead to delay in receiving funds.

Jurisdiction and Citizen Surveys: Ms. Faith stated that at least one person per municipality must fill out the jurisdiction survey, and the citizen survey should be sent to as many people as possible. Audience member asked how the survey will be utilized and raised concern over capturing all voices and the tendency of communities with louder voices to dominate. Ms. Faith said the survey prioritizes the hazards per community and this determines the order of discussion in the plan, and that is up to each jurisdiction to utilize the data.

Updated Repetitive Loss Areas: Ms. Faith stated that that FEMA liked the repetitive loss tracking and has requested counts from each jurisdiction. An audience member requested clarification on organization of the plan. Ms. Faith said that there will still be section that are grouped together with subsections on each jurisdictions, which will also contribute to CRS points.

Good of the Order: Ms. Faith thanked everyone for attending. The next meeting is July 17th, 2019 at 2:30 pm and reminded everyone to complete surveys by then. The meeting was adjourned.



**Charleston Area Hazard Mitigation Plan
Annual Meeting #1
Meeting Minutes
4045 Bridge View Dr, Rm B-339
July 17, 2019 2:30pm**

Attendees:

Property Protection/Preventative Activities: Buddy Smith (Town of Awendaw), Randy Robinson (Town of Sullivan's Island), John Porcelli* (Town of James Island), Rob Rogerson (Town of Mount Pleasant)

Structural Projects: Aaron Pope (Town of Folly Beach), Mark Johnson* (Town of James Island), Aleta Reisberg (Agent Group Realty), Emily DeMore (Town of Mount Pleasant)

Natural Benefits: James Whittaker (City of North Charleston), Jody Muldrow* (Town of Awendaw),

Emergency Services: Amanda Knight (Town of Mt. Pleasant), Brock Clary (CCSD)

Others in Attendance: Katie Faith (Charleston County Building Services), Susan Klugman (St. Andrews Parks & Playground), Ronnie Freeman* (Mt. Pleasant Water Works), Hillary Repik (Town of Mount Pleasant), Merrie Koester* (USC Center for Science Education), Douglas Kerr* (City of Isle of Palms), Max Wurthmann (Town of Sullivan's Island), Stewart Weinberg (City of Charleston), John Gregg (Town of Seabrook Island), David Kent (Realtor), Ina Ivanova (Graduate student intern College of Charleston), Kevin O'Dell (Student intern College of Charleston)

*call in

Opening Comments and Introduction: Katie Faith thanked everyone for coming and/or calling in to the meeting. She gave some background information on Project Impact/Hazard Mitigation Plan and a synopsis of the purpose of the meeting – check in on HMP progress and goals. First, there was a motion to approve the minutes from the previous HMP/Project Impact meeting on June 13, 2019. The motion was seconded and approved by participants.

Follow up on Action Items for 2019 HMP update: Ms. Faith began with a recap that all jurisdictions should be taking the survey, and has sent reminders to jurisdictions who have not yet done so. She opened the floor to discussion about the questions asked in the survey and invited attendees to share additional questions or topics that should be covered in the survey. No suggestions were made.

Ms. Faith requested jurisdictions' assistance with providing updated repetitive loss areas statistics. She shared that FEMA likes us to tally the numbers for frequently flooded properties and that DNR can also be a resource for pulling those.

Next Ms. Faith reminded attendees that we still need several Adopting Resolutions and has emailed those jurisdictions that still need to provide a copy. She stressed the need to present these in order to qualify for grant funding. There is more information on this on the BIS website.

Ms. Faith also reminded that Action Reports are also needed, email reminders have been sent out. She stated that by Aug 20th there should be a draft of the HMP ready to be circulated. Audience member inquired about the drainage project list and Ms. Faith replied that in the future it will be sent out at an earlier time for more thorough review.

Public Information Plan annual update: Ms. Faith provided updates on the PPI plan and reminded that all jurisdictions are covered under one PPI. Audience member inquired about a copy of the PPI. Ms. Faith said the PPI is an appendix in the HMP, which is on the County website, and she can also send it out separately to jurisdictions for review. Audience member asked about the preparation of the PPI and Ms. Faith shared that the detailed guidelines on putting the PPI together are provided in the CRS Manual. County can share steps and status updates during the process as well as provide a final copy earlier, before it gets posted on the website. Audience member asked about better tracking of public outreach within individual jurisdiction and how they can contribute to PO, and potentially working on setting a requirement per jurisdiction to encourage buy-in. Ms. Faith described the PPI steps and set up and reminded that there are many methods that can be used (expos, newsletter, social media etc.) as long as these are conducted annually. Future requirements per jurisdiction can be added to our Goals for the committee.

Discussion on timeline for HMP: Ms. Faith highlighted the importance of following the 10 steps listed in the CRS manual and how many points get deducted for missing even one step. Audience member asked to what degree different vulnerabilities are looked at, in the assessments, and commented on the importance of citizen especially student education. Ms. Faith said jurisdictional and citizen surveys are two way we assess vulnerabilities, as well as state definition. She invited suggestions to circulate survey to students and suggest questions to be added if more perspectives are needed.

Ms. Faith discussed the checklist (Attachment 3) and highlighted the responsibilities of County, Jurisdictions and Annual meetings of the Committee. Audience member inquired about ways to layer subjective survey data with data from other agencies and if we can have a more comprehensive view of modeling, which then can be discussed by the Committee. Ms. Faith said data is available through HAZUS, which is ran by the County's GIS department, State and CofC also provide assistance with modeling when needed. County usually does modeling once every 5year cycle which is sufficient, however it is important to keep tally at the jurisdiction level. Audience member asked if there can be a review of models by jurisdiction. Ms. Faith said we can work on sharing more information as well as modeling, suggested timeline was requesting information in Feb 2020 and review model data in March, and jurisdictions will have more time to discuss.

Discussion of Flood Ordinance: Ms. Faith shared that first reading was received well and second reading will take place the following day. Audience members shared concerns over jurisdictions outside of Unincorporated Charleston County who may chose not to adopt the ordinance and the potential negative effects on the region as a whole. A suggestion was made to compile a document that lays out the different requirements for all jurisdictions to help assess the situation.

Discussion of Flood Committee: It was decided not to create a whole new committee but focus on making the current committee more constructive and incorporate the flood discussions. Audience member suggested reviewing the work of other committees and assess status. Suggestions were made to more formally provide information that is already given out. Ms. Faith suggested assessing Tri County status and creating actionables for the future.

Good of the Order: Ms. Faith thanked everyone for attending. The next meeting is August 20th, 2019 at 2:30 pm. The meeting was adjourned.

Charleston Area Hazard Mitigation Plan
Annual Meeting #1
Meeting Minutes
4045 Bridge View Dr, Rm B-339
September 18, 2019 2:30pm

Attendees:

Property Protection/Preventative Activities: Buddy Smith (Town of Awendaw), Rob Rogerson (Town of Mount Pleasant), Stephen Julka (City of Charleston)

Structural Projects: Emily DeMore (Town of Mount Pleasant), Aaron Pope* (Town of Folly Beach), Eric Lutz (Town of Folly Beach)

Natural Benefits: James Whittaker (City of North Charleston), Jody Muldrow (Town of Awendaw)

Emergency Services: Brock Clary (CCSD), Shawn Engelman (JIPSD)

Others in Attendance: Katie Faith (Charleston County Building Services), Mark Cartwright* (Roper St. Francis Hospital), Merrie Koester* (USC Center for Science Education), Michelle McClellan* (Town of McClellanville), Stewart Weinberg (City of Charleston), Sonya Gentry (Town of Ravenel), Jacob Smith (City of Charleston), Anne Sass (Roper St. Francis Hospital), Bruce Spicher (Town of Kiawah Island), John Gregg (Town of Seabrook Island), Michelle McCutchen (Charleston Water System), Sean Dove (Charleston County Building Services), Anna Kimelblatt (Graduate Student Intern College of Charleston)

Opening Comments and Introduction: Katie Faith thanked everyone for coming and noted that this will likely be the final HMP Committee Meeting for the year unless anyone had a strong objection or issue. She gave a brief synopsis of the agenda followed by a motion to approve the minutes from the previous HMP/Project Impact meeting held on July 17, 2019. The motion was seconded and approved by participants.

Follow up on Action Items for 2019 HMP Update: Ms. Faith announced that she was still missing some adoption resolutions from certain municipalities, and that an email was sent to those who had not yet sent their updated adoption resolution. She reminded attendees that these resolutions are important because they will not be able to receive federal assistance in the event of a disaster if they have not adopted the plan. She also mentioned that there were certain municipalities who still had not completed the HMP update survey. Survey results would be checked the following morning and added to the updated plan.

Ms. Faith then requested updated repetitive loss (RL) area statistics from the municipalities. The statistic requested is a total number of RL properties for the municipality. It was noted by an attendee that the Town of Kiawah has zero RL properties.

Discussion on annual meeting schedule: Next, Ms. Faith announced the schedule for future HMP committee meetings. The proposed schedule included quarterly meetings on the third Wednesday of March, May, July, and September at 2:30pm. The intention of this new schedule is to not have meetings as close together as occurred in the 2019 planning period. The schedule attachment received by attendees contained milestones and goals for each quarterly meeting in order to create a standard timeline for future HMP updates. One participant raised the concern that some of the

quarterly meetings existed during hurricane season and proposed concentrating the meetings within the months of May through September so that the update would be complete prior to hurricane season. Ms. Faith noted that the start of the federal fiscal year is October, and therefore FEMA uses the council adopted version of the plan with respect to grant or disaster funding. The original concern was echoed by another participant who proposed to shift the first three meetings to earlier in the year and save the final meeting for closer to the start of the federal fiscal year. There were no objections to this proposal and it seemed to be the preferred schedule for most participants. Another participant commented that the final meeting should be in August as the greater Charleston area is typically under threat of hurricanes in early September, and there would be a risk of cancellation for the final meeting. It was decided that the first three meetings would occur earlier in the year and the final meeting would occur as close to the new fiscal year as possible but ideally outside of peak hurricane season.

Discussion on HMP Annual Checklist and Responsibilities: Following an explanation of the proposed schedule, Ms. Faith reviewed the responsibilities of the county and the municipalities with respect to updating the HMP, which were summarized for attendees in an attachment. She reviewed that Category 1 contains in-house responsibilities of the County, Category 2 contains the responsibilities of the municipalities, and Category 3 encompasses the responsibility of all participating parties to conduct a comprehensive review and provide any major changes or updates at the annual meeting. Ms. Faith noted that the vast majority of Category 2 responsibilities for the municipalities could be completed simply by taking the update survey.

Ms. Faith opened the floor to any questions or comments with respect to the schedule or designated responsibilities. There were no additional comments besides the aforementioned changes to the proposed schedule.

Discussion on Summary of Major Changes to 2019-2020 HMP: Ms. Faith then reviewed the summary of changes to the updated HMP. Most of the changes were routine, but she noted that the plan has been reorganized so that each municipality has its own section of the HMP that can be easily isolated from the entire plan for individual review. The full plan will be available on the county website. Additionally, it was announced that the Pepperhill study from North Charleston had been incorporated as an amendment to the updated plan. Ms. Faith informed the attendees that they can always reach out to her if they require an amendment in the future and she would coordinate with FEMA to accommodate those requests. There were no questions or comments with respect to the summary of major changes. A motion to approve this version of the updated HMP was put forward, and subsequently seconded. The plan was approved.

Ms. Faith reminded the representatives from the different municipalities that those who participated in the Community Rating System would need to notify their respective councils of the approved updated plan by October 1, 2019.

Good of the Order: Ms. Faith thanked everyone for attending and the meeting was adjourned.

A.7 - Charleston Regional Hazard Mitigation Plan Summary of Changes

Summary of Changes Made to the Charleston Regional Hazard Mitigation Plan for 2019-2020 Update:

Section 1: Introduction

- Background (1.1): Updated the number of activities in the PIP.
- Community Profile (1.2): Added Figure 1.1, Figure 1.2 to the Climate section.
 - Reworded “The People” section to include more up to date demographics and data of the area including growth, age, employment and race. Added Figures 1.3-1.6.
 - Reworded “The Government” section to include how the County to structured and the elected positions.
- Goals (Section 1.3): Moved Goals section up from 1.5 to follow the rest of the order and renumbered appropriately.
- The Planning Process (1.4): Updated language about the most recent survey.
 - Added wording on the PIP and how it has evolved in the last year.
- Hazard Assessment (1.6): Updated language to coincide with the latest survey findings.
- Problem Assessment (1.7): Updated the building count due to vulnerability.
- Project Impact Org Chart (A 1-A): Updated the organizational chart to reflect the bylaws.

Section 2: Goals

- Updated the number of partners in Project Impact.
- Reordered the goals for the Plan based on the latest survey.

Section 3: Planning Process

- Pre Planning Request for Input (3.1): Updated language about the survey including the biggest hazard threats to the area.
- Public Input (3.3): Included language about the addition of emergency preparedness and resiliency of communities to the surveys.
- Local Jurisdiction Adoption (3.4): Updated when the readoption process would occur.
- Planning Process Summary (3.6): Added the most recent public meetings about the Plan.
- Updated all of the tables and attachments for this section.

Section 4: Hazard Assessment: Background and Classification are unchanged and remain in this section. Location, Historical Occurrences, and Probability are inserted into each jurisdiction in the *new* Section 5

- Prioritization (4.1): Updated all survey results and wording.
 - Added an emergency preparedness subsection to explain the new questions added to the survey this year.
 - Included a table of all hazard events occurring in 2018-2019.
 - Reordered sections based on the priority results of the survey.
- Hurricane (4.2):
 - Updated the Occurrences and the probability for this past year.

- Flooding (4.3): Updated Historical Occurrences and Probability for this past year.
- Sea Level Rise (4.4): Added this entire section based off the survey.
- Hazardous Materials (4.7): Updated historical occurrences for this year.
- Terrorism (4.8): Updated historical occurrences for this year.
- Wildfire (4.9): Updated historical occurrences for this year.
- Rip Currents (4.12): Updated historical occurrences for this year.
- Severe Storm (4.13): Updated historical occurrences for this year.
- Drought (4.14): Updated historical occurrences for this year.
- Updated the following tables: Table 4.1, 4.2, 4.3.

***New* Section 5: Hazard and Problem Assessment Per Jurisdiction:** we broke out each jurisdiction individually and updated hazard histories specific to each jurisdiction in the appropriate place.

Section 5: Problem Assessment

- Table 5-1: Update to reflect the new hazard of Sea Level Rise and remove Avian Flu.
- Vulnerable Buildings (5.2): Updated wording to reflect the latest survey results.
 - Updated building numbers to reflect most recent SFHA and repetitive loss report
- Infrastructure Vulnerability (5.3): Updated the wording to reflect the latest survey results.
 - Added sea level rise to the analysis with flooding.
- Known Flood Damages (5.4): Updated the repetitive loss data.
 - Updated Table 5-11.
- Critical Facilities (5.7): Updated the number of critical facilities in the County.
 - Updated wording based on most recent survey results.
- Natural and Beneficial Functions of Floodplains (5.8): Added wording on the functions of a floodplain, why they are needed and how they work. Two pictures were also included.
- Development and Population Trends (5.9): Updated population information for the County.
- Resiliency to Hazards (5.11): Added this section in to cover the responses given to the questions asked in the survey from this year.
- Added Table 5-9, 5-10, 5-12 and 5-15.
- Updated the following attachments: 5-A, 5-B, 5-C, 5-D, 5-E and 5-F.

Section 6: Possible Activities

- Prioritizing Projects (6.1): Updated language based on the survey.
- Public Information Plan (6.2): Made the document more concise and referred to Appendix 1 where whole PIP is located within this document.
- Preventative Actions (6.3): Reference Appendix 1 and explained what the committee does.
- Public Information Plan Activities (6.8): Added language to reference Appendix 1.
- Updated Table 6-1, 6-2, 6-3, 6-4, 6-5, and 6-6 to include all Preventative activities in the County.
- Updated Attachment 6-C to include all drainage projects.

- Removed Attachment 6-D as it will be included in Appendix 1.

Section 7: Adopting Resolution and Jurisdiction-Specific Action Plans

- Included Adopting resolutions and action plans for 2018-2019 for the following plan signatory jurisdictions:
 - Unincorporated Charleston County
 - Town of Awendaw
 - College of Charleston
 - Charleston Water System
 - Charleston County Parks & Recreation Commission
 - Charleston County School District
 - City of Charleston
 - Cooper River Parks & Playground Commission
 - City of Folly Beach
 - Town of Hollywood
 - City of Isle of Palms
 - Town of James Island
 - James Island Public Service District Commission
 - Town of Kiawah Island
 - Town of Lincolnville
 - Town of McClellanville
 - Town of Meggett
 - Town of Mt. Pleasant
 - Mt. Pleasant Water Works Commission
 - City of North Charleston
 - North Charleston District
 - North Charleston Sewer District
 - Town of Ravenel
 - Town of Rockville
 - Roper St. Francis
 - St. Andrews Parish Parks and Playground Commission
 - St. Andrews Public Service District
 - St. Johns Fire Service District
 - St. Paul’s Fire Service District
 - Town of Seabrook Island
 - Town of Sullivan’s Island

Section 8: Appendices

- Added Appendix 1 (Overview of the Public Information Plan) and renumbered the subsequent appendices appropriately.
- Public Meeting Notices 2019 (A.4): Added the announcements for this year’s 3 meetings.
- Previous Yearly Meeting Minutes 2019(A.5): Added the meeting minutes for this year’s meetings.
- Added Appendix 14 (Pepperhill-McChune Branch Drainage Study)
- CRHMP Summary of Changes 2019 (A.6): Added the summary of changes for this plan.

A.8 – Impact Statements

Impacts for all Hazards for Unincorporated Charleston County	
Hazard	Impact

Hurricane	Hurricanes and Tropical Storms threaten the entire Atlantic Coast. Landing patterns are unpredictable until the storm has formed and is within a short time from landing. The amount of impact is dependent on size of storm, speed, and location of landfall, if any. The portions of Unincorporated Charleston County (Edisto Island, Johns Island, Unconsolidated Awendaw area, Dewees Island) closer to the coast will experience greater effects from a hurricane. The impact of hurricanes (high winds, storm surge, rainfall) is lesser than most jurisdictions as we have limited beach/coastline under jurisdiction.
Flooding	Around 65% of the Charleston Region is in a floodplain. Some portions of the County aren't located in the floodplain but are still considered at risk for the aftermaths of a flooding event. Impact of flooding can be severe depending on how much rain occurs in a short period of time. Unincorporated Charleston County is also impacted by rainfall from the upstate as seen in 2015, mainly the Santee Watershed but also the Edisto. Due to the rural majority of the County, the lack of infrastructure to access flooded and damaged homes is impactful as seen in Hurricane Matthew (2016).
Sea Level Rise	The impact of this hazard has yet to be seen to full magnitude. With the limited beachfront properties and development, the impact of this hazard will be minimal. King tides are the best measurement of this event. For unincorporated Charleston County, little infrastructure or buildings are impacted regularly. It is expected to be have greater impact within the next 20 years.
Earthquake	Historically, impacts to earthquakes on Unincorporated Charleston County have been minimal. As most of the Unincorporated Areas are to the east and west, with the fault line being to the north, impacts of buildings are minimal. If there were to be a major earthquake at this fault line, there would inevitably be damage to building and infrastructure, but other jurisdictions would be hit more severely. Fault lines outside of Charleston County should also be monitored as aftershocks can be catastrophic and trigger other seismic events.
Tornado	The impact of the most recent tornado on Johns Island in 2015 caused over \$1.5 million in damages. The unpredictability of tornadoes can be very impactful even in rural communities like most of the unincorporated Charleston County. Mobile homes are especially at risk and would be the most impacted.
Hazardous Materials	The impact of a hazard materials spill in Unincorporated Charleston County would not be impactful unless in the West Ashley, Mt Pleasant or James Island area. Those areas closer to ports or more vulnerable populations or water sources will have a higher impact on Unincorporated Charleston County.

Terrorism	The higher impact would be on the portions of the County closer to the Peninsula. Little impact would occur in the far east and west portions of the County. The impact would be dependent on the scale and type of terrorism.
Wildfire	The impact of wildfires would be detrimental to the natural resources and beautification of Unincorporated Charleston County as well as farmers and agriculturalists. The size of the fire and origination would depict the overall impact.
Tsunamis	The impact of tsunamis has been minimal to Unincorporated Charleston County.
Dam Failure	The highest impact of dam failure is to the eastern part of Charleston County. Past impacts have been minimal and are expected to stay that course.
Rip Currents	Unincorporated Charleston County is not impacted by this.
Severe Storm	There are impacts to Unincorporated Charleston County for severe storms depending on wind speed, hail size and rainfall. Cars and residential homes, especially mobile homes, are at risk and would have the most impact. Overall, severe storms have caused roughly as much as \$140,000 worth of damage, but typical damage is about \$15,000.
Drought	The impact of drought is minimal on the County as the droughts typically experienced is D1 (moderate drought). The damages this would put on the County is minimal, though farmers would be more impacted and reside more in Unincorporated Charleston County than other jurisdictions.
Winter Weather	Most winter hazards are associated with vegetation damage, freezing pipes, and occasional icing of roads. With the most recent event in 2018, the impact to the area was road integrity, economic loss of businesses closing, and burst pipes. Winter weather does not impact the County often.

Impacts for all Hazards for Roper St. Francis Healthcare	
Hazard	Impact
Hurricane	Hurricanes and Tropical Storms threaten the entire Atlantic Coast. Landing patterns are unpredictable until the storm has formed and is within a short time from landing. The amount of impact is dependent on size of storm, speed, and location of landfall, if any. The portions of Roper St. Francis Healthcare on the peninsula will experience greater effects from a hurricane. The impact of hurricanes (high winds, storm surge, rainfall) is lesser than most jurisdictions as we have limited beach/coastline under jurisdiction.
Flooding	During the last major storm, flooding was significant enough that vehicles were almost completely overtaken around the hospital. During large tidal surges flooding is observed at the corner of Calhoun and Courtney as well as parking lot near the marina on Calhoun. This is further compounded if there is any rain associated with the tidal even and water can flow in the crawlspace beneath the hospital.
Sea Level Rise	The impact of this hazard has yet to be seen to full magnitude. King tides are the best measurement of this event. For Roper, the infrastructure or buildings that are impacted regularly are located on the Peninsula. It is expected to be have greater impact within the next 20 years.
Earthquake	Historically, impacts to earthquakes on Roper St. Francis have been minimal. As most of the Hospitals are to the east and west, with the fault line being to the north, impacts of buildings are minimal. If there were to be a major earthquake at this fault line, there would inevitably be damage to building and infrastructure, but other jurisdictions would be hit more severely. Fault lines outside of Charleston County should also be monitored as aftershocks can be catastrophic and trigger other seismic events.
Tornado	Tornadoes do not impact Roper St. Francis as the building standards are more than the average facility due to it being a hospital.
Hazardous Materials	The impact of a hazard materials spill for Roper would be impactful especially on the peninsula and North Charleston are where they would be more at risk. Those areas closer to ports or more vulnerable populations or water sources will have a higher impact. Historically, little impact has occurred.
Terrorism	The higher impact would be on the portions of the healthcare system closer to the Peninsula, but really all facilities would be impacted for a terrorist attack. The impact would be dependent on the scale and type of terrorism.
Wildfire	Historically, little to no impact has occurred due to wildfires.
Tsunamis	The impact of tsunamis has been minimal to Roper St. Francis.

Dam Failure	The highest impact of dam failure is to the eastern part of Charleston County where the Mount Pleasant Hospital lies. Past impacts have been minimal and are expected to stay that course.
Rip Currents	Roper St Francis is not impacted by this.
Severe Storm	There are impacts to Roper for severe storms depending on wind speed, hail size and rainfall. Overall, severe storms have caused roughly as much as \$140,000 worth of damage, but typical damage is about \$15,000.
Drought	The impact of drought is minimal on Roper as the droughts typically experienced is D1 (moderate drought).
Winter Weather	Little impact occurred to Roper facilities in recent years. Winter weather does not impact the County often.

Impacts for all Hazards for St. Andrew's Parks and Playground Commission	
Hazard	Impact
Hurricane	Impact is dependent on the size of the storm and location of landfall. Our primary concern during a storm is damage from wind and rising storm waters.
Flooding	Our biggest concern is damage from flood waters. Much of our property is in low lying areas and several of our fields are particularly vulnerable to flooding.
Sea Level Rise	We have not seen any impact from sea level rise as most of our properties are well away from the coast.
Earthquake	Should there be a strong earthquake in our area in or near the fault line, we can expect moderate to severe damage to some of our buildings.
Tornado	Damage from tornado could be extreme. Our most vulnerable buildings and park structures would not be able to withstand the winds of a F2 or greater tornado.
Hazardous Materials	Our jurisdiction is heavily populated and therefore would be vulnerable to hazard materials release.
Terrorism	Our jurisdiction is heavily populated and therefore would be vulnerable to terrorism.
Wildfire	The impact of wildfires would depend on the location. Several of our properties are heavily wooded.
Tsunamis	Our jurisdiction is well away from the coast and expected impact from a tsunami would be minimal
Dam Failure	Our jurisdiction is well away from the nearest dam structure and impact from dam failure would be minimal.
Rip Currents	We do not have any coastal beachfront properties and therefore impact from rip currents is minimal.
Severe Storm	The greatest area of concern with a severe storm is the impact from rising water in low lying areas
Drought	Recreation fields are typically more vulnerable to drought as turf grass is difficult to maintain without adequate irrigation.

Winter Weather

Locations in our coastal areas do not typically experience severe winter weather but prolonged freezing temperatures can cause issues with burst pipes and HVAC equipment.

Impacts for all Hazards for the Town of Hollywood	
Hazard	Impact
Hurricane	Hurricanes and Tropical Storms threaten the entire Atlantic Coast. Landing patterns are unpredictable until the storm has formed and is within a short time from landing. The amount of impact is dependent on size of storm and speed. The impact of hurricanes (high winds, storm surge, rainfall) is lesser than most jurisdictions as we have limited beach/coastline under jurisdiction. Affects will be possible along our Riverland areas fronting the Rantowels Creek, Wallace River, Stono River, Toogoodoo Creek and Wadmalaw River.
Flooding	Impact of flooding can be severe depending on how much rain occurs in a short period of time. Hollywood is also impacted by rainfall from the upstate as seen in 2015, mainly the Santee Watershed but also the Edisto. The lack of infrastructure to access flooded and damaged homes is impactful as seen in Hurricane Matthew (2016). Areas of concern are around the intersection of Baptist Hill Road and Toogoodoo Road; Toogoodoo and Kings Path; Toogoodoo and Sam King; Toogoodoo and Erica Place in particular as they are in current AE (El. 12) and have experienced a lot of water when we had heavy rain events.
Sea Level Rise	The impact of this hazard has yet to be seen to full magnitude. With the no beachfront properties and development, the impact of this hazard will be minimal. King tides are the best measurement of this event. For Hollywood, little infrastructure or buildings are impacted regularly. It is expected to be have greater impact within the next 20 years.

<p>Earthquake</p>	<p>Historically, impacts to earthquakes on Hollywood have been minimal. As most of the Unincorporated Areas are to the east and west, with the fault line being to the north, impacts of buildings are minimal. If there were to be a major earthquake at this fault line, there would inevitably be damage to building and infrastructure, but other jurisdictions would be hit more severely. Fault lines outside of Charleston County should also be monitored as aftershocks can be catastrophic and trigger other seismic events.</p>
<p>Tornado</p>	<p>Impact has been minimal but could have been much greater as the most recent tornado on Johns Island in 2015 caused over \$1.5 million in damages. The unpredictability of tornadoes can be very impactful even in rural communities like most of the unincorporated Charleston County. Mobile homes are especially at risk and would be the most impacted.</p>
<p>Hazardous Materials</p>	<p>The impact of a hazard materials spill in Hollywood would not be impactful unless in the West Ashley or Johns Island area. There has been an event located on the West Ashley/Johns Island-area that involved a sewer line break which impacted the shell fish in the local vicinity.</p>
<p>Terrorism</p>	<p>The higher impact would be on the portions of the County closer to the Peninsula. Little impact would occur in the Hollywood/St. Paul's portion of the County. The impact would be dependent on the scale and type of terrorism.</p>
<p>Wildfire</p>	<p>The impact of wildfires would be detrimental to the natural resources and beautification of Hollywood as well as farmers and agriculturalists. The size of the fire and origination would depict the overall impact. There are many large, forested tracts of land with fuel for wildfire.</p>
<p>Tsunamis</p>	<p>The impact of tsunamis has been minimal to the Town of Hollywood.</p>
<p>Dam Failure</p>	<p>Past impacts have been minimal and are expected to stay that course.</p>

Rip Currents	The Town of Hollywood is not impacted by this.
Severe Storm	There are impacts to the Town of Hollywood for severe storms depending on wind speed, hail size and rainfall. Cars and residential homes, especially mobile homes, are at risk and would have the most impact. Overall, severe storms have caused roughly as much as \$140,000 worth of damage, but typical damage is about \$15,000.
Drought	The impact of drought is minimal on the Town as the droughts typically experienced is D1 (moderate drought). The damages this would put on the Town is minimal, though farmers would be more impacted.
Winter Weather	Most winter hazards are associated with vegetation damage, freezing pipes, and occasional icing of roads. With the most recent event in 2018, the impact to the area was road integrity, economic loss of businesses closing, and burst pipes. Winter weather does not impact the Town often.

Impacts for all Hazards for Charleston Water System	
Hazard	Impact
Hurricane	Hurricanes and Tropical Storms threaten the entire Atlantic Coast. Landing patterns are unpredictable until the storm has formed and is within a short time from landing. The amount of impact is dependent on size of storm and speed. The impact of hurricanes (high winds, storm surge, rainfall) is lesser than most jurisdictions as we have limited beach/coastline under jurisdiction.
Flooding	Impact of flooding can be severe depending on how much rain occurs in a short period of time. Hollywood is also impacted by rainfall from the upstate as seen in 2015, mainly the Santee Watershed but also the Edisto. The lack of infrastructure to access flooded and damaged homes is impactful as seen in Hurricane Matthew (2016). Areas of concern are low-lying areas throughout the City of Charleston.
Sea Level Rise	The impact of this hazard has yet to be seen to full magnitude. With the no beachfront properties and development, the impact of this hazard will be minimal. King tides are the best measurement of this event. For Hollywood, little infrastructure or buildings are impacted regularly. It is expected to be have greater impact within the next 20 years.
Earthquake	Historically, impacts to earthquakes on Hollywood have been minimal. As most of the Unincorporated Areas are to the east and west, with the fault line being to the north, impacts of buildings are minimal. If there were to be a major earthquake at this fault line, there would inevitably be damage to building and infrastructure, but other jurisdictions would be hit more severely. Fault lines outside of Charleston County should also be monitored as aftershocks can be catastrophic and trigger other seismic events.

Tornado	Impact has been minimal but could have been much greater as the most recent tornado on Johns Island in 2015 caused over \$1.5 million in damages. The unpredictability of tornadoes can be very impactful even in rural communities like most of the unincorporated Charleston County. Mobile homes are especially at risk and would be the most impacted.
Hazardous Materials	The impact of a hazard materials spill in Hollywood would not be impactful unless in the West Ashley or Johns Island area. There has been an event located on the West Ashley/Johns Island-area that involved a sewer line break which impacted the shell fish in the local vicinity.
Terrorism	The higher impact would be on the portions of the County closer to the Peninsula. Little impact would occur in the Hollywood/St. Paul's portion of the County as most of this area is not serviced by Charleston Water. The impact would be dependent on the scale and type of terrorism.
Wildfire	The impact of wildfires would be detrimental to the natural resources and beautification of Hollywood as well as farmers and agriculturalists. The size of the fire and origination would depict the overall impact. There are many large, forested tracts of land with fuel for wildfire.
Tsunamis	The impact of tsunamis has been minimal to Charleston Water.
Dam Failure	Past impacts have been minimal and are expected to stay that course.
Rip Currents	Charleston Water System is not impacted by this.
Severe Storm	The main impacts to Charleston Water would be downed tree limbs, flash flooding and sewer backups that affect the day to day operations.
Drought	The impact of drought is minimal on Charleston Water as the droughts typically experienced is D1 (moderate drought). The damages this would put on the Town is minimal, though farmers would be more impacted.

Winter Weather

Most winter hazards are associated with vegetation damage, freezing pipes, and occasional icing of roads. With the most recent event in 2018, the impact to the area was road integrity, economic loss of businesses closing, and burst pipes. Winter weather does not impact the Water System often.

Impacts for all Hazards for Mt Pleasant Waterworks Commission	
Hazard	Impact
Hurricane	Mount Pleasant Waterworks has a comprehensive Emergency Management Plan that covers the effects and impacts of hurricanes regardless of category. The impacts of a hurricane will generally be flooding and infrastructure damage that will limit our ability to provide water and sewer services to the Town of Mount Pleasant until repairs have been made. The low-lying areas around the "Old Village" would be hardest hit. Also, of concern is the aging infrastructure located there. The Mount Pleasant area has barrier islands that provide a small buffer area that will take the impact of a hurricane should it be a direct landfall.
Flooding	Two types of flooding occur in Mount Pleasant: localized flooding and flooding from rising water caused by a storm. Localized flooding is caused from blocked drainage systems or inadequate drainage facilities. Storm flooding or "storm surge" is due to rising water caused by tropical storms and hurricanes. This type of flooding may also have wave action which could exert velocity impact forces against structures located in coastal high hazard areas. Depending on the level of flooding our pump stations could be overwhelmed causing wastewater flooding in certain areas.
Sea Level Rise	Mount Pleasant has minimal impact from sea level rise. King tides are becoming more of an event and Mount Pleasant Waterworks will be addressing this issue soon.
Earthquake	Mount Pleasant Waterworks has a comprehensive Emergency Management Plan that addresses the impacts of an earthquake. Impacts from earthquakes have had minimal impact on the Mount Pleasant area. If there was a major earthquake to hit our area there is the potential for major damage to our infrastructure as well as our buildings making repairs a real challenge.
Tornado	Mount Pleasant Waterworks has a comprehensive Emergency Management Plan that addresses our response to impacts from a tornado. The unpredictability of tornados can be impactful on our infrastructure as well as our buildings making repairs a challenge. In 2017, Tropical Storm Irma passed through our area as a EFO-80 strength tornado, with winds at 80mph, formed on the marsh between Mount Pleasant and Sullivan's island.
Hazardous Materials	Mount Pleasant Waterworks has a Comprehensive Emergency Management Plan that addresses various hazardous materials releases. We have eliminated major hazardous chemicals that we use in our treatment processes to the greatest extent possible. However, chemical releases could be harmful to our environment.
Terrorism	The impact would depend on the scale and location of the terrorist attack. Mount Pleasant Waterworks employs a Security Response Team to handle small scale events. Our Emergency Management Plan covers terrorist attacks and its impact on our operations.

Wildfire	There would be minimal impact on our infrastructure system should there be a wildfire in our area. However, depending on the location some buildings might be impacted.
Tsunamis	The probability of tsunamis is minimal to the Mount Pleasant Area. Impact would be similar to flooding.
Dam Failure	Minimal impacts expected by dam failure to the Mount Pleasant area. Though the many dam failures in recent weather events have been severe, our area was not impacted by them.
Rip Currents	The Mount Pleasant area is not expected to have impacts from rip currents.
Severe Storm	Mount Pleasant Waterworks has a comprehensive Emergency Management Plan that addresses severe storms and their impacts on our infrastructure. Depending on the severity of the storm and locations, things like downed power lines could cause failures on pump stations and other processes. Fallen trees could disrupt infrastructure as well. Heavy rains could cause flooding in low lying areas.
Drought	The impact on Mount Pleasant Waterworks depends on the severity of the drought. A long-term drought would have an impact of water systems and their capabilities to provide water for our customers. MPW has a drought response plan with action levels based on certain triggers.
Winter Weather	Mount Pleasant Waterworks has a comprehensive Emergency Management Plan that addresses various types of winter weather events. With the snowstorm experience in early 2018 and with the freezing rain of 2014 we experienced issues with infrastructure and difficulty traveling on hazardous roads to make repairs. Harsh winter weather does not happen often in the Mount Pleasant area.

Impacts for all Hazards for the Town of Lincolville	
Hazard	Impact
Hurricane	The amount of impact is dependent on size of storm, speed, and location of landfall, if any. Lincolville is not routinely impacted by hurricanes as it is one of the most inland parts of Charleston County. However, there are some mobile homes that could be effected by wind.
Flooding	Minimal impacts of flooding. The Town has no buildings in the floodplain so there is little impact.
Sea Level Rise	This hazard does not affect Lincolville.
Earthquake	Historically, impacts to earthquakes on the Town of Lincolville have been minimal. This Town is close to the fault line in Summerville, but there is little infrastructure in Lincolville.
Tornado	The effects of tornadoes have not occurred in recent history.
Hazardous Materials	Lincolville has not been impacted by this hazard but is surrounded by major thoroughfares and could be impacted by a chemical spill.
Terrorism	The Town has not been impacted by terrorism.
Wildfire	The Town has not been impacted by wildfires and is surrounded by urban area.
Tsunamis	The Town has not been impacted by tsunamis.
Dam Failure	The Town has not been impacted by dam failure.
Rip Currents	The Town has not been impacted by rip currents and not at risk for it.
Severe Storm	Severe storms occur every year. The worst impact has been downed tree limbs.
Drought	The impact of drought is minimal on the Town as the droughts typically experienced is D1 (moderate drought). The damages this would put on the Town is minimal.
Winter Weather	Most winter hazards are associated with vegetation damage, freezing pipes, and occasional icing of roads. With the most recent event in 2018, the impact to the area was road integrity, economic loss of businesses closing, and burst pipes. Winter weather does not impact the Town often.

Impacts for all Hazards for Town of Meggett	
Hazard	Impact
Hurricane	Hurricanes and Tropical Storms threaten the entire Atlantic Coast. Landing patterns are unpredictable until the storm has formed and is within a short time from landing. The amount of impact is dependent on size of storm, speed, and location of landfall, if any. The portions of the Town are impacted by storm surge, specifically near Ethel Post Office Road and the DOT bridge.
Flooding	Flooding has minimal impact on Meggett to good building codes regulations and freeboard requirements. There are some portions of the Town that are still considered at risk for the aftermaths of a flooding event. Impact of flooding can be severe depending on how much rain occurs in a short period of time.
Sea Level Rise	The impact of this hazard has yet to be seen to full magnitude. With the limited riverfront properties and development, the impact of this hazard will be minimal.
Earthquake	Historically, impacts to earthquakes on the Town have been minimal. Fault lines outside of the Town should be monitored as aftershocks can be catastrophic and trigger other seismic events.
Tornado	The impact of tornadoes have been minimal. The unpredictability of tornadoes can be very impactful even in rural communities. Mobile homes are especially at risk and would be the most impacted.
Hazardous Materials	The impact of a hazard materials spill has been minimal in Meggett as there are not a lot of commercial businesses.
Terrorism	There is not a high threat or previous impact on the Town for terrorism.
Wildfire	The impact of wildfires has been minimal to the Town.
Tsunamis	The impact of tsunamis has been minimal to the Town.
Dam Failure	The impact of dam failure has been minimal to the Town.
Rip Currents	The Town is not impacted by this.
Severe Storm	There are impacts to the Town of Meggett for severe storms depending on wind speed, hail size and rainfall. Cars and residential homes, especially mobile homes, are at risk and would have the most impact. Overall, severe storms have caused roughly as much as \$140,000 worth of damage, but typical damage is about \$15,000.
Drought	The impact of drought is minimal on the Town as the droughts typically experienced is D1 (moderate drought). The damages this would put on the County is minimal.
Winter Weather	Most winter hazards are associated with vegetation damage, freezing pipes, and occasional icing of roads. With the most recent event in 2018, the impact to the area was road integrity, economic loss of businesses closing, and burst pipes. Winter weather does not impact the Town often.

Impacts for all Hazards for Town of Rockville	
Hazard	Impact
Hurricane	Hurricanes and Tropical Storms threaten the entire Atlantic Coast. Landing patterns are unpredictable until the storm has formed and is within a short time from landing. The amount of impact is dependent on size of storm, speed, and location of landfall, if any. The portions of the Town are impacted by storm surge, specifically near the marina.
Flooding	Flooding has minimal impact on Rockville due to good building codes regulations and freeboard requirements. No reports of flooding have occurred from the past 5 years.
Sea Level Rise	The impact of this hazard has yet to be seen to full magnitude. With the limited riverfront properties and development, the impact of this hazard will be minimal.
Earthquake	Historically, impacts to earthquakes on the Town have been minimal. Fault lines outside of the Town should be monitored as aftershocks can be catastrophic and trigger other seismic events.
Tornado	The impact of tornadoes have been minimal. The unpredictability of tornadoes can be very impactful even in rural communities. Mobile homes are especially at risk and would be the most impacted.
Hazardous Materials	The impact of a hazard materials spill has been minimal in Rockville. There could be a possibility with the boat marina store.
Terrorism	There is not a high threat or previous impact on the Town for terrorism.
Wildfire	The impact of wildfires has been minimal to the Town.
Tsunamis	The impact of tsunamis has been minimal to the Town.
Dam Failure	The impact of dam failure has been minimal to the Town.
Rip Currents	The Town is not impacted by this.
Severe Storm	There are impacts to the Town of Rockville for severe storms depending on wind speed, hail size and rainfall. Cars and residential homes, especially mobile homes, are at risk and would have the most impact. Overall, severe storms have caused roughly as much as \$140,000 worth of damage, but typical damage is about \$15,000.
Drought	The impact of drought is minimal on the Town as the droughts typically experienced is D1 (moderate drought). The damages this would put on the County is minimal.
Winter Weather	Most winter hazards are associated with vegetation damage, freezing pipes, and occasional icing of roads. With the most recent event in 2018, the impact to the area was road integrity, economic loss of businesses closing, and burst pipes. Winter weather does not impact the Town often.

Impacts for all Hazards for North Charleston Sewer District	
Hazard	Impact
Hurricane	Hurricanes and Tropical Storms threaten the entire Atlantic Coast. Landing patterns are unpredictable until the storm has formed and is within a short time from landing. The amount of impact is dependent on size of storm, speed, and location of landfall, if any. The impact to North Charleston Sewer District will depend on windspeed, rainfall, storm surge, and our ability to access and assess our service area after the event.
Flooding	Flooding has a major impact on North Charleston Sewer District due to infiltration into our underground infrastructure. Flooding places a large strain on our pump stations and treatment process. With this added strain on our system it also places our customers at more of a risk to have a sewer overflow in their residence. It also places our properties in low lying areas at the risk of flooding.
Sea Level Rise	The impact of this hazard has yet to be seen to full magnitude however there will be flooding associated with this hazard.
Earthquake	The impact of an earthquake is unknown but of concern due to our underground infrastructure.
Tornado	There are impacts to North Charleston Sewer District for tornados depending on wind speeds.
Hazardous Materials	The impact of a hazard materials spill into our system could have a major impact depending on location and material. It could adversely affect our biomass and could take weeks to recover.
Terrorism	There has not been any attempts and likelihood is low. An attack killing our biomass would have a major impact on treatment process and could take weeks to recover.
Wildfire	The impact of wildfires has been minimal to North Charleston Sewer District.
Tsunamis	The impact of tsunamis has been minimal to North Charleston Sewer District.
Dam Failure	North Charleston Sewer District could be impacted by the amount of water released.
Rip Currents	North Charleston Sewer District is not impacted by this.
Severe Storm	There are impacts to North Charleston Sewer District for severe storms depending on wind speeds and rainfall. The system can become inundated with infiltration affecting our treatment process.
Drought	North Charleston Sewer District is not impacted by this.
Winter Weather	Most winter hazards are associated with occasional icing of roads and driving conditions.

Impacts for all Hazards for Town of Ravenel	
Hazard	Impact
Hurricane	Hurricanes and Tropical Storms threaten the entire Atlantic Coast. Landing patterns are unpredictable until the storm has formed and is within a short time from landing. The amount of impact is dependent on size of storm, speed, and location of landfall, if any. The impact of hurricanes (high winds, storm surge, rainfall) is lesser for the Town of Ravenel than most jurisdictions as we have limited beach/coastline under jurisdiction.
Flooding	Ravenel is located in a floodplain so it is considered at risk for the aftermaths of a flooding event. Impact of flooding can be severe depending on how much rain occurs in a short period of time. The Town of Ravenel is also impacted by rainfall from the upstate as seen in 2015, mainly the Santee Watershed but also the Edisto.
Sea Level Rise	The impact of this hazard has yet to be seen to full magnitude. With the limited beachfront properties and development, the impact of this hazard will be minimal. King tides are the best measurement of this event. For the Town of Ravenel, little infrastructure or buildings are impacted regularly. It is expected to have greater impact within the next 20 years.
Earthquake	Historically, impacts from earthquakes on the Town of Ravenel have been minimal. However, two fault lines meet in Ravenel. If there were to be a major earthquake at these fault lines, there could likely be catastrophic damage to buildings and infrastructure. Fault lines outside of Ravenel should also be monitored as aftershocks can be catastrophic and trigger other seismic events.
Tornado	The impact of the most recent tornado on Johns Island in 2015 caused over \$1.5 million in damages. The unpredictability of tornadoes can be very impactful even in rural communities like the Town of Ravenel. Mobile homes are especially at risk and would be the most impacted. The Town of Ravenel contains many mobile homes.
Hazardous Materials	The Town of Ravenel is located along Highway 17 as well as railroad tracks, so it is vulnerable to hazardous material spills. The impact of a hazardous materials spill in Ravenel could be large.

Terrorism	There is not a high threat on the Town for terrorism.
Wildfire	The impact of wildfires would be detrimental to the natural resources and beautification of Ravenel as well as farmers and agriculturalists. The size of the fire and origination would depict the overall impact.
Tsunamis	The impact of tsunamis has been minimal to Ravenel.
Dam Failure	Past impacts from dam failure have been minimal and are expected to stay that course.
Rip Currents	Ravenel is not impacted by this.
Severe Storm	The impact of severe storms depending on wind speed, hail size and rainfall are impactful to Ravenel. Cars and residential homes, especially mobile homes, are at risk and would have the most impact. Ravenel contains many mobile homes.
Drought	The impact of drought is minimal on the Town as the droughts typically experienced are D1 (moderate drought). The damages this would put on the Town would be minimal, though farmers would be more impacted and several farmers reside in Ravenel.
Winter Weather	Most winter hazards are associated with vegetation damage, freezing pipes, and occasional icing of roads. With the most recent event in 2018, the impact to the area was road integrity, economic loss of businesses closing, and burst pipes. Winter weather does not impact Ravenel often.

Impacts for all Hazards for College of Charleston	
Hazard	Impact
Hurricane	Hurricanes and Tropical Storms threaten the entire Atlantic Coast. Landing patterns are unpredictable until the storm has formed and is within a short time from landing. The amount of impact is dependent on size of storm, speed, and location of landfall, if any. The Grice Marine Lab, closer to the coast will experience greater effects from a hurricane. The impact of hurricanes (high winds, storm surge, and rainfall) is lesser than most jurisdictions as we have limited beach/coastline under our College jurisdiction.
Flooding	Impact of flooding can be severe depending on how much rain occurs in a short period of time. The College of Charleston has been impacted before by 24" flooding in two-three buildings requiring repair. Significant flooding in the downtown area will impact buildings on campus on Calhoun Street, Wentworth Street, Coming Street. Significant flooding on Lockwood will intrude our building located there. And, significant flooding on the coast will impact Grice Marine Lab on Ft Johnson Road.
Sea Level Rise	The impact of this hazard has yet to be seen to full magnitude. It is expected to have greater impact within the next 20 years to our Ft. Johnson Road facilities mentioned above.
Earthquake	Historically, impacts to earthquakes on Unincorporated Charleston County have been minimal. As most of the Unincorporated Areas are to the east and west, with the fault line being to the north, impacts of buildings on campus are minimal. If there were to be a major earthquake at this fault line, there would inevitably be damage to building and infrastructure, but other jurisdictions would be hit more severely. Fault lines outside of Charleston County should also be monitored as aftershocks can be catastrophic and trigger other seismic events. Recent construction has incorporated earthquake-resistant technology where possible
Tornado	The impact of the most recent tornado on Johns Island in 2015 caused over \$1.5 million in damages. The unpredictability of tornadoes can be very impactful even on the College campus like most of the unincorporated Charleston County. .

Hazardous Materials	The impact of a hazard materials spill on any of the main arteries routing through campus would be significant if it restricted movement or resumption of classes as a result of a spill. North Campus is adjacent to I-526 and the airport and major industry Being is located. Patriots Point Sailing Facility, Harborwalk Office and Classroom facility, and Grice Marine Laboratory are all on the harbor where a significant spill may affect or limit activities there.
Terrorism	The higher impact would be on the portions of the County closer to the Peninsula. Little impact would occur in the far east and west portions of the County. The impact would be dependent on the scale and type of terrorism.
Wildfire	The impact of wildfires would be detrimental to the natural resources and beautification of Unincorporated Charleston County as well as farmers and agriculturalists. The size of the fire and origination would depict the overall impact.
Tsunamis	The impact of tsunamis has been minimal to the College unless they were to involve our facilities on the harbor or seaside as discussed above.
Dam Failure	The highest impact of dam failure is to the eastern part of Charleston County. Past impacts have been minimal and are expected to stay that course.
Rip Currents	The College of Charleston is not impacted by this.
Severe Storm	The impact of severe storms depending on wind speed, hail size and rainfall is moderately impactful to The College of Charleston. Vehicle access, transportation routes, car and bus travel, if restricted will affect operations significantly.
Drought	The impact of drought is minimal in the County as the droughts typically experienced is D1 (moderate drought). The damages this would put on the County would be minimal to the College as well.
Winter Weather	Most winter hazards are associated with vegetation damage, freezing pipes, and occasional icing of roads. With the most recent event in 2018, the impact to the area was road integrity, economic loss of businesses closing, and burst pipes. Winter weather does not impact the College of Charleston except where sidewalks become impassable due to ice and snow buildup.

Impacts for all Hazards for City of Charleston	
Hazard	Impact
Hurricane	<p>Hurricanes and Tropical Storms threaten the entire Atlantic Coast. Landing patterns are unpredictable until the storm has formed and is within a short time from landing. The amount of impact is dependent on size of storm, speed, and location of landfall, if any. The entire City of Charleston is at risk from high winds from a hurricane making landfall. There are many old and historic structures on the City's Peninsula that would suffer the most damage from high winds. The most dangerous threat is from storm surge which will impact the Peninsula first from any Tropical System to include the entire City for a Category 2 storm or higher. The damage would be to older buildings, vehicles, historic and cultural city is extremely vulnerable to storm surge particular on the Peninsula however the entire city is at risk from a category 2 or larger storm.</p>
Flooding	<p>Around 68% of the Charleston Region is in a floodplain including the City of Charleston. The city is at risk of flooding from tropical system storm surge send high tide events approaching 50 times a year along the Peninsula. As tides increasingly surpass 7.1 feet, the impact is being felt along all areas of the city dependent on drainage into tidal waterways. Heavy rainfall from extreme precipitation events affects the entire city. Old and undersized drainage systems along with increased development pressure in and around the floodplain is causing increased flooding from rainfall events due to poor and undersized drainage. The potential for impact to businesses, real estate values and access to critical infrastructure exists as sea levels continue to rise exasperating the effects of high tide flooding and extreme precipitation events.</p>
Sea Level Rise	<p>The City of Charleston is experiencing an increasing rate of sea level rise. The City of Charleston Sea Level Rise Strategy suggests planning for a rate of 2-3 feet over the next 50 years. This rate is consistent with the Fourth National Climate Assessment predictions released in 2018. Sea Level rise exasperates flooding from storm surge, high tides and extreme precipitation. It makes episodic flooding more intense and it has a significant effect on aging infrastructure, particularly roads. Sea level rise will continue to impact city roadways, access to critical infrastructure and vulnerable neighborhoods.</p>

<p>Earthquake</p>	<p>The City of Charleston is vulnerable to an earthquake, having suffered a major earthquake (6.9-7.3) on August 31, 1886. Past earthquakes may be predictive of future events, consequently we should be thinking about impact in those terms. The most vulnerable areas of the city are also our most populated areas with both residential, business and our most critical healthcare facilities. Maps of the area show the most likely areas for significant liquefaction are along the edges of the city where considerable fill was used to expand the city boundaries. These are also the locations where the city has seen the densest growth. Old buildings made of masonry construction will most likely cause the majority of deaths and injuries and the entire city will be cut off both internally and externally due to the numerous bridges and roadways that will need to be inspected and approved before being used.</p>
<p>Tornado</p>	<p>The impact of the most recent tornado on Johns Island in 2015 caused over \$1.5 million in damages, including many homes in the city of Charleston. The unpredictability of tornadoes can be very impactful especially in our more rural areas where it may be difficult to reach the damaged area including most of our mobile home communities. Likewise our housing developments generally have heavy tree presence which can be very dangerous and cause more damage.</p>
<p>Hazardous Materials</p>	<p>The city of Charleston would be impacted by a hazardous material spill due to the close proximity of chemical plants and residential areas. The areas most at risk would be the CainHoy and Upper Neck Area where there are chemical plants operating within the vicinity of current and planned residential communities. The impact would involve evacuating homes and businesses until the spill was contained and cleaned up.</p>
<p>Terrorism</p>	<p>The impact would range from a very large group for a special event i.e., Cooper River Bridge Run with 40,000 participants, 5 day Volvo Tennis Classic, LPGA Tournament to a more modest size crowd on Saturday's Farmers Market or Spoleto Festival. A special event on the Peninsula or at a stadium venue on Daniel's Island would be the most likely areas. Impact would be numerous casualties and injuries from a concentrated attack on a large crowd.</p>
<p>Wildfire</p>	<p>Impacts from a wildfire would be almost exclusively to residential single and multi-family homes located on the edges of tracts of forest lands. Evacuations with some damages would be the most likely impacts.</p>

Tsunamis	The impact of a Tsunami would be confined exclusively to the coastal edges of the city including the Peninsula and James, Johns and Daniels Island. Depending on the height of the Tsunami would depend on the severity and impact to include damages from storm surge.
Dam Failure	The impact from a Dam Failure to the City of Charleston would be slow but steady rising water along the city's edges on the Cooper and Ashley Rivers to about 36" of water at the maximum. Impacts would include water damage to infrastructure, homes and transportation networks. In addition, there would be a significant impact to the economy until the water receded and repairs were complete.
Rip Currents	There would be no impact to the City of Charleston from Rip Currents as we have no true ocean front property.
Severe Storm	The impact of severe storms depending on wind speed, hail size and rainfall could range from moderate to severe. Most impacted would be our Peninsula area that suffers from poor drainage and low streets and building elevations. Flooding and transportation interruptions would be the most likely impact. Single family homes in the suburbs would be most impacted by falling trees and debris from high winds.
Drought	Impact from Drought would be minimal as we have very limited agriculture and the vast majority of the city is covered by a municipal water utility.
Winter Weather	Impact from winter weather has and would involve a serious disruption to transportation on bridges and roads that interrupts school, businesses and critical public safety efforts. Likewise, winter weather causes tree limbs to break and fall closing roadways and bringing down power lines.

Impacts for all Hazards for St. Paul's Fire District	
Hazard	Impact
Hurricane	Hurricanes and Tropical Storms threaten the entire Atlantic Coast. Landing patterns are unpredictable until the storm has formed and is within a short time from landing. The amount of impact is dependent on size of storm, speed, and location of landfall, if any. The portions of St. Paul's Fire District (Edisto Island, Adams Run, Town of Meggett, Town of Hollywood and Town of Ravenel) are closer to the coast will experience greater effects from a hurricane. The impact of hurricanes (high winds, storm surge, rainfall) is greater than most jurisdictions as there are many low lying areas, multiple tidal creeks and rivers, that impact many major highways and secondary roads within the fire district. 5 out of 9 fire stations are susceptible to flooding from either storm surge or "king tides" based on the tide and wind blowing additional water into the river systems which cause flooding. The concern for access to and from the 9 fire stations are of concern due to the potential of falling trees and other debris blocking access to and falling on apparatus and buildings.
Flooding	Around 66% of the St. Paul's Fire District is in a floodplain. Some portions of the Fire District are not located in the floodplain but are still considered at risk for the aftermaths of a flooding event. Impact of flooding can be severe depending on how much rain occurs in a short period of time. St. Paul's Fire District is also impacted by rainfall from the upstate as seen in 2015, mainly the Edisto River above the Highway 17 Bridge. Flooded and impacted Parkers Ferry and Greenwood roads by several feet of swift water. Many homes were also heavily impacted due to the flooding. Due to the rural majority of the Fire District, the lack of infrastructure to access flooded and damaged roads and homes required assistance from the National Guard for staffing and their high water vehicles.
Sea Level Rise	The impact of this hazard has yet to be seen within the St. Paul's Fire District. However, with the rapid development of new subdivisions along the rivers and creeks there will likely be impacts to dwellings, vehicles, and access roads. King tides are the best measurement of this event. For St. Paul's Fire District, five of the nine fire stations could be impacted due to flooding from a king tide, main impact would be roadway access to the buildings.
Earthquake	Historically, impacts to earthquakes in St. Paul's Fire District have been minimal. The fire district has a large fault line that starts on Ethel Post Office Rd and runs through the Towns of Meggett, Hollywood, and Ravenel and ends near Ladson at Palmetto Commerce Parkway. With the fault line, being in the center of the fire district potential impacts to the fire stations could be substantial. If there were to be a major earthquake at this fault line, there would inevitably be damage to all building and infrastructure, along with other jurisdictions. Aftershocks can be extremely dangerous as they usually occur after the major quake, placing employees at risk while

	they perform their duties. Water and sewer lines can become damaged creating a public health emergency.
Tornado	The unpredictability of tornadoes and its impact the St. Paul's Fire District could be minimal. All the fire stations are subject to impacts from a tornado based on its location and strength. Again, a tornado is unpredictable and the impact area is a narrow swath through the fire district. Mobile homes are especially at risk and would be the most impacted.
Hazardous Materials	The impact of a hazard materials spill in St. Paul's Fire District could result in various types of impacts. Impacts from a train derailment involving hazardous materials could impact 4 of the 9 fire stations that are located relatively close to the CSX rail road. Fire stations may have to be evacuated due to hazardous chemical plume or toxic smoke from a burning chemical tank car. Highway incidents involving hazardous materials trucks pose a potential impact within the St. Paul's Fire District, Hwy 17 north and south are routes that lead to and from various chemical related companies located in the county and beyond. Hwy 17 is a route to the State ports for shipping and receiving these chemicals. Both routes; rail and highway pose a significant risk to multiple water sources and populations based on location of the incident.
Terrorism	Homegrown terrorism could potentially impact St. Paul's Fire District, examples could be reporting false calls to ambush the employees and apparatus, drive by shootings targeting fire stations, employees, and apparatus. Responding to school shootings, which seems to be on the increase could place employees and others in danger. The impact would be dependent on the scale and type of terrorism and no one is exempt from this threat.
Wildfire	St. Paul's Fire District could be impacted by a large wildland fire, some of the fire stations are metal sided, and a rubber covered roof. These construction features could pose potential problems for ignition of the fire station should large wildland fire occur that is approximate to the location. The impact of wildfires would be detrimental to natural resources and beautification of St. Paul's Fire District well as farmers and agriculturalists. The size of the fire and origination would depict the overall impact.
Tsunamis	The impact of tsunamis has been minimal to St. Paul's Fire District.
Dam Failure	The impact of a Dam failure is expected to minimal in the St. Paul's Fire District
Rip Currents	St. Paul's Fire District is not impacted by this.

Severe Storm	The impact of severe storms depending on wind speed, hail size and rainfall is a minimal threat to the St. Paul's Fire District.
Drought	The impact of drought is moderate on the St. Paul's Fire District, as the droughts typically experienced is D1 (moderate drought). The damages this would put on the Fire District facilities is minimal, though the employees and fire apparatus could see an increase in call volume due to uncontrolled fires and the public failing to follow the forestry commission guidelines for open burning.
Winter Weather	Most winter hazards are associated with St. Paul's Fire District responding to reported structure fires, vehicle accidents (call volume increase). The impact of winter weather would be on employees and fire apparatus, becoming involved in accidents while responding and the firefighters being exposed to severe cold for an extended time period. Access could become an issue due to trees and power lines becoming coated with ice and snow causing tree limbs to hang much lower and hitting the apparatus, or breaking off and blocking the roadways. Power lines could break and cause extended power outages, dangerous conditions in the areas where they fall potentially exposing employees to electrocution hazards. Winter weather does not impact the St. Paul's Fire District often.

Impacts for all Hazards for St Andrews Public Service District	
Hazard	Impact
Hurricane	Our service district is prone to hurricane related damage. Although direct impacts have been limited in recent years, we have been affected by near miss related issues. Most significant have been downed trees, powerlines, and isolated flooding from Hurricane Matthew.
Flooding	Flooding in West Ashley is impacted by the tidal creeks as well as, rivers being at or near flood stage. The PSD has experienced large amounts of rain in the past 4 years and flooding has impacted our ability to respond to several geographical areas of service.
Sea Level Rise	The area is not affected by Sea Level Rise directly and no impacts have been seen on the PSD.
Earthquake	Our district has not been impacted by earthquakes. We do recognize the possibility but there have been no measurable impacts in the last 2 decades. Infrastructure such as bridges, water, and electrical distribution systems would be impacted the most if we were to experience one of these events.

Tornado	There is minimal impact with no measurable damage from tornadoes on the PSD in recent years.
Hazardous Materials	A hazardous materials incident would be minor in impact to our district. Although, depending on the location, it could disrupt access and egress to the district.
Terrorism	Impact for terrorism has been minimal for the PSD.
Wildfire	We have realized a dramatic reduction in wildfires over the last 4 decades. Most of which can be attributed to development in the district.
Tsunamis	Nothing measurable in the last 2 decades
Dam Failure	N/A
Rip Currents	The PSD is not affected by this hazard.
Severe Storm	The impact of severe storms depending on wind speed, hail size and rainfall is impactful to Unincorporated Charleston County. Cars and residential homes, especially mobile homes though there are few, are at risk and would have the most impact.
Drought	The impact of drought is minimal on the County as the droughts typically experienced is D1 (moderate drought). The damages this would put on the district is minimal.
Winter Weather	Most winter hazards are associated with vegetation damage, freezing pipes, and occasional icing of roads and bridges. With the most recent event in 2018, the impact to the area was road integrity, economic loss of businesses closing, and burst pipes. Winter weather does not impact the district often.

Impacts for all Hazards for Charleston County Park & Recreation Commission	
Hazard	Impact
Hurricane	Charleston County is prone to various tropical system due the location along the coast. Although tropical systems are unpredictable, Charleston County Parks has developed "Emergency Action Plans" for our agency that details the steps to preparing and securing our facilities.
Flooding	Charleston County resides in areas that are at or below sea level. Charleston County Park has three beach parks that is prone to flooding. Although there isn't much we can do against tides or storm surge we try and prepare our facilities by building at higher levels and using sandbags. The campground at James Island County Park is prone to flooding. We are currently in the process to clean out drainage ditches to help with standing water. Caw Caw interpretive center is also an area prone to flooding due to the location to Tea Farm Creek. The area floods but recedes rather quickly without causing harm to any of our structures.
Sea Level Rise	Rising sea levels are a concern, however we have not been able to track rising sea levels. King tides and storm surge are the more obvious signs of higher sea levels
Earthquake	Charleston resides on a major fault line. Our agency has created "Emergency Action Plans" that cover earthquakes and we do carry the proper insurance for that disaster.
Tornado	Tornadoes are unpredictable. The last tornado that effected our area caused 1.5 million dollars in damages. However none of the property or facilities in our agency was harmed. The most vulnerable area for our parks would be the campground at James Island County Park due to the number of campers we serve each year.
Hazardous Materials	A Hazardous Materials release could prove to be serious given the locations of our facilities. Many of our locations are on or near waterways or near railways and industrial settings.
Terrorism	Terrorism is always a threat and could impact many of our facilities due to the large scale and population of our events. We work closely with local law enforcement and train with them annually.
Wildfire	Our properties in the rural areas would be impacted greater However, the impact would depend on the size of the fire and origin of the fire.

Tsunamis	With our location on the coast and having many parks on the coastline and rivers a tsunamis could be severe however the likely hood is small.
Dam Failure	Very few of our facilities would be impacted by a dam failure. Impacts are believe to be minimal.
Rip Currents	All three of our beach parks would be at risk for rip currents. Our lifeguards are trained to recognize the signs of rip currents and alert the public once identified.
Severe Storm	The impact of storms could produce moderately severe impacts at our facilities. Depending on the size of the storm and the amount of lightning would determine how our parks are impacted.
Drought	Most of the drought in our area is considered to be minimal.
Winter Weather	Freezing pipes, vegetation and freezing roadways and bridges are the major concern. Economic impact would be the most impact for our agency.

Impacts for all Hazards for James Island Public Service District	
Hazard	Impact
Hurricane	Hurricanes and Tropical Storms threaten the entire Atlantic Coast. These storms are unpredictable until the storms are a short distance from landfall. The impact of a storm on James Island Public Service District (JI PSD) depends largely on where it makes landfall. Greater impact occurs if the eye of the storm is south of James Island. While we are not a barrier island and thus not subject to direct wave action, we do experience storm surge in our tidal creek areas, wind and rain impacts.
Flooding	All areas of the Town are at risk from the impacts of flooding as we are on an island with limited routes for vehicles. Several roadways experience regular flooding from tides and heavy rain events. Stormwater infrastructure in the Town is overwhelmed by severe rain events especially if they include large quantities of stormwater in a short amount of time and occur around high tide.
Sea Level Rise	The full impact of this hazard has not yet been experienced. JI PSD has experienced regular flooding and infrastructure damage from King Tides. The PSD is expecting greater impact from this in the coming years.
Earthquake	Impacts from earthquakes in our local area or region to the JI PSD are likely to be minor for Town infrastructure but significant for James Island. We are connected to the mainland by two bridges and to Johns Island by a third bridge all of which would be closed for inspection at the least in the event of an earthquake. Damage to infrastructure in other jurisdictions will also effect James Island and should be accounted for.
Tornado	The unpredictability of tornadoes can be very impactful even in rural communities like some of JI PSD. Mobile homes are especially at risk and would be the most impacted.
Hazardous Materials	James Island PSD is close to the Port of Charleston and as such would be impacted by any hazardous material spill near the harbor or waterways.
Terrorism	The higher impact would be on the portions of the JI PSD closer to the Peninsula and other shorelines. The impact would be dependent on the scale and type of terrorism.
Wildfire	The impact of wildfires would be detrimental to the natural resources and beautification of JI PSD as well as disturb service distribution. The size of the fire and origination would depict the overall impact.
Tsunamis	The impact of tsunamis has been minimal to JI PSD.
Dam Failure	JI PSD is not impacted by this.
Rip Currents	JI PSD is not impacted by this.

Severe Storm	There are impacts to JI PSD for severe storms depending on wind speed, hail size and rainfall. Cars and residential homes, especially mobile homes, are at risk and would have the most impact. Overall, severe storms have caused roughly as much as \$140,000 worth of damage, but typical damage is about \$15,000.
Drought	The impact of drought is minimal on JI PSD as the droughts typically experienced is D1 (moderate drought). The damages this would put on the County is minimal.
Winter Weather	Most winter hazards are associated with vegetation damage, freezing pipes, and occasional icing of roads. With the most recent event in 2018, the impact to the area was road integrity, economic loss of businesses closing, and burst pipes. Winter weather does not impact JIPSD often.

Impacts for all Hazards for St Johns Fire District	
Hazard	Impact
Hurricane	Our service district is prone to hurricane related damage. Although direct impacts have been limited in recent years, we have been affected by near miss related issues. Most significant have been downed trees, powerlines, and isolated flooding.
Flooding	Flooding on the islands is impacted by the tides of the Atlantic as well as, rivers being at or near flood stage. We have experienced large amounts of rain in the past 4 years and flooding has impacted our ability to respond to several geographical areas of service.
Sea Level Rise	Beach erosion on Kiawah and Seabrook Islands have been impacted the most by sea level rise. It is more prevalent during sever weather events, such as hurricanes.
Earthquake	Our district has not been impacted by earthquakes. We do recognize the possibility but there have been no measurable impacts in the last 2 decades. Infrastructure such as bridges, water, and electrical distribution systems would be impacted the most if we were to experience one of these events.
Tornado	The impact of the most recent tornado on Johns Island in 2015 caused over \$1.5 million in damages. The unpredictability of tornadoes can be very impactful even in rural communities like most of the unincorporated Charleston County. Mobile homes are especially at risk and would be the most impacted.
Hazardous Materials	A hazardous materials incident would be minor in impact to our district. The exception would be the rail line that is on the West Ashley side of the Limehouse Bride/boat landing. If an event happened on or near that section of the rail line, It could disrupt access and egress to the district. (An example would be the Main Rd flooding that took place a few years ago causing Main Rd to be unusable for several days.)
Terrorism	Large scale sporting events on and dignitary visits to Kiawah Island are of the most concern for terrorism events in the district. We are also home to several target hazards (schools and churches) that are near the furthest reaches of county assets due to geographical configuration.

Wildfire	We have realized a dramatic reduction in wildfires over the last 2 decades. Most of which can be attributed to development in the district.
Tsunamis	Nothing measurable in the last 2 decades
Dam Failure	N/A
Rip Currents	Small rips at various times during the year can happen on the beaches and inlets around Kiawah and Seabrook islands. At this time there are two known rip areas in the district. Between Kiawah and Seabrook islands and at the southernmost end of Seabrook at the mouth of the Edisto River.
Severe Storm	The impact of severe storms depending on wind speed, hail size and rainfall is impactful to Unincorporated Charleston County. Cars and residential homes, especially mobile homes, are at risk and would have the most impact.
Drought	The impact of drought is minimal on the County as the droughts typically experienced is D1 (moderate drought). The damages this would put on the district is minimal. The remaining farmers on Johns and Wadmalaw islands would be impacted.
Winter Weather	Most winter hazards are associated with vegetation damage, freezing pipes, and occasional icing of roads and bridges. With the most recent event in 2018, the impact to the area was road integrity, economic loss of businesses closing, and burst pipes. Winter weather does not impact the district often.

Impacts for all Hazards for the Town of McClellanville	
Hazard	Impact
Hurricane	Hurricanes and Tropical Storms threaten the entire Atlantic Coast. Landing patterns are unpredictable until the storm has formed and is within a short time from landing. The amount of impact is dependent on size of storm, speed, and location of landfall, if any. Hurricane Hugo made landfall in the Cape Romain Bulls Bay area. McClellanville, in Hugo's northeast quadrant, felt the strongest effects. Hurricane Matthew, a category two hurricane, made landfall in McClellanville in 2016.
Flooding	Many properties adjacent to Jeremy Creek which runs through town floods with heavy rain. Several drainage ditches overflow which impacts the Town's infrastructure.
Sea Level Rise	The impact of this hazard has yet to be seen to full magnitude. With the limited beachfront properties and development, the impact of this hazard will be minimal. King tides are the best measurement of this event. For the Town of McClellanville, Jeremy Creek is a source to keep an eye on for impacting the town.
Earthquake	Little impact has been made on the Town from earthquakes in the past.
Tornado	The unpredictability of tornadoes can be very impactful. Mobile homes are especially at risk and would be the most impacted. Impact of tornadoes on the Town has been minimal so far.
Hazardous Materials	Hazardous materials have not made a large impact on the Town thus far.
Terrorism	Due to the Town's size and rural location, terrorism has not been impactful.
Wildfire	The impact of wildfires would be detrimental to the natural resources and beautification of the Town of McClellanville due to its rural location and vicinity to the Francis Marion Forest. The size of the fire and origination would depict the overall impact.
Tsunamis	The impact of tsunamis has been minimal to the Town of McClellanville.
Dam Failure	There would be high impact to the Town in dam failure occurred. Past impacts have been minimal and are expected to stay that course.
Rip Currents	Town of McClellanville is not impacted by this.
Severe Storm	There are impacts to the Town of McClellanville for severe storms depending on wind speed, hail size and rainfall. Cars and residential homes, especially mobile homes, are at risk and would have the most impact.
Drought	The impact of drought is minimal on the Town as the droughts typically experienced is D1 (moderate drought). The damages this would put on the Town is minimal.

Winter Weather	Most winter hazards are associated with vegetation damage, freezing pipes, and occasional icing of roads. With the most recent event in 2018, the impact to the area was road integrity, economic loss of businesses closing, and burst pipes. Winter weather does not impact the Town often.
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Impacts for all Hazards for Town of Sullivan's Island	
Hazard	Impact
Hurricane	Hurricanes and Tropical Storms threaten the entire Atlantic Coast. Landing patterns are unpredictable until the storm has formed and is within a short time from landing. The amount of impact is dependent on size of storm, speed, and location of landfall, if any. The impact from a tropical event is the greatest hazard to a community such as Sullivan's Island. The potential for widespread devastation is possible depending on the severity of the event.
Flooding	100% of Sullivan's Island is in a floodplain and the potential for Hurricane storm surge flooding can be severe as seen with the whole of Sullivan's Island being a repetitive loss area. Hurricane Hugo greatly impacted the island. Sullivan's Island has also a potential for rainfall flooding which has occurred in recent years due to rainfall events seen between 2015 to 2018 not seen before on Sullivan's Island. Flooding from rainfall is due to several low lying areas and an outdated stormwater system that is constantly being updated as funds are available.
Sea Level Rise	The impact of this hazard has yet to be seen to full magnitude. With most beachfront properties set back behind a natural and beneficial buffer area, the impact of this hazard will be minimal. King tides are the best measurement of this event. For Sullivan's Island minimal infrastructure or buildings are impacted regularly. It is predicted to have greater impact within the next 20 years.
Earthquake	Historically, impacts to earthquakes on Sullivan's Island have been minimal. With the fault line being to the north west, impacts of buildings are minimal. If there were to be a major earthquake at this fault line, there would inevitably be damage to building and infrastructure. Fault lines outside of Charleston County should be monitored as aftershocks can be catastrophic and trigger other seismic events.
Tornado	The impact of the most recent tornado on Johns Island in 2015 caused over \$1.5 million in damages. The unpredictability of tornadoes can be very impactful even in rural communities like most of the unincorporated Charleston County. Mobile homes are especially at risk and would be the most impacted.
Hazardous Materials	The impact of a hazard materials spill is minimal on Sullivan's Island due to the mainly single family nature of the island. No industrial or shipping terminals are on the island.

Terrorism	The higher impact would be on the portions of the County closer to the Peninsula. Little impact would occur in the far east and west portions of the County. The impact would be dependent on the scale and type of terrorism.
Wildfire	The impact of wildfires would be detrimental to the natural resources and beautification of Sullivan's Islands Natural and Beneficial areas. Impact to structures abutting this area (Approx. 80 homes) could be devastating. The size of the fire and origination would depict the overall impact.
Tsunamis	The impact of tsunamis has not been a threat to Sullivan's Island in the past and probability in the future is minimal.
Dam Failure	Due to Sullivan's Island being a coastal community there would be little to no impact to this community from a dam failure event.
Rip Currents	Sullivan's experiences rip current events on a regular basis during storm events and when storms pass by the island in the Atlantic ocean.
Severe Storm	The impact of severe storms depending on wind speed, hail size and rainfall is moderately impactful to Sullivan's Island. Cars and residential homes are at risk and would have the most impact.
Drought	The impact of drought is minimal on Sullivan's Island as the droughts typically experienced is D1 (moderate drought). The damages this would put on Sullivan's Island is minimal if any. Most impact may occur from fire potential in the natural and beneficial shrub areas on the ocean side of the island.
Winter Weather	Most winter hazards are associated with vegetation damage, freezing pipes, and occasional icing of roads. With the most recent event in 2018, the impact to the area was road integrity, economic loss of businesses closing, and burst pipes. Winter weather does not impact Sullivan's Island often.

Impacts for all Hazards for Town of Awendaw	
Hazard	Impact
Hurricane	The Town of Awendaw is located along 10 miles of the Intracoastal Waterway so hurricanes and tropical storms are typically an annual threat. The impacts would include high winds, storm surge, high rainfall and potential flooding from the rain or surge. Cars and personal property, homes, businesses and roads, especially earthen roads, could be impacted with economic loss for closed businesses.
Flooding	The areas along the 10-mile stretch of the Intracoastal Waterway and around Awendaw Creek are in the floodplain. Flooding impacts depend on the amount of rain and potentially the tides.
Sea Level Rise	The impact of sea level rise has not been experienced yet-- no buildings or infrastructure have been impacted. Given the Town's location and elevation, this may become an issue in the future as the level continues to rise.
Earthquake	The impact from earthquakes has not been experienced yet. Buildings and roads would probably be impacted were the Town to be near an earthquake.
Tornado	To date the Town has not experienced a tornado but the impact could be catastrophic as many residents live in mobile homes.
Hazardous Materials	The impact from a hazardous materials spill could be detrimental given the many waterways and associated marsh and wetlands.
Terrorism	The impact would depend on the scale and type of the event. Primary concern would be contamination of the Town water system.
Wildfire	The impact from a wildfire could be detrimental given the natural resources including the Francis Marion National Forest and Birds of Prey Center. The size and origination of the fire would determine the impact.
Tsunamis	Awendaw has not experienced a tsunami but there is the potential for severe impact.
Dam Failure	The impact from dam failure is minimal.
Rip Currents	Awendaw is not impacted by this.
Severe Storm	The impact from storms could be severe depending on the wind speed and direction, hail size and rainfall. Cars and personal property, homes, businesses and roads, especially earthen roads, could be impacted along with economic loss for closed businesses.
Drought	The impact from drought is moderate however, the increased potential from wildfires is severe.
Winter Weather	The impact from winter weather includes vegetation damage, downed power lines, freezing water pipes and icing roads. These impacts may result in road damage, economic loss for closed businesses and burst pipes.

Impacts for all Hazards for Town of Mount Pleasant	
Hazard	Impact
Hurricane	The potential for Tropical Weather is of great concern for the Town of Mount Pleasant. Storm track and intensity are very unpredictable until near landfall. The severity of impact will vary according to the tropical system's composition to include size, surge, intensity, speed, and geographic location of landfall with regard to Mount Pleasant. The Town can expect, at a minimum, interruption of key and critical infrastructure due to high wind impacts and flooding of roads, structures, utilities, etc. Tropical systems come with a risk of tornado impact especially as the system interacts with land.
Flooding	Approximately 60% of the Town of Mount Pleasant is located in a Special Flood Hazard Area. Flood impact occurs as a consequence of many types of flood hazard to include storm surge, heavy rain events, undersized (or no) drainage systems, and extreme high tides. Flood hazard impact often is exacerbated by overlapping event types such as a heavy rain event during extreme high tide. Anticipated impacts of flooding are largely dependent upon the extent and duration of the event. At a minimum, severe flooding will interrupt transportation and threaten critical utilities (such as wastewater treatment). First responder rescues are likely to be needed for citizens trapped in vehicles or isolated in structures surrounded by high and flowing water. Following extended flood events public health may be of great concern as waters become contaminated.
Sea Level Rise	Some impact from Sea Level Rise is felt now, and is anticipated to increase in severity in coming decades. Currently, the primary consequence seen is an increase of minor flooding for portions of major transportation roadways as well as low lying community roads and yards. Long term impacts are still being assessed. Focus should be given to infrastructure such as drainage and wastewater systems. Particularly, how they are designed or upfitted to withstand SLR impact and adequately discharge without mechanical assistance. Very long term concern includes more frequent and severe impacts to roads, properties, and structures.
Earthquake	The Charleston area is one of the greatest areas of earthquake risk in in the state. The last significant earthquake that impacted the area occurred in 1886 which killed 60 people and caused significant structural damage in the City of Charleston. If the same 7.3 magnitude earthquake were to occur today, there would be potentially catastrophic impacts to include significant loss of life, structures destroyed, subsequent fires, severe interruption of critical facilities and infrastructure; as well as cascading impact on the economy.
Tornado	Tornadoes occur with very little warning and carry impacts varying according to the intensity, duration, and path. Tornado risk is typically associated with severe weather brought in by low pressure systems. Hurricanes also produce tornadoes in rain bands as it comes ashore. Potential impact includes loss of life, building and infrastructure damage, interruption of transportation and other utilities.

Hazardous Materials	Hazardous Material incidents have the potential to impact the Town of Mount Pleasant in the case of a port incident, intentional attack, or spill, leak, or explosion during transport or storage. Materials in various forms can cause loss of life, injury, long-term health problems, damage to property.
Terrorism	Impacts resulting from an intentional, acts of violence will range from minimal to extreme loss of life, injuries, destruction of property and economic loss. Much of the impact will vary according to severity and classification of the attack.
Wildfire	There are portions of the Town of Mount Pleasant that are susceptible to wildfire; mostly restricted to less densely populated areas. Impacts associated with wildfire include interrupted transportation, air quality, potential loss of life, loss of structure, and property damage.
Tsunamis	The impact of tsunamis is considered minimal and may be expected to occur with earthquake events. Vulnerability to tsunami impacts in the Town of Mount Pleasant would include disruption to transportation routes, structures, and utilities located in the lower lying areas along Charleston Harbor and the intracoastal waterway.
Dam Failure	The Town of Mount Pleasant is minimally vulnerable to the impact of Dam Failure. The greatest risk is associated with smaller dams within the town, which would likely result in minor flooding and damage to roadways and utilities. There are larger dams within the region, but are considered to have a lower risk of impact to Mount Pleasant.
Rip Currents	The Town of Mount Pleasant is a waterfront community, but with no beach areas. The vulnerability to Rip Currents is minimal. There are several larger rivers, including Charleston Harbor, that have strong currents that can pose a safety risk for boaters and swimmers.
Severe Storm	Severe weather occurs throughout the year and may be associated with frontal boundaries, low pressure systems, or hot summer days with "pop up thunderstorms". Severe thunderstorms typical produce large amounts of lightning, hail, high winds, heavy rain, and potentially tornadoes. Impact varies according to intensity of the storm and may include risk of injury or loss of life, destruction of property, and flash flooding.
Drought	The impact of drought is minimal on the Town of Mount Pleasant. Regionally, the historical droughts typically experienced were D1 (moderate drought). Vulnerable populations and utilities would include farmers/ agriculture, properties with drinking wells, and municipal water sources. Drinking water in Mount Pleasant is provided by a separate utility. Water is sourced from a deep aquifer and from inland sources. The inland water sources are the most vulnerable during droughts.
Winter Weather	Severe winter weather can negatively impact many components of the entire region when it occurs. Transportation infrastructure, economy and critical utilities are the primary areas of concern. Vulnerable populations may be at greater risk due to lack of access to heat. Injuries, loss of life,

	<p>and property damage can occur due to falling trees and tree limbs and slippery road surfaces.</p>
<p>Other</p>	<p>The Town of Mount Pleasant is located in a coastal region where access to the jurisdiction requires the use of bridges. Bridges are also used for access and interconnectivity within the community. During any regional emergency, it is possible for the Town or portions of the Town to be isolated for a period of time. The vulnerability for the Town and its citizens may be lead to delayed emergency or recovery services from outside resources or from Town responders.</p>

Impacts for all Hazards for the City of Isle of Palms	
Hazard	Impact
Hurricane	Hurricanes and Tropical Storms have a tremendous impact on the Isle of Palms, because island is a low-lying beachfront community susceptible to erosion, flooding and storm surge. The amount of impact is dependent on size of storm, speed, and location of landfall, but even minor storms can have a significant impact as the older portions of the island still has homes that are not elevated above the base flood elevations.
Flooding	Over 90% of the Isle of Palms is in a floodplain. Some portions of the island are just above the high tide elevations and are inundated with floodwaters on severe high tides without any rain. Additionally, almost all of the Isle of Palms drainage systems are tidally influenced and depend on low tide elevations to allow stormwater to escape the island. Therefore, flooding has an impact on the island routinely.
Sea Level Rise	As described above, the Isle of Palms is already impacted by the inundation of sea water. As this water rises, the issue of flooding will intensify and create more of an impact for the community. Preparing for sea level rise is expected to be a primary focus for the island for the foreseeable future.
Earthquake	Historically, impacts to earthquakes on the Isle of Palms have been minimal. If there were to be a major earthquake in the area, there would inevitably be damage to buildings and infrastructure, but modern buildings are constructed with consideration given to seismic forces. While earthquakes pose a threat to the island, the issues of flooding, sea level rise and hurricane preparedness remain the focus.
Tornado	The island has been impacted by tornados in recent years, but the damage has typically been minimal and the impact is more focused in smaller areas. The island's focus on hurricane preparedness keeps the community somewhat prepared for tornados.
Hazardous Materials	The Isle of Palms is less exposed than other parts of the community to hazardous materials and does not anticipate being impacted from spills or other hazard materials.
Terrorism	The Isle of Palms remains on alert to the threat of terrorism during times when large numbers of visitors congregate on the island for special events.

Wildfire	There are parts of the island that are densely constructed and parts occupied by visitors that may not be familiar with their environs; therefore the Isle of Palms remains on alert for fire events.
Tsunamis	While the Isle of Palms is coastal community and is always tsunamis-prepared, the community does not expect to be impacted by a tsunami.
Dam Failure	The Isle of Palms does not expect to be impacted by a dam failure.
Rip Currents	The Isle of Palms has sand bars separated by the shoreline that become exposed during low tides. These sand bars become an attraction to beach visitors and unsuspecting visitors can be caught by rip currents as the tide comes in and covers the sand bars. The island struggles with keeping visitors safe every year and rip currents pose a significant threat.
Severe Storm	The impact of severe storms on the Isle of Palms typically comes from high winds and flooding, which are covered above.
Drought	The impact of drought is minimal on the Isle of Palms as the potable water is provided through a public system that is not impacted by droughts.
Winter Weather	Most winter hazards are associated with ice storms, damage by tree limbs falling, freezing pipes, and occasional icing of roads. With the most recent event in 2018, the impact to the area was road integrity, economic loss of businesses closing, and burst pipes. Winter weather does not impact the Isle of Palms often.

Impacts for all Hazards for Town of Seabrook Island	
Hazard	Impact
Hurricane	<p>Hurricanes and Tropical Storms threaten the entire Atlantic Coast. Landing patterns are unpredictable until the storm has formed and is within a short time from landing. The amount of impact is dependent on size of storm, speed, and location of landfall, if any.</p> <p>As a barrier island, Seabrook Island will be subject to tropical storm force winds and storm surge. Wind damage can produce both vegetative and construction debris. Storm surge flooding can result in damage to residences and temporary flooding of roads affecting access by first responders and restoration of utilities.</p>
Flooding	<p>Nearly all of Seabrook Island is located within the floodplain. Flooding impacts include: roads being temporarily impassable (including the only access on and off the island); loss of power (either because of damage to equipment or deliberate shut-off to protect equipment); damage to residences; and, commercial losses from suspension of business operations because workers are not able to travel to their workplaces.</p>
Sea Level Rise	<p>It is believed that sea level rise is contributing to decreased ability of local soil to absorb water from rainfall and high tides, increasing the occurrence of "nuisance" flooding that results in temporarily flooded roadways and persistent pooling following heavy rains and "king" tide events. Sea level rise does not currently pose a threat to existing residences and beachfront properties are not presently threatened by rising sea level.</p>
Earthquake	<p>With the primary fault line being to the north, impacts to Seabrook Island structures would be expected to be attenuated. Impacts of the 1886 earthquake at Seabrook Island are not known owing to the rural (undeveloped) character of the barrier island at that time. It is recognized that the local geology poses the potential for liquefaction of subsurface soil and resulting occurrence of sinkholes and depositions of sediment above the surface. Besides damage to structures, damage to roadways can be expected as well as damage to bridges providing access to the island and to those bridges within the island across creeks. Until bridges providing access to the community are determined to be safe to use, Seabrook Island may be isolated from outside help. In 2002 there was a 4.4 magnitude 16 miles southeast of Seabrook Island and in 2016, a 1.9 magnitude earthquake 12 miles west-southwest of Seabrook Island.</p>

<p>Tornado</p>	<p>The impact of the most recent tornado on Johns Island in 2015 caused over \$1.5 million in damages. While occurrence of tornadoes is unpredictable, the potential for formation of tornadoes is increased with tropical storms. As a barrier island, Seabrook Island is exposed to tropical storms along the coast and, consequently exposed to the increased risk for the attendant development of tornadoes. Owing to the density of trees within the community, it is to be expected that damage to and uprooting of trees will pose a threat of damage to structures by the surrounding trees.</p>
<p>Hazardous Materials</p>	<p>There are no industrial areas, rail yards or port facilities within Seabrook Island nor are such developments within ten miles of Seabrook Island. Hence, little to no impact on Seabrook Island is expected from hazardous material spills at any such facilities. In the event offshore production of oil or gas were to be undertaken in the future, such activities could pose a risk to Seabrook Island for spills or leaking depending on proximity of that activity to Seabrook Island.</p>
<p>Terrorism</p>	<p>Seabrook Island is primarily a residential community without commercial centers, port facilities or airports of national significance. The community is not considered a high priority target for acts of terrorism. To the extent terrorist acts were perpetrated on airports or port facilities near Charleston or Savannah, Georgia, there would likely be no direct impact on Seabrook Island from such acts other than any economic impacts affecting the greater southeastern region.</p>
<p>Wildfire</p>	<p>Johns Island includes densely forested areas and Seabrook Island is within a maritime forest. Hence, wildfires could result in excessive demand on firefighting resources posing the risk of structural damage pending arrival of those resources. Loss of wooded areas to wildfires can exacerbate occasional overloading of drainage infrastructure due to increased runoff.</p>
<p>Tsunamis</p>	<p>There is no record of tsunamis impacting Seabrook Island. As a barrier island, the community is exposed to tsunamis travelling westward in the Atlantic ocean. Local impacts would depend on the speed and height of incoming tsunamis, but could inundate large portions of the community, damaging structures and overwhelming drainage infrastructure.</p>
<p>Dam Failure</p>	<p>As a barrier island at the eastern side of Johns Island, Seabrook Island is protected from inland dam failures by the Edisto and Stono rivers separating Johns Island from the mainland. It is believed that inland dam failures would have little to no impact on Seabrook Island.</p>
<p>Rip Currents</p>	<p>Seabrook Island beaches are impacted by rip currents caused by offshore storms. Apart from isolated unusual erosion of the beach, rip currents pose a hazard to swimmers at the beach.</p>

<p>Severe Storm</p>	<p>Severe storms can damage trees and produce temporary flooding of roadways within Seabrook Island. Apart from direct and indirect damage to structures from high winds and tree damage, severe storms can produce unusual amounts of vegetative debris requiring removal to keep roadways open.</p>
<p>Drought</p>	<p>Seabrook Island is primarily a residential and golf course community and has no commercial farming. The principle impact of drought conditions is damage to landscapes and increased demand for watering of golf courses to maintain availability for use.</p>
<p>Winter Weather</p>	<p>As a barrier island at the eastern side of Johns Island, impacts of winter storms are primarily associated with disruption of overland travel to and from Seabrook Island. Seabrook Island is dependent on the South Carolina Department of Transportation and Charleston County to treat and clear roads on Johns Islands following winter storm impacts. Disruptions to overland travel can cause suspension of operations of local businesses and government offices. Damage to trees from snow and ice storms can increase the volume of vegetative debris requiring removal to keep roads open.</p>

Impacts for all Hazards for Town of James Island	
Hazard	Impact
Hurricane	Hurricanes and Tropical Storms threaten the entire Atlantic Coast. These storms are unpredictable until the storms are a short distance from landfall. The impact of a storm on the Town of James Island depends largely on where it makes landfall. Greater impact occurs if the eye of the storm is south of James Island. While we are not a barrier island and thus not subject to direct wave action, we do experience storm surge in our tidal creek areas, wind and rain impacts.
Flooding	Approximately 60% of the Town of James Island is in a floodplain. All areas of the Town are at risk from the impacts of flooding as we are on an island with limited routes for vehicles. Several roadways experience regular flooding from tides and heavy rain events. Stormwater infrastructure in the Town is overwhelmed by severe rain events especially if they include large quantities of stormwater in a short amount of time and occur around high tide.
Sea Level Rise	The full impact of this hazard has not yet been experienced. The Town of James Island has experienced regular flooding and infrastructure damage from King Tides. The Town is expecting greater impact from this in the coming years and is exploring ways to mitigate its effects.
Earthquake	Impacts from earthquakes in our local area or region to the Town of James Island are likely to be minor for Town infrastructure but significant for James Island. We are connected to the mainland by two bridges and to Johns Island by a third bridge all of which would be closed for inspection at the least in the event of an earthquake. Damage to infrastructure in other jurisdictions will also effect James Island and should be accounted for.
Tornado	James Island has had tornadoes touch down in the past but this hazard is very unpredictable. Impacts would be to structures and trees blocking roads.
Hazardous Materials	James Island is close to the Port of Charleston and as such would be impacted by any hazardous material spill near the harbor or waterways.
Terrorism	There are several venues and events on James Island and in the Town that would have a higher impact than other areas. Proximity to Peninsular Charleston is a factor the Town considers in planning for this type of hazard.
Wildfire	The impact of wildfires has not been a significant hazard for James Island.
Tsunamis	The impact of tsunamis has been minimal to James Island.
Dam Failure	The impact of dam failure has been minimal to James Island.
Rip Currents	James Island is not impacted by this.

Severe Storm	The impact of severe storms to the Town of James Island depends largely on the duration, rainfall amounts, wind speeds and hail size. Residential homes and vehicles are most at risk.
Drought	Drought impact has been minimal to James Island.
Winter Weather	Winter weather impacts are seldom but moderate when they occur. Most impacts to James Island include icy roads, economic loss due to businesses closing and burst water pipes.

Impacts for all Hazards for City of North Charleston	
Hazard	Impact
Hurricane	Charleston County, which the City of North Charleston resides, is one of the most likely counties in the state to be impacted by hurricanes and tropical storms. Densely populated coastal areas, especially during peak tourist seasons, coupled with the generally low coastal elevations, significantly increase the county's vulnerability. The greatest threat to life and property associated with a hurricane and tropical storm is storm surge. Other effects include high winds, tornadoes, and inland flooding associated with heavy rainfall that usually accompanies these storms.
Flooding	There are several factors that influence the severity of flooding to include the physical characteristics of the area, the physical characteristics of the drainage outfall, and the severity of the storm. Coastal flooding is usually the result of a severe weather system such as a tropical storm or hurricane which contains an element of high winds. The damaging effects of coastal floods are caused by the combination of storm surge, wind, rain, erosion and battering of debris. Coastal areas, rivers and low laying areas throughout the county may experience flooding from a verity of situations like tropical storms, storm surge, dam failure or inland flooding due to significant rainfall. The impact for the City is mostly riverine flooding combined with stormwater drainage issues.
Sea Level Rise	The City of North Charleston is not impacted by this yet though the tidal creeks going through Town could be impacted in the future especially neighborhoods off the Ashley River.

<p>Earthquake</p>	<p>Earthquakes in South Carolina have the potential to cause great and sudden loss because devastation can occur in minutes. While there have not been any large- scale earthquakes in South Carolina in recent years, a study titled, Comprehensive Seismic Risk and Vulnerability Study for the State of South Carolina, confirmed the state is extremely vulnerable to earthquake activity. The study, provided information about the likely effects of earthquakes on the current population and on contemporary structures and systems, including roadways, bridges, homes, commercial and government buildings, schools, hospitals, and water and sewer facilities throughout Charleston County. The greatest impact to the City was the major earthquake in 1886 with millions of dollars' worth of damage though an event like that has not occurred recently.</p>
<p>Tornado</p>	<p>South Carolina ranks twenty-sixth in the United States in the number of tornado strikes, and eighteenth in the number of tornadoes per square mile. The most common type of tornado, the relatively weak and short-lived type, occurs between March and May. Tornadoes are most likely during the spring, but can occur almost anywhere at anytime and anywhere in the City.</p>
<p>Hazardous Materials</p>	<p>The City contains a rapidly growing international port with many industries and growing businesses that may handle hazardous materials. Charleston County also has an Air Force Base and several other smaller military establishments, which handle various types and quantities of hazardous materials. Hazardous materials are a continuous potential hazard due to the large amount of transportation of these materials occurring in and around the area. Statistics reflect that responses to methamphetamine labs in the area are on the increase which has added an increase in response to hazardous materials incidents in Charleston County.</p>

<p>Terrorism</p>	<p>While there have not been any successful acts of terrorism committed in the City of North Charleston, the City has many critical and high-profile facilities, high concentrations of population and other potentially attractive venues for terrorist activity that are inherently vulnerable to a variety of terrorist methods. Governmental, transportation, commercial, infrastructure, cultural, academic, research, military, athletic and other activities and facilities constitute ideal targets for terrorist attacks which may cause catastrophic levels of property and environmental damage, injury, and loss of life. Terrorist attacks may take the form of other hazards described in this section when incidents of these types are executed for criminal purposes, such as induced dam or levee failures, the use of hazardous materials to injure or kill, or the use of biological weapons to create an epidemic.</p>
<p>Wildfire</p>	<p>During periods of drought, the threat of wildfires becomes a serious hazard. The careless toss of a lit cigarette butt or the match of an arsonist can cause major fires. Also, these fires produce large amounts of smoke that can reduce visibility on the highways. According to the SC Forestry Commission, the heaviest wildfire season is between January and April. The City of North Charleston, as a whole, is susceptible to urban, rural and wildfire threats.</p>
<p>Tsunamis</p>	<p>Tsunamis have generally been considered a significant hazard threat primarily for land areas near the Pacific Ocean. Since the Indian Ocean tsunami, geologists have stated that the eastern US could experience this phenomenon but to what severity is unknown. As with any coastal community along the Atlantic Ocean, there is still an extremely remote chance that a volcano eruption in the Caribbean or Canary Islands, or a collapse of the Continental Shelf, or an earthquake in the Puerto Rico Trench, that a tsunami could ultimately strike the Coastal Charleston County area. However, the volcanic eruption of most scientific concern (Canary Islands) for the Southeastern US is theorized to potentially not occur for another 5,000 years and adequate warning of such an event would be likely, so that residents would be expected to have an opportunity to evacuate coastal areas should such an unlikely event occur.</p>

<p>Dam Failure</p>	<p>Dam failures are extremely rare events. Santee Cooper, a state-owned utility, operates both the Santee Dam and the Pinopolis Dam System, a failure of which could affect areas within the City of North Charleston along and near the Cooper and Santee Rivers and other low laying areas adjacent to these rivers. A catastrophic failure at either of these dams would create flooding within the City, and would be a significant event. The most likely root cause of such a failure would be an earthquake of a larger magnitude than 7.6 on the Richter scale, or perhaps an act of terrorism. While dam failure is unlikely, it is possible that the City could experience dam-related flooding. A failure of the Pinopolis Dam System is estimated to result in flooding along the Cooper, Wando, and Ashley Rivers, including but not limited to, areas in or adjacent to Charleston, Dorchester, and Berkeley counties and the City of North Charleston. A failure of the Santee Dam system would result in flooding in areas in the northern part of Charleston County.</p>
<p>Rip Currents</p>	<p>The City of North Charleston is not impacted by this.</p>
<p>Severe Storm</p>	<p>The impact of severe storms to the City of North Charleston depends largely on the duration, rainfall amounts, wind speeds and hail size. Residential homes, manufactured homes, and vehicles are most at risk.</p>
<p>Drought</p>	<p>Summer in the City of North Charleston is hot and humid. Temperatures of 100 degrees or more are possible. Summer is typically the rainiest season, with 41% of the annual rainfall total. When rainfall has fallen below normal levels, as has occurred frequently in the area over time, drought conditions have resulted. Drought has also been a contributing factor to wildfires that occurred in the forested areas. Similarly, since high temperatures and humidity are possible and occur frequently during the summer months, heat wave conditions are possible in the area. The threat of drought and heat can affect human as well as animals throughout the City of North Charleston.</p>

Winter Weather

Snow and ice storms, coupled with cold temperatures, periodically threaten the City. Winter storms can damage property, create safety risks, destroy crops and valuable timber, damage infrastructure components such as power lines, and have enormous economic impacts throughout the City. This weather can cause major problems for City roadways, overpasses and bridges create major obstacles. Snow and ice storms most recently struck South Carolina in 1989, 1993, 2000, 2002, 2010 and 2014. For more detailed information see Exhibits: City of North Charleston Winter Weather Guide.

Impacts for all Hazards for Cooper River Parks and Playground Commission	
Hazard	Impact
Hurricane	Charleston County, which Cooper River Parks resides, is one of the most likely counties in the state to be impacted by hurricanes and tropical storms. Densely populated coastal areas, especially during peak tourist seasons, coupled with the generally low coastal elevations, significantly increase the county's vulnerability. The greatest threat to life and property associated with a hurricane and tropical storm is storm surge. Other effects include high winds, tornadoes, and inland flooding associated with heavy rainfall that usually accompanies these storms.
Flooding	There are several factors that influence the severity of flooding to include the physical characteristics of the area, the physical characteristics of the drainage outfall, and the severity of the storm. Coastal flooding is usually the result of a severe weather system such as a tropical storm or hurricane which contains an element of high winds. The damaging effects of coastal floods are caused by the combination of storm surge, wind, rain, erosion and battering of debris. Coastal areas, rivers and low laying areas throughout the county may experience flooding from a variety of situations like tropical storms, storm surge, dam failure or inland flooding due to significant rainfall. The impact for the Parks is mostly riverine flooding combined with stormwater drainage issues.
Sea Level Rise	The Cooper River Parks is not impacted by this yet though the tidal creeks going through Town could be impacted in the future especially neighborhoods off the Ashley River.
Earthquake	Earthquakes in South Carolina have the potential to cause great and sudden loss because devastation can occur in minutes. While there have not been any large- scale earthquakes in South Carolina in recent years, a study titled, Comprehensive Seismic Risk and Vulnerability Study for the State of South Carolina, confirmed the state is extremely vulnerable to earthquake activity. The study, provided information about the likely effects of earthquakes on the current population and on contemporary structures and systems, including roadways, bridges, homes, commercial and government buildings, schools, hospitals, and water and sewer facilities throughout Charleston County. The greatest impact to the City was the major earthquake in 1886 with millions of dollars' worth of damage though an event like that has not occurred recently.

<p>Tornado</p>	<p>South Carolina ranks twenty-sixth in the United States in the number of tornado strikes, and eighteenth in the number of tornadoes per square mile. The most common type of tornado, the relatively weak and short-lived type, occurs between March and May. Tornadoes are most likely during the spring, but can occur almost anywhere at anytime and anywhere in the City.</p>
<p>Hazardous Materials</p>	<p>The Parks resides next to a rapidly growing international port with many industries and growing businesses that may handle hazardous materials. Charleston County also has an Air Force Base and several other smaller military establishments, which handle various types and quantities of hazardous materials. Hazardous materials are a continuous potential hazard due to the large amount of transportation of these materials occurring in and around the area. Statistics reflect that responses to methamphetamine labs in the area are on the increase which has added an increase in response to hazardous materials incidents in Charleston County.</p>
<p>Terrorism</p>	<p>While there have not been any successful acts of terrorism committed in the Cooper River Parks, the Parks are near many critical and high-profile facilities, high concentrations of population and other potentially attractive venues for terrorist activity that are inherently vulnerable to a variety of terrorist methods. Governmental, transportation, commercial, infrastructure, cultural, academic, research, military, athletic and other activities and facilities constitute ideal targets for terrorist attacks which may cause catastrophic levels of property and environmental damage, injury, and loss of life. Terrorist attacks may take the form of other hazards described in this section when incidents of these types are executed for criminal purposes, such as induced dam or levee failures, the use of hazardous materials to injure or kill, or the use of biological weapons to create an epidemic.</p>
<p>Wildfire</p>	<p>During periods of drought, the threat of wildfires becomes a serious hazard. The careless toss of a lit cigarette butt or the match of an arsonist can cause major fires. Also, these fires produce large amounts of smoke that can reduce visibility on the highways. According to the SC Forestry Commission, the heaviest wildfire season is between January and April. The Cooper River Parks, as a whole, is susceptible to urban, rural and wildfire threats.</p>

<p>Tsunamis</p>	<p>Tsunamis have generally been considered a significant hazard threat primarily for land areas near the Pacific Ocean. Since the Indian Ocean tsunami, geologists have stated that the eastern US could experience this phenomenon but to what severity is unknown. As with any coastal community along the Atlantic Ocean, there is still an extremely remote chance that a volcanic eruption in the Caribbean or Canary Islands, or a collapse of the Continental Shelf, or an earthquake in the Puerto Rico Trench, that a tsunami could ultimately strike the Coastal Charleston County area. However, the volcanic eruption of most scientific concern (Canary Islands) for the Southeastern US is theorized to potentially not occur for another 5,000 years and adequate warning of such an event would be unlikely, so that residents would be expected to have an opportunity to evacuate coastal areas should such an unlikely event occur.</p>
<p>Dam Failure</p>	<p>Dam failures are extremely rare events. Santee Cooper, a state-owned utility, operates both the Santee Dam and the Pinopolis Dam System, a failure of which could affect areas within the City of North Charleston along and near the Cooper and Santee Rivers and other low lying areas adjacent to these rivers. A catastrophic failure at either of these dams would create flooding within the City, and would be a significant event. The most likely root cause of such a failure would be an earthquake of a larger magnitude than 7.6 on the Richter scale, or perhaps an act of terrorism. While dam failure is unlikely, it is possible that the Parks could experience dam-related flooding. A failure of the Pinopolis Dam System is estimated to result in flooding along the Cooper, Wando, and Ashley Rivers, including but not limited to, areas in or adjacent to Charleston, Dorchester, and Berkeley counties and the City of North Charleston therefore Cooper River Parks. A failure of the Santee Dam system would result in flooding in areas in the northern part of Charleston County.</p>
<p>Rip Currents</p>	<p>Cooper River Parks is not impacted by this.</p>
<p>Severe Storm</p>	<p>The impact of severe storms to the Cooper River Parks depends largely on the duration, rainfall amounts, wind speeds and hail size. Residential homes, manufactured homes, and vehicles are most at risk.</p>

<p>Drought</p>	<p>Summer in the City of North Charleston therefore Cooper River Parks is hot and humid. Temperatures of 100 degrees or more are possible. Summer is typically the rainiest season, with 41% of the annual rainfall total. When rainfall has fallen below normal levels, as has occurred frequently in the area over time, drought conditions have resulted. Drought has also been a contributing factor to wildfires that occurred in the forested areas. Similarly, since high temperatures and humidity are possible and occur frequently during the summer months, heat wave conditions are possible in the area. The threat of drought and heat can affect human as well as animals throughout the City of North Charleston.</p>
<p>Winter Weather</p>	<p>Snow and ice storms, coupled with cold temperatures, periodically threaten the Parks. Winter storms can damage property, create safety risks, destroy crops and valuable timber, damage infrastructure components such as power lines, and have enormous economic impacts throughout the Parks. This weather can cause major problems for City roadways, overpasses and bridges create major obstacles to get to the Parks. Snow and ice storms most recently struck South Carolina in 1989, 1993, 2000, 2002, 2010 and 2014. For more detailed information see Exhibits: City of North Charleston Winter Weather Guide.</p>

Impacts for all Hazards for Charleston County School District (CCSD)	
Hazard	Impact
Hurricane	<p>Charleston County and its schools are impacted by hurricanes or tropical storms almost annually; notable ones include Hurricane Hugo in 1989, Hurricane Matthew in 2016 and Tropical Storm Irma in 2017. All of these hurricanes resulted in school closures, damage and use of shelters; these actions can be expected to continue to occur.</p> <p>The greatest threat to life and property associated with a hurricane and tropical storm is storm surge.</p> <p>Other effects include high winds, tornadoes, and inland flooding associated with heavy rainfall that usually accompanies these storms.</p>
Flooding	<p>Floods are the most common natural disaster in the United States; Charleston County and its schools are very threatened by floods and flooding due to our low elevation, the presence of rivers, marshes and other bodies of water, tidal effects and a rainy climate. Schools on the peninsula of downtown Charleston, McClellanville, Mount Pleasant, Sullivan’s Island, James Island and North Charleston are all subject to either flash or tidal flooding.</p>
Sea Level Rise	<p>While, the impact of this hazard has yet to be seen to full magnitude, it is expected that it could impact schools on the peninsula of downtown Charleston, Sullivan’s Island and Mount Pleasant could be impacted by it. It is expected to be have greater impact within the next 20 years.</p>
Earthquake	<p>If there were to be a major earthquake at this fault line, there would inevitably be damage to buildings and infrastructure in CCSD, especially in its schools located closest to the epicenter. These are likely to include schools in North Charleston, West Ashley and downtown Charleston. Due to its no notice and potential to separate parents, teacher, staff and students, an earthquake is considered among the biggest hazards to the CCSD.</p>
Tornado	<p>Tornadoes can strike anywhere at any of the schools in CCSD. While there is some notice available from NWS alerts, watches and warnings, the short notice of these incidents makes them a considerable hazard to CCSD.</p>

Hazardous Materials	All in CCSD schools are at risk from the effects of radiological, hazardous toxic material accidents. Such accidents may result in the need to take immediate action. The action to be taken will depend on the proximity of the accident to the school, the type of hazardous material (HAZMAT), the wind velocity, and the weather.
Terrorism	Charleston County could be subject to terrorist attacks due to the presence of its port – one of the top ten in the United States, its Air Force Base, its airport – the busiest in the state and its many festivals, events and gatherings, which draw thousands of tourists. These potential attacks could affect Charleston County Schools. Action taken to respond to a terrorist attack will depend on the type of attack, the proximity to the school, instructions from CCSD/local emergency services and other factors.
Wildfire	The impact of wildfires to CCSD would be limited, resulting mainly in the closure of roads. Schools in the western part of Charleston County on Edisto Island, Wadmalaw Island, the Willtown and Baptist Hill areas are most threatened by wildfire.
Tsunamis	<p>As with any coastal community along the Atlantic Ocean, there is still an extremely remote chance that a volcano eruption in the Caribbean or Canary Islands, or a collapse of the Continental Shelf, or an earthquake in the Puerto Rico Trench, that a tsunami could ultimately strike the Coastal Charleston County area. However, the volcanic eruption of most scientific concern (Canary Islands) for the Southeastern US is theorized to potentially not occur for another 5,000 years and adequate warning of such an event would be likely, so that residents would be expected to have an opportunity to evacuate coastal areas should such an unlikely event occur.</p> <p>The schools most likely to be affected by a tsunami are primarily on barrier islands and low lying areas at or along the Intracoastal Waterway and Charleston Harbor.</p>
Dam Failure	The highest impact of dam failure is to the eastern part of Charleston County. There is only one school in this area - it is not in the likely flood zone. Past impacts have been minimal and are expected to stay that course.

Rip Currents	CCSD would not be affected by this.
Severe Storm	Virtually every day during the warm season in Charleston County, the environment is supportive of at least isolated severe thunderstorms. The frequency and potential danger of thunderstorms and severe thunderstorms means CCSD must prepare for them.
Drought	The impact of drought is minimal on CCSD.
Winter Weather	<p>Despite the infrequency of winter storms in Charleston County, winter weather and storms do occur and can be quite dangerous. Winter storms in 1989, 2010, 2012 and 2018 resulted in days of school cancellation, closed roads, utility failures and other incidents.</p> <p>Due to the forecasting and lead time ahead of a winter storm, preparations and actions could begin 12-24 hours or more ahead of time for them. It is very likely schools will be closed, and Incident Commanders and their staff may have to coordinate or conduct some activities from home.</p>

Impacts for all Hazards for the Town of Kiawah Island	
Hazard	Impact
Hurricane	Hurricanes and Tropical Storms threaten the entire Atlantic Coast. Landing patterns are unpredictable until the storm has formed and is within a cone of predictability. The severity of the storm is directly correlates to the amount of destruction received. Being a coastal community Kiawah Island is very susceptible to hurricanes and Tropical storms.
Flooding	All of Kiawah Island is in a floodplain. Impact of flooding can be severe depending on how much rain occurs, storm surge, and time duration. Kiawah Island is also impacted by rainfall from the upstate as seen in 2015, mainly the Santee Watershed. During major rain events main roadways both internal and external to the island flood preventing safe access to the island.
Sea Level Rise	The impact of this hazard has yet to be seen to full magnitude. King tides are the best measurement of this event. The Town of Kiawah Island has authored a Sea-Level Rise Report for Kiawah Island addressing the potential vulnerabilities the island residents will need to begin planning for to ensure sustainability. Currently, sea-level rise for the area is reported at 1.5 ft. above, which is creating abnormally high king tides. We have not experienced any flooding due to the king tides and sea-level rise, but, we are currently having engineering analysis performed to determine how high to raise section(s) of Kiawah Island Parkway.

Earthquake	Historically, impacts to earthquakes on Kiawah Island have been minimal. Geographically the island is East-to-West with the fault line being to the north, with the exception of the Helena Banks Fault. Recent data shows only minimal intensity noted, however, since there are F-D seismic zones located on the island, an earthquake classified as major would create massive destruction island wide.
Tornado	Tornadoes can be very damaging, and Kiawah Island is susceptible to tornados.
Hazardous Materials	Hazardous materials spill could affect the ecology and wildlife of the island if not contained in time. SOP's are incorporated to the Town's Hazard Mitigation manual for such an event.
Terrorism	An act of terrorism on the island would have long lasting effect in terms of marketability. Not to mention a loss of life scenario.
Wildfire	The impact of wildfires would be detrimental to the natural resources and beautification of the island. The size of the fire and origination would depict the overall impact.
Tsunamis	The impact of tsunamis has been minimal to Kiawah Island.
Dam Failure	There are no dams on Kiawah Island.
Rip Currents	The Town of Kiawah Island has contract with a private beach patrol company who monitors rip currents and other hazards associated with beach goers. Beach patrol has the responsibility to warn bathers of the hazards associated with coastal waters.
Severe Storm	The impact of severe storms is dependent on wind speed, hail size and rainfall. Severe storms will create some minor flooding events on main roadways.
Drought	The impact of drought is minimal on the County as the droughts typically experienced is D1 (moderate drought). The damages this would create for the island is minimal.

Winter Weather

Most winter hazards are associated with vegetation damage, freezing pipes, and occasional icing of roads. With the most recent event in 2018, the impact to the area was road integrity, economic loss of businesses closing, and burst pipes. Winter weather does not impact Kiawah Island often.

Impacts for all Hazards for City of Folly Beach	
Hazard	Impact
Hurricane	Hurricanes and Tropical Storms threaten the entire Atlantic Coast. Landing patterns are unpredictable until the storm has formed and is within a short time from landing. The amount of impact is dependent on size of storm, speed, and location of landfall, if any. The impact of hurricanes (high winds, storm surge, rainfall) is extremely high for Folly Beach from both direct hits and near misses with beach front erosion and property damage occurring at most every storm.
Flooding	100% of Folly Beach is in a Special Flood Hazard Area with V-zone and Coastal A-zones. Impact of flooding can be severe depending on how much rain occurs in a short period of time and the coinciding tide cycle. Some high tides, with our without a rain event, can cause damaging flooding primarily to the marsh side of the island to including flooding of homes, damage to flora, marsh front erosion, and road closures.
Sea Level Rise	The impact of this hazard has yet to be seen to full magnitude. King tides are the best measurement of this event. For the City of Folly Beach increasing amount of King Tide events they are becoming a more regular and more serious threat to the barrier island. As time passes it is expected that Folly will see more property and infrastructure damage due to Sea Level rise.

<p>Earthquake</p>	<p>Historically, impacts to earthquakes on Folly Beach have been minimal. With the fault line being to the north, typical impacts to buildings are minimal. If there were to be a major earthquake at this fault line, there would inevitably be damage to buildings and infrastructure, but other jurisdictions would be hit more severely. Fault lines outside of Charleston County should also be monitored as aftershocks can be catastrophic and trigger other seismic events.</p>
<p>Tornado</p>	<p>The impact of the most recent tornado on Johns Island in 2015 caused over \$1.5 million in damages. The unpredictability of tornadoes can be very impactful for Coastal Communities. Though rare they are always a potential threat.</p>
<p>Hazardous Materials</p>	<p>The impact of a hazard materials exposure could be severe if materials are not contained and make their way into the storm water system. Impacts to the marsh and creeks could be severe.</p>
<p>Terrorism</p>	<p>Though unlikely the impact could be severe be dependent on the scale and type of terrorism.</p>
<p>Wildfire</p>	<p>Due to primarily developed land or marshes the impact of wild fires is low for Folly Beach with the exception being air quality due to smoke from fires further inland.</p>
<p>Tsunamis</p>	<p>The impact of tsunamis could be severe due to Folly being a Beach Front community. A tsunami could produce considerable property and infra structure damage.</p>
<p>Dam Failure</p>	<p>Dam failure is not a current threat to Folly Beach.</p>
<p>Rip Currents</p>	<p>Folly Beach is heavily impacted by rip currents. Danger to tourists and first responders during rescue operations.</p>

<p>Severe Storm</p>	<p>The impact of severe storms depending on wind speed, hail size and rainfall is moderately impactful to Folly Beach. Cars and residential homes, are at risk and would have the most impact.</p>
<p>Drought</p>	<p>The impact of drought is minimal to Folly Beach as the droughts typically experienced is D1 (moderate drought). The damages this would put on the City is minimal.</p>
<p>Winter Weather</p>	<p>Most winter hazards are associated with vegetation damage, freezing pipes, and occasional icing of roads. With the most recent event in 2018, the impact to the area was road integrity, economic loss of businesses closing, and burst pipes. Winter weather does not impact the City of Folly Beach often.</p>

A.9 – Complete Hazard Histories

Hurricane Events between August 11 1940 - April 30 2013			
Name	Category	Date	Damage Description
August 11th, 1940 (Name classification started after 1950)	2	August 11th, 1940	Estimated damage to the city was \$1 million. Sullivan’s Island and the City of the Isle of Palms suffered minor damage.
Hurricane Hazel	4	October 15th, 1954	Folly Beach, Sullivan’s Island, and the Isle of Palms suffered light property damage and slight beach erosion. The City of Charleston experienced no serious damage.
Hurricane Gracie	3	September 29th, 1959	The total damage inflicted by the storm was estimated at \$14 million. High water marks, which were reported near the Town of Edisto Beach, South Carolina, ranged from 7.3 to 11.9 feet.
Hurricane David	3	August 29th - September 7th, 1979	Flooding and minor damage in the City of Charleston.
Hurricane Hugo	4	September 19th, 1989	Tidal surges north of the city were recorded at 19.8 feet and 11.8 feet in the Peninsula City. The hurricane struck at high tide. Its recorded diameter was over 500 miles, Four (4) people were killed and scores injured. Estimated damage of \$7 billion for the total area.
Hurricane Bertha	2	July 12th, 1996	This hurricane came close but did not cause any significant damage. Some coastal areas experienced moderate beach erosion. Tourism estimated loss revenue of 20 million dollars.
Hurricane Fran	3	Septemer 5th, 1996	The storm didn't directly hit the Charleston Region but remnants of this hurricane created power outages with economic losses estimated at 20 million dollars.
Hurricane Bonnie	3	August 26th, 1998	Remnants of this hurricane produced winds that knocked down several trees in the Town of Mount Pleasant as it headed for the North Carolina Coast.
Hurricane Floyd	2	September 15th, 1999	Sustained winds of 58 miles per hour were recorded in downtown Charleston with gusts up to 85 miles per hour. Generally 3-5 inches of rainfall occurred. An estimated \$10.5 million in damages occurred in the Charleston region.
Hurricane Irene	1	October 17th, 1999	This hurricane dropped 3 to 5 inches of rain created minor street flooding. Minor beach erosion. Trees knocked down and power outages in the area.
Tropical Storm Gordon		September 18th, 2000	Remnants of the storm dropped 6-10 inches of rain. Minor beach erosion occurred as a result of this storm.
Tropical Storm Claudette		July 14th, 2003	Two and a half inches of rain, a tree was downed, 11 traffic accidents.
Tropical Depression Seven		July 25th, 2003	Expected to receive as much as 6 inches of rain and wind gusts up to 35 mph from this storm.
Tropical Storm Henri		September 6th, 2003	Folly Beach, Sullivan’s Island, and Isle of Palms experienced beach erosion from remnants of the storm, which was predicted to also bring up to 5 inches of rain to the Charleston area.
Hurricane Isabel	2	September 17th, 2003	This storm created 8 foot surf at Kiawah Island and had wind gusts of 40 mph offshore and 20 mph in downtown Charleston when it passed offshore. Coastal erosion was expected, as tides were 6 to 12 inches above normal.
Tropical Storm Alex		August 2nd, 2004	Minor beach erosion was reported on Folly Beach.
Tropical Storm Bonnie		August 12th, 2004	The remnants of this storm caused a tornado and several incidents of wind damage in the Awendaw area.
Hurricane Charley	1	August 14-15th, 2004	An estimated 4 inches of rain fell in 2 hours in the Northern part of Charleston County on August 14, 2004, flooding low lying areas and areas with poor drainage. Storm surge was estimated at 4-6 feet from Oyster Landing to the Cape Romain Wildlife Refuge in the northern portions of Charleston County. Minor property and tree damage occurred as a result of this storm. The storm caused an estimated damage of \$2 million in South Carolina.
Hurricane Gaston	1	August 29th, 2004	Sustained winds of 75 mph. The storm brought a 4 foot storm surge into Bull’s Bay, which caused an estimated \$4.8 million in damages to homes, primarily in areas east of the Cooper River creating debris with an estimated clean-up cost of \$2.2 million county-wide, and left nearly all of the customers of South Carolina Electric and Gas without electrical power. Total estimated damages, per the National Weather Service, were \$7.6 million in Charleston County.

Tropical Storm Frances		September 6th, 2004	This storm created nearly 6 ft. surf. Dropped nearly 5 inches of rain, winds of 35 mph, minor damage and flooding.
Tropical Depression Jeanne		September 27th, 2004	Resulted in 40 ft. of beach erosion on the north end of Folly Beach. Maximum wind gusts in Charleston County from this storm were 41 mph in downtown Charleston and at the Charleston airport. Maximum wind gusts at Folly Beach were 38 mph. Non-tornadic damage was limited to a few trees falling on cars.
Tropical Storm Ophelia		September 13th, 2005	Loss of Life, Beach Erosion, minor damage.
Tropical Storm Tammy		October 5th, 2005	Significant Beach Erosion, flooding, minor damage.
Tropical Storm Alberto		June 13th, 2006	Remnants of the storm produced a tornado that touched down near Awendaw, knocking down trees. Street flooding occurred in Charleston and North Charleston as a result of this storm.
Tropical Storm Ernesto		August 31st, 2006	Mt. Pleasant received 6.65 inches of rainfall from this storm system. Street flooding occurred in the City of Charleston and 40 mph gusts.
Tropical Storm Barry		June 2nd, 2007	Remnants of the storm produced heavy rains, strong winds, rough surf, and 3 inches of rain. Loss of electricity to 13,900 customers of SCE&G and Berkeley Electric Cooperative, mostly in the Summerville area, which caused vessels to break their lines, and flood streets, particularly on the Charleston Peninsula. Wind gusts up to 60 mph were recorded.
Tropical Storm Hanna		September 5th, 2008	Resulting in strong wind and localized heavy rain.
Tropical Storm Irene		August 25th, 2011	The Charleston County Folly Beach Park received significant erosion-related damages as a result of this storm, including beach areas and structures.
Tropical Storm Lee		September 6th, 2011	Charleston County sustained scattered showers, thunderstorms, and winds up to 22 mph with a half-inch of rain in some areas.
Tropical Storm Beryl		May 27th, 2012	The region saw tropical storm forced winds, heavy rainfall, and fallen trees as result of the storm.
Tropical Storm Sandy		October 27th, 2012	The storm produced forced winds of 40 mph.

Hurricane Events between May 1, 2013 – January 31, 2019

Name	Category	Date	Damage Description
Tropical Storm Andrea		June 6, 2013	Heavy rainfall 3-7 inches
Tropical Storm Arthur		July 3, 2014	Tropical storm watch was posted for Santee River to Bogue Banks, NC. Wind gusts up to 42 mph (68 km/h) along coastal areas, resulting in scattered power outages
Tropical Storm Ana		May 7-8, 2015	Tropical storm warning from South Santee River to Surf City, NC. Produced a small storm surge along Charleston County coast.
Hurricane Joaquin	4	October 1-5, 2015	Did not make landfall in the US, but caused catastrophic flooding in South Carolina and intense flooding and power outages in Charleston County. South Carolina Governor Haley declared a State of Emergency.
Hurricane Matthew	1	October 7-8, 2016	Once a Category 5 hurricane before ripping through Haiti and eastern Cuba, Hurricane Matthew had downgraded to a Category 1 by the time it hit South Carolina. Even so, 830,000 South Carolinians lost power, 355,000 evacuated from their homes, and 4 lost their lives.
Hurricane Irma	1	9/11-9/12/2017	Once a Category 5 hurricane before ripping through the Caribbean, Hurricane Irma had downgraded to a Category 1, and eventually a tropical storm, by the time the system impacted South Carolina. Even so, over 100,000 South Carolinians lost power, 3 lost their lives, and Charleston recorded its third highest storm surge ever (10ft).
Hurricane Florence	1	9/14/2018	Once a Category 4 hurricane before making landfall north of Charleston County, this storm impacted Charleston County as a tropical depression. No lives were lost in Charleston County although thousands of residents lost power during the storm's peak.

Hurricane Michael	4	10/11/2018	Making landfall as a Category 4 hurricane in Florida's Bay County, this storm impacted Charleston County by bringing 50 mph winds which dismantled many trees and power lines plus a storm surge measured at 2.07 ft in Charleston Harbor. Charleston County saw no lost lives, although the storm directly caused 16 casualties and 43 indirectly, according to the NOAA.
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FLOODING EVENTS IN CHARLESTON COUNTY Jan 1, 1950 - April 30, 2019			
Location	Date	Type	Property Damage
CHARLESTON	10/8/1996	Flash Flood	0
CHARLESTON	6/6/1997	Flash Flood	125000
NORTH CHARLESTON	6/28/1997	Flash Flood	0
EAST PORTION	1/23/1998	Flash Flood	0
NORTH CHARLESTON	9/21/1998	Flash Flood	413500
CHARLESTON	5/12/1999	Flash Flood	0
JAMES IS	6/16/1999	Flash Flood	0
NORTH CHARLESTON	9/28/1999	Flash Flood	0
CHARLESTON (ZONE)	9/29/1999	Flood	0
NORTHEAST PORTION	10/17/1999	Flash Flood	0
AWENDAW	9/5/2000	Flash Flood	0
MC CLELLANVILLE	9/18/2000	Flash Flood	0
CHARLESTON (ZONE)	6/22/2002	Flood	0
CHARLESTON	8/30/2002	Flash Flood	0
MC CLELLANVILLE	8/31/2002	Flash Flood	0
EDISTO IS	10/10/2002	Flash Flood	0
NORTH CHARLESTON	10/11/2002	Flash Flood	0
CHARLESTON (ZONE)	3/20/2003	Flood	0
CHARLESTON	7/14/2003	Flash Flood	0
CHARLESTON	6/15/2004	Flash Flood	0
MT PLEASANT	8/14/2004	Flash Flood	0
CHARLESTON	8/15/2004	Flash Flood	0
SULLIVANS IS	8/29/2004	Flash Flood	0
CHARLESTON	9/27/2004	Flash Flood	0
JAMES IS	5/16/2005	Flash Flood	0
CENTRAL PORTION	5/17/2005	Flash Flood	0
CHARLESTON	5/17/2005	Flash Flood	0
CHARLESTON	6/28/2005	Flash Flood	0

FLOODING EVENTS IN CHARLESTON COUNTY Jan 1, 1950 - April 30, 2019

Location	Date	Type	Property Damage
AWENDAW	7/9/2005	Flash Flood	0
CHARLESTON	7/9/2005	Flash Flood	0
AWENDAW	7/9/2005	Flash Flood	0
NORTH CHARLESTON	7/21/2005	Flash Flood	0
MT PLEASANT	8/17/2005	Flash Flood	0
NORTH CHARLESTON	8/24/2005	Flash Flood	0
JAMES IS	9/28/2005	Flash Flood	0
CHARLESTON	8/24/2006	Flash Flood	0
CHARLESTON	8/24/2006	Flash Flood	0
NORTH CHARLESTON	8/24/2006	Flash Flood	0
NORTH CHARLESTON	8/24/2006	Flash Flood	0
CHARLESTON	8/24/2006	Flash Flood	0
CHARLESTON	8/31/2006	Flash Flood	0
MT PLEASANT	8/31/2006	Flash Flood	0
CHARLESTON	8/31/2006	Flash Flood	0
ASHLEY HALL	7/28/2007	Flash Flood	1000
CHARLESTON HGTS	7/30/2007	Flash Flood	2000
CHARLESTON HGTS	7/30/2007	Flash Flood	0
CHARLESTON HGTS	7/30/2007	Flash Flood	0
CHARLESTON	7/30/2007	Flash Flood	0
CHARLESTON HGTS	7/30/2007	Flash Flood	0
CHARLESTON	7/30/2007	Flash Flood	0
AWENDAW	5/9/2008	Flash Flood	0
CENTERVILLE	6/20/2008	Flash Flood	0
CHARLESTON	6/21/2008	Flash Flood	0
ROCKVILLE	8/1/2008	Flash Flood	0
ROCKVILLE	8/1/2008	Flash Flood	0
MARYVILLE	9/5/2008	Flash Flood	0
CITADEL	9/5/2008	Flash Flood	0
CHARLESTON HGTS	9/16/2008	Flash Flood	0
CITADEL	10/24/2008	Flash Flood	5000
CHARLESTON	10/24/2008	Flash Flood	0

FLOODING EVENTS IN CHARLESTON COUNTY Jan 1, 1950 - April 30, 2019

Location	Date	Type	Property Damage
DRAYTON	10/24/2008	Flash Flood	0
DRAYTON	10/24/2008	Flash Flood	50000
DUPONT	10/24/2008	Flash Flood	0
HILLDALE	10/24/2008	Flash Flood	35000
DRAYTON	10/24/2008	Flash Flood	7500
CHARLESTON	10/24/2008	Flash Flood	15000
DUPONT	10/24/2008	Flash Flood	0
SNOWDEN	10/24/2008	Flash Flood	0
CHARLESTON (ZONE)	6/22/2009	Coastal Flood	0
CHARLESTON (ZONE)	6/22/2009	Coastal Flood	0
CHARLESTON (ZONE)	6/22/2009	Coastal Flood	0
CHARLESTON (ZONE)	6/22/2009	Coastal Flood	0
CHARLESTON (ZONE)	6/22/2009	Coastal Flood	0
CHARLESTON (ZONE)	6/22/2009	Coastal Flood	0
CHARLESTON (ZONE)	6/22/2009	Coastal Flood	0
CHARLESTON (ZONE)	6/22/2009	Coastal Flood	0
CHARLESTON (ZONE)	6/22/2009	Coastal Flood	0
CHARLESTON (ZONE)	6/22/2009	Coastal Flood	0
CHARLESTON (ZONE)	6/22/2009	Coastal Flood	0
CHARLESTON (ZONE)	6/22/2009	Coastal Flood	30000
CHARLESTON (ZONE)	6/22/2009	Coastal Flood	100000
CHARLESTON (ZONE)	6/22/2009	Coastal Flood	0
CHARLESTON (ZONE)	6/22/2009	Coastal Flood	50000
CHARLESTON (ZONE)	6/22/2009	Coastal Flood	50000
CHARLESTON (ZONE)	6/22/2009	Coastal Flood	0
CHARLESTON (ZONE)	6/22/2009	Coastal Flood	0
CHARLESTON (ZONE)	6/22/2009	Coastal Flood	0

FLOODING EVENTS IN CHARLESTON COUNTY Jan 1, 1950 - April 30, 2019

Location	Date	Type	Property Damage
CHARLESTON (ZONE)	6/22/2009	Coastal Flood	0
CHARLESTON (ZONE)	6/22/2009	Coastal Flood	75000
CHARLESTON (ZONE)	6/22/2009	Coastal Flood	50000
CHARLESTON (ZONE)	6/22/2009	Coastal Flood	0
CHARLESTON (ZONE)	6/22/2009	Coastal Flood	40000
CHARLESTON (ZONE)	6/22/2009	Coastal Flood	0
CHARLESTON (ZONE)	6/22/2009	Coastal Flood	0
CHARLESTON (ZONE)	6/22/2009	Coastal Flood	0
CHARLESTON (ZONE)	6/22/2009	Coastal Flood	0
CHARLESTON (ZONE)	6/22/2009	Coastal Flood	0
CHARLESTON (ZONE)	6/22/2009	Coastal Flood	0
CHARLESTON (ZONE)	6/22/2009	Coastal Flood	0
CHARLESTON (ZONE)	6/22/2009	Coastal Flood	0
CHARLESTON (ZONE)	6/23/2009	Coastal Flood	0
CHARLESTON (ZONE)	6/23/2009	Coastal Flood	0
CHARLESTON (ZONE)	6/23/2009	Coastal Flood	0
CHARLESTON (ZONE)	6/23/2009	Coastal Flood	0
CHARLESTON (ZONE)	6/23/2009	Coastal Flood	0
CHARLESTON (ZONE)	6/23/2009	Coastal Flood	0
CHARLESTON (ZONE)	6/23/2009	Coastal Flood	0
CHARLESTON (ZONE)	6/23/2009	Coastal Flood	0
CHARLESTON (ZONE)	6/23/2009	Coastal Flood	0
CHARLESTON HGTS	7/8/2009	Flash Flood	3500
HILLDALE	7/8/2009	Flash Flood	5000

FLOODING EVENTS IN CHARLESTON COUNTY Jan 1, 1950 - April 30, 2019

Location	Date	Type	Property Damage
(CHS)CHARLESTON AFB	7/8/2009	Flash Flood	5000
SCANLONVILLE	7/8/2009	Flash Flood	0
RAVENEL	7/8/2009	Flash Flood	500
CITADEL	7/8/2009	Flash Flood	1000
MT PLEASANT	7/8/2009	Flash Flood	500
CHARLESTON	7/8/2009	Flash Flood	1000
AWENDAW	8/22/2009	Flash Flood	500
AWENDAW	8/22/2009	Flash Flood	1000
AWENDAW	8/22/2009	Flash Flood	1000
AWENDAW	8/22/2009	Flash Flood	5000
CHARLESTON (ZONE)	12/2/2009	Coastal Flood	0
CHARLESTON	12/2/2009	Flash Flood	0
CITADEL	12/2/2009	Flash Flood	0
CITADEL	12/2/2009	Flash Flood	0
CITADEL	12/2/2009	Flash Flood	0
CHARLESTON	12/2/2009	Flash Flood	0
CITADEL	12/2/2009	Flash Flood	0
CHARLESTON	12/2/2009	Flash Flood	10000
SNOWDEN	12/2/2009	Flash Flood	0
CHARLESTON HGTS	12/2/2009	Flash Flood	0
MIDLAND PARK	12/2/2009	Flash Flood	0
SEVEN MILE	12/18/2009	Flash Flood	0
CHARLESTON HGTS	12/18/2009	Flash Flood	0
THE GROVES	12/18/2009	Flash Flood	0
ISLE OF PALMS ARPT	12/18/2009	Flash Flood	0
CITADEL	12/18/2009	Flash Flood	0
SNOWDEN	12/18/2009	Flash Flood	0
CHARLESTON (ZONE)	1/30/2010	Coastal Flood	0
CHARLESTON (ZONE)	1/30/2010	Coastal Flood	0
CHARLESTON (ZONE)	1/30/2010	Coastal Flood	0
THE GROVES	8/15/2010	Flash Flood	1000
THE GROVES	8/15/2010	Flash Flood	2500
CITADEL	8/20/2010	Flash Flood	0

FLOODING EVENTS IN CHARLESTON COUNTY Jan 1, 1950 - April 30, 2019

Location	Date	Type	Property Damage
MOORE CORNER	9/29/2010	Flash Flood	1000
FOLLY BEACH	7/27/2011	Flash Flood	5000
LADSON	8/12/2011	Flash Flood	0
CHARLESTON (ZONE)	8/26/2011	Storm Surge/Tide	0
CHARLESTON (ZONE)	5/7/2012	Coastal Flood	0
CITADEL	5/29/2012	Flash Flood	0
CHARLESTON (ZONE)	6/1/2012	Coastal Flood	0
CHARLESTON (ZONE)	6/5/2012	Coastal Flood	0
CHARLESTON (ZONE)	6/5/2012	Coastal Flood	0
ASHLEY HALL	6/6/2012	Flash Flood	0
CITADEL	6/6/2012	Flash Flood	0
CHARLESTON (ZONE)	6/6/2012	Coastal Flood	0
CHARLESTON	7/11/2012	Flash Flood	10000
CHARLESTON	8/28/2012	Flash Flood	0
CENTERVILLE	8/28/2012	Flash Flood	0
CITADEL	8/28/2012	Flash Flood	0
DUPONT	8/28/2012	Flash Flood	0
MARYVILLE	8/28/2012	Flash Flood	0
THE GROVES	8/28/2012	Flash Flood	0
DORCHESTER	8/28/2012	Flash Flood	0
MARYVILLE	8/28/2012	Flash Flood	0
ASHLEY HALL	8/28/2012	Flash Flood	0
ASHLEY JCT	8/28/2012	Flash Flood	0
PINECREST	8/28/2012	Flash Flood	0
CHARLESTON	8/28/2012	Flash Flood	750000
PHILIP	8/29/2012	Flash Flood	0
CITADEL	8/29/2012	Flash Flood	0
MT PLEASANT	8/29/2012	Flash Flood	0
CITADEL	8/29/2012	Flash Flood	0
CITADEL	8/29/2012	Flash Flood	0
ISLE OF PALMS ARPT	8/29/2012	Flash Flood	0
CHARLESTON (ZONE)	11/15/2012	Coastal Flood	0

FLOODING EVENTS IN CHARLESTON COUNTY Jan 1, 1950 - April 30, 2019

Location	Date	Type	Property Damage
CHARLESTON (ZONE)	11/15/2012	Coastal Flood	0
CHARLESTON (ZONE)	11/15/2012	Coastal Flood	0
CHARLESTON (ZONE)	12/13/2012	Coastal Flood	0
CHARLESTON (ZONE)	12/15/2012	Coastal Flood	0
CITADEL	2/26/2013	Flash Flood	0
CHARLESTON	3/24/2013	Flash Flood	0
CITADEL	3/24/2013	Flash Flood	0
CENTERVILLE	3/24/2013	Flash Flood	0
WAYLYN	3/24/2013	Flash Flood	0
CHARLESTON	3/24/2013	Flash Flood	0
CITADEL	3/24/2013	Flash Flood	0
CITADEL	3/24/2013	Flash Flood	0
CHARLESTON	3/24/2013	Flash Flood	0
CHARLESTON (ZONE)	5/5/2013	Coastal Flood	0
CHARLESTON (ZONE)	5/5/2013	Coastal Flood	0
CHARLESTON (ZONE)	5/5/2013	Coastal Flood	0
CHARLESTON (ZONE)	5/25/2013	Coastal Flood	0
CITADEL	6/11/2013	Flash Flood	0
CITADEL	6/11/2013	Flash Flood	0
CITADEL	6/11/2013	Flash Flood	0
CITADEL	6/11/2013	Flash Flood	0
CITADEL	6/18/2013	Flash Flood	0
CITADEL	6/18/2013	Flash Flood	0
CITADEL	6/18/2013	Flash Flood	0
CITADEL	6/18/2013	Flash Flood	0
CHARLESTON HGTS	6/19/2013	Flash Flood	0
CHARLESTON	6/19/2013	Flash Flood	0
CHARLESTON	6/19/2013	Flash Flood	0
CITADEL	6/19/2013	Flash Flood	0
MYERS	6/19/2013	Flash Flood	0
CITADEL	6/19/2013	Flash Flood	0
CITADEL	6/30/2013	Flash Flood	0

FLOODING EVENTS IN CHARLESTON COUNTY Jan 1, 1950 - April 30, 2019

Location	Date	Type	Property Damage
SNOWDEN	6/30/2013	Flash Flood	0
HOBCAW PT	6/30/2013	Flash Flood	0
CITADEL	6/30/2013	Flash Flood	0
CITADEL	7/12/2013	Flash Flood	20000
PARKERS FERRY	7/19/2013	Flood	20000
CHARLESTON	7/21/2013	Flash Flood	50000
CHARLESTON (ZONE)	7/24/2013	Coastal Flood	0
LADSON	7/29/2013	Flash Flood	10000
CITADEL	8/14/2013	Flash Flood	0
CITADEL	8/14/2013	Flash Flood	0
CITADEL	8/15/2013	Flash Flood	0
CHARLESTON	8/15/2013	Flash Flood	0
CHARLESTON (ZONE)	8/18/2013	Coastal Flood	0
CHARLESTON (ZONE)	8/18/2013	Coastal Flood	0
CHARLESTON (ZONE)	8/20/2013	Coastal Flood	0
CHARLESTON (ZONE)	3/1/2014	Coastal Flood	0
CITADEL	4/18/2014	Flash Flood	0
LADSON	6/7/2014	Flash Flood	500
HILLDALE	6/23/2014	Flash Flood	0
FOLLY BEACH	7/6/2014	Flash Flood	0
CHARLESTON	7/31/2014	Flash Flood	5000
FOLLY BEACH	7/31/2014	Flash Flood	15000
RIVERLAND TERRACE	7/31/2014	Flash Flood	5000
WAYLYN	7/31/2014	Flash Flood	5000
CHARLESTON	8/9/2014	Flash Flood	0
THE GROVES	8/10/2014	Flash Flood	2500
(CHS)CHARLESTON AFB	8/10/2014	Flash Flood	0
CHARLESTON (ZONE)	8/11/2014	Coastal Flood	0
CITADEL	9/15/2014	Flash Flood	5000
(CHS)CHARLESTON AFB	9/15/2014	Flash Flood	10000
CITADEL	9/16/2014	Flash Flood	5000
PINECREST	9/16/2014	Flash Flood	1000

FLOODING EVENTS IN CHARLESTON COUNTY Jan 1, 1950 - April 30, 2019

Location	Date	Type	Property Damage
CHARLESTON (ZONE)	12/6/2014	Coastal Flood	0
CHARLESTON (ZONE)	12/8/2014	Coastal Flood	0
CHARLESTON (ZONE)	12/22/2014	Coastal Flood	0
CHARLESTON (ZONE)	12/24/2014	Coastal Flood	0
CHARLESTON (ZONE)	3/22/2015	Coastal Flood	0
CITADEL	6/9/2015	Flash Flood	10000
CHARLESTON	8/18/2015	Flash Flood	0
THE GROVES	8/19/2015	Flash Flood	0
MYERS	8/19/2015	Flash Flood	0
NAVY YARD	8/31/2015	Flash Flood	0
DUPONT	8/31/2015	Flash Flood	100000
DEER PARK	8/31/2015	Flash Flood	0
CHARLESTON HGTS	8/31/2015	Flash Flood	0
ASHLEY JCT	8/31/2015	Flash Flood	0
MIDLAND PARK	8/31/2015	Flash Flood	0
CITADEL	8/31/2015	Flash Flood	0
(CHS)CHARLESTON AFB	8/31/2015	Flash Flood	0
CHARLESTON (ZONE)	9/24/2015	Coastal Flood	0
CHARLESTON (ZONE)	9/26/2015	Coastal Flood	0
CHARLESTON (ZONE)	9/27/2015	Coastal Flood	0
CHARLESTON (ZONE)	9/28/2015	Coastal Flood	0
CHARLESTON (ZONE)	9/28/2015	Coastal Flood	0
CHARLESTON (ZONE)	9/28/2015	Coastal Flood	0
CHARLESTON (ZONE)	9/29/2015	Coastal Flood	0
CHARLESTON (ZONE)	9/29/2015	Coastal Flood	0
CHARLESTON (ZONE)	9/29/2015	Coastal Flood	0

FLOODING EVENTS IN CHARLESTON COUNTY Jan 1, 1950 - April 30, 2019

Location	Date	Type	Property Damage
CHARLESTON (ZONE)	9/30/2015	Coastal Flood	0
CHARLESTON (ZONE)	10/1/2015	Coastal Flood	0
MYERS	10/1/2015	Flash Flood	728550
CHARLESTON (ZONE)	10/2/2015	Coastal Flood	0
CHARLESTON	10/3/2015	Flash Flood	728550
PHILIP	10/3/2015	Flash Flood	728550
PINECREST	10/3/2015	Flash Flood	728550
MORRIS ACRES	10/3/2015	Flash Flood	728550
MYERS	10/3/2015	Flash Flood	728550
THE GROVES	10/3/2015	Flash Flood	728550
RIVERLAND TERRACE	10/3/2015	Flash Flood	728550
JOHNS IS	10/3/2015	Flash Flood	728550
CHARLESTON (ZONE)	10/3/2015	Coastal Flood	0
MEGGETT	10/3/2015	Flash Flood	728550
LINCOLNVILLE	10/3/2015	Flash Flood	728550
YONGES IS	10/3/2015	Flash Flood	728550
DUPONT	10/3/2015	Flash Flood	728550
WADMALAW IS	10/3/2015	Flash Flood	728550
EDISTO IS	10/3/2015	Flash Flood	728550
ROCKVILLE	10/3/2015	Flash Flood	728550
CHARLESTON	10/3/2015	Flash Flood	728550
DUPONT	10/3/2015	Flash Flood	728550
ISLE OF PALMS ARPT	10/3/2015	Flash Flood	728550
HILLDALE	10/3/2015	Flash Flood	728550
PHILIP	10/3/2015	Flash Flood	728550
JAMES IS	10/4/2015	Flash Flood	728550
AWENDAW	10/4/2015	Flash Flood	728550
CHARLESTON HGTS	10/4/2015	Flash Flood	728550
CHARLESTON (ZONE)	10/4/2015	Coastal Flood	0
RIVERLAND TERRACE	10/4/2015	Flash Flood	728550
CHARLESTON (ZONE)	10/6/2015	Coastal Flood	0

FLOODING EVENTS IN CHARLESTON COUNTY Jan 1, 1950 - April 30, 2019

Location	Date	Type	Property Damage
CHARLESTON (ZONE)	10/7/2015	Coastal Flood	0
CHARLESTON (ZONE)	10/7/2015	Coastal Flood	0
CHARLESTON (ZONE)	10/7/2015	Coastal Flood	0
CHARLESTON (ZONE)	10/27/2015	Coastal Flood	0
CHARLESTON (ZONE)	10/27/2015	Coastal Flood	0
CHARLESTON (ZONE)	10/27/2015	Coastal Flood	0
CHARLESTON (ZONE)	10/27/2015	Coastal Flood	0
CHARLESTON (ZONE)	10/27/2015	Coastal Flood	0
CHARLESTON (ZONE)	10/27/2015	Coastal Flood	0
CHARLESTON (ZONE)	10/27/2015	Coastal Flood	0
CHARLESTON (ZONE)	10/27/2015	Coastal Flood	0
CHARLESTON (ZONE)	10/27/2015	Coastal Flood	0
CHARLESTON (ZONE)	10/27/2015	Coastal Flood	0
CHARLESTON (ZONE)	10/28/2015	Coastal Flood	0
CHARLESTON (ZONE)	10/28/2015	Coastal Flood	0
CHARLESTON (ZONE)	10/28/2015	Coastal Flood	0
CHARLESTON (ZONE)	10/28/2015	Coastal Flood	0
CHARLESTON (ZONE)	10/28/2015	Coastal Flood	0
CHARLESTON (ZONE)	10/28/2015	Coastal Flood	0
CHARLESTON (ZONE)	10/28/2015	Coastal Flood	0
CHARLESTON (ZONE)	10/28/2015	Coastal Flood	0
CHARLESTON (ZONE)	10/28/2015	Coastal Flood	0
CHARLESTON (ZONE)	11/9/2015	Coastal Flood	0
CITADEL	1/15/2016	Flood	0
CHARLESTON	2/4/2016	Flood	0

FLOODING EVENTS IN CHARLESTON COUNTY Jan 1, 1950 - April 30, 2019

Location	Date	Type	Property Damage
HILLDALE	5/29/2016	Flash Flood	0
CHARLESTON (ZONE)	6/3/2016	Coastal Flood	0
CHARLESTON (ZONE)	6/4/2016	Coastal Flood	0
CHARLESTON HGTS	6/6/2016	Flash Flood	0
WAYLYN	6/6/2016	Flash Flood	0
CHARLESTON	6/6/2016	Flash Flood	0
CHARLESTON (ZONE)	6/6/2016	Storm Surge/Tide	0
CHARLESTON (ZONE)	6/18/2016	Coastal Flood	0
CHARLESTON	6/29/2016	Flash Flood	0
CHARLESTON (ZONE)	9/2/2016	Storm Surge/Tide	0
CHARLESTON (ZONE)	10/7/2016	Storm Surge/Tide	0
ASHLEY HALL	10/8/2016	Flash Flood	0
DRAYTON	10/8/2016	Flash Flood	0
ASHLEY HALL	10/8/2016	Flash Flood	0
HOLLYWOOD	10/8/2016	Flash Flood	0
CHARLESTON (ZONE)	10/10/2016	Coastal Flood	0
PARKERS FERRY	10/12/2016	Flood	0
CHARLESTON (ZONE)	10/12/2016	Coastal Flood	0
CHARLESTON (ZONE)	10/15/2016	Coastal Flood	0
CHARLESTON (ZONE)	10/16/2016	Coastal Flood	0
CHARLESTON (ZONE)	10/17/2016	Coastal Flood	0
CHARLESTON (ZONE)	9/10/2017	Coastal Flood	0
CHARLESTON (ZONE)	9/10/2017	Coastal Flood	0
CHARLESTON (ZONE)	9/11/2017	Storm Surge/Tide	0
DRAYTON	9/11/2017	Flash Flood	50000
CITADEL	7/20/2018	Flash Flood	20000

FLOODING EVENTS IN CHARLESTON COUNTY Jan 1, 1950 - April 30, 2019			
Location	Date	Type	Property Damage
CHARLESTON (ZONE)	10/11/2018	Storm Surge/Tide	0
CHARLESTON (ZONE)	11/23/2018	Coastal Flood	0
CHARLESTON (ZONE)	11/23/2018	Coastal Flood	0
CHARLESTON (ZONE)	11/24/2018	Coastal Flood	0
CHARLESTON (ZONE)	11/24/2018	Coastal Flood	0
CHARLESTON (ZONE)	12/9/2018	Coastal Flood	0
CHARLESTON (ZONE)	12/9/2018	Coastal Flood	0
CITADEL	12/14/2018	Flood	2500
CHARLESTON (ZONE)	2/20/2019	Coastal Flood	0
CHARLESTON (ZONE)	2/20/2019	Coastal Flood	0
TOTAL: 350 Events			TOTAL: \$20,402,750

*NOAA Storm Events Database

Duration and Depth* of King Tides in Charleston Area from January 2014 – December 2019**				
Year	Predicted Number of Tides	Observed Number of Tides	Highest Predicted Tide (ft)	Highest Observed Tide (ft)
2014	28	46	7	7.6
2015	40	111	7.2	8.7
2016	49	82	7.2	7.9
2017	34	111	7	9.9
2018	44	72	6.9	8.8
Average	39	84.4	7.06	8.58
Total	195	422	35.3	42.9

*Depth is based off of the Charleston Harbor Tide Gauge

**Available data from 2014 onwards gathered through MyCoast.org backed by SC DHEC:
<https://mycoast.org/sc/king-tides>

Source: USGS Latest Earthquakes 1800-to-date

Time*	Dept h	Magnitud e	Location
1817-01-08T09:00:00.000Z		5	South Carolina
1886-09-01T02:51:00.000Z		7.03	South Carolina
1959-08-03T06:08:37.200Z	1	4.4	South Carolina
1974-11-22T05:25:55.500Z	18	4.7	South Carolina
1977-01-18T18:29:13.500Z	5	3	South Carolina
1977-12-15T07:15:55.000Z	9	2.5	South Carolina
1977-12-15T19:16:43.100Z	9	3	South Carolina
1978-09-07T22:53:22.300Z	11	2.7	South Carolina
1979-12-07T05:43:35.000Z	15	2.9	South Carolina
1980-09-01T05:44:42.300Z	6	2.7	South Carolina
1981-03-19T04:33:55.720Z	0.1	2.5	South Carolina
1982-03-01T03:33:13.560Z	6.7	3	South Carolina
1983-11-06T09:02:19.820Z	9.6	3.3	South Carolina
1986-09-17T09:33:49.460Z	7.7	2.6	South Carolina
1988-01-23T01:57:16.390Z	7.4	3.3	South Carolina
1989-01-02T16:35:16.270Z	4.9	2.6	South Carolina
1990-02-07T07:41:39.920Z	9.3	2.7	South Carolina
1990-05-11T18:23:33.950Z	6.1	2.6	South Carolina
1990-11-13T15:22:13.010Z	3.4	3.2	South Carolina
1992-08-21T16:31:55.160Z	10	4.1	South Carolina
1995-04-17T13:45:57.800Z	10	3.9	South Carolina
1999-03-29T14:49:36.510Z	5	2.9	South Carolina
2002-11-08T13:29:03.190Z	3.9	3.5	South Carolina

Time*	Depth	Magnitude	Location
2002-11-11T23:39:29.720Z	2.4	4	South Carolina
2003-02-28T07:02:36.500Z	4.3	2.6	7km SW of Ladson, South Carolina
2003-03-02T17:18:26.500Z	6.5	2.9	7km SW of Ladson, South Carolina
2003-05-05T10:53:49.900Z	11.4	3.1	4km NNW of Summerville, South Carolina
2003-06-12T23:33:17.200Z	10.4	2.6	5km WSW of Centerville, South Carolina
2003-07-19T14:22:21.300Z	5.7	2.5	7km SSW of Ladson, South Carolina
2003-10-14T10:45:38.600Z	7.2	2.5	5km S of Centerville, South Carolina
2003-12-22T23:50:26.000Z	5.6	3	8km SSW of Ladson, South Carolina
2004-05-01T04:16:28.300Z	10.7	2.7	3km ENE of Goose Creek, South Carolina
2004-07-20T09:13:14.400Z	10.3	3.1	7km WSW of Centerville, South Carolina
2004-08-18T03:43:42.400Z	7.7	2.5	0km NE of Summerville, South Carolina
2004-11-25T22:58:45.900Z	12.9	2.7	4km NNW of Summerville, South Carolina
2005-11-19T20:02:20.000Z	5	2.6	South Carolina
2008-12-16T12:42:17.520Z	15.39	3.6	5km N of Sangaree, South Carolina
2009-01-29T21:11:27.200Z	6.45	2.5	2km SW of Summerville, South Carolina
2009-05-06T17:07:17.090Z	2.02	2.5	2km N of Summerville, South Carolina
2009-08-29T10:37:13.700Z	4.93	3.2	2km NE of Summerville, South Carolina
2010-05-12T09:03:36.760Z	1.26	2.8	6km SSW of Ladson, South Carolina
2011-10-15T07:02:32.820Z	8.05	2.5	4km WSW of Summerville, South Carolina
2011-12-21T21:38:57.670Z	12.33	2.6	7km SW of Centerville, South Carolina
2012-01-04T07:56:03.800Z	4.94	2.6	3km SSW of Centerville, South Carolina
2012-07-31T04:53:09.290Z	8.21	2.8	5km S of Centerville, South Carolina

Time*	Depth	Magnitude	Location
2013-09-19T19:14:11.170Z	11.44	2.5	8km WSW of Summerville, South Carolina
2014-03-19T22:38:03.330Z	6.91	3	0km S of Centerville, South Carolina

*Sourced from USGS Latest Earthquakes 1800-to-date

Tornado Events in Charleston County Between January 1, 1950 – December 31, 2018			
Origin Location	Date	SCALE	Property Damage
	5/22/1957	F0	\$ 30
	9/11/1960	F3	\$ 2,500,000
	4/12/1961	F1	\$ 250,000
	8/29/1964	F2	\$ 2,500
	7/5/1965	F1	\$ 2,500
	4/13/1966	F0	\$ 30
	8/7/1966	F1	\$ 25,000
	9/19/1966	F1	\$ 2,500
	9/19/1966	F1	\$ 2,500
	6/7/1968		\$ 30
	5/25/1970	F1	\$ 2,500
	3/12/1974	F1	\$ 25,000
	3/8/1976	F1	\$ 25,000
	9/4/1979	F0	\$ 250
	6/27/1982	F1	\$ 2,500
	2/27/1984	F0	\$ 2,500
	7/26/1986	F0	\$ 25,000
	11/7/1995	F0	\$ -
SULLIVANS IS	3/14/1997	F1	\$ 30,000
AWENDAW	3/14/1997	F1	\$ 75,000
ISLE OF PALMS	7/23/2000	F0	\$ 200,000
ISLE OF PALMS	8/3/2000	F0	\$ -
EDISTO IS	6/12/2001	F0	\$ -
CHARLESTON	7/15/2002	F0	\$ -
CHARLESTON AFB	9/28/2002	F0	\$ -
ISLE OF PALMS	8/12/2004	F1	\$ -
SOUTH SANTEE	8/14/2004	F0	\$ -
JAMES IS	5/30/2005	F1	\$ -
ADAMS RUN	4/8/2006	F1	\$ -
CHARLESTON	4/8/2006	F0	\$ -
CHARLESTON	4/8/2006	F0	\$ -
AWENDAW	4/26/2006	F1	\$ -
RAVENEL	5/14/2006	F1	\$ -
CHARLESTON	6/13/2006	F0	\$ 3,000
AWENDAW	6/13/2006	F0	\$ 500
LINCOLNVILLE	6/13/2006	F0	\$ 5,000

YONGES IS	5/11/2008	EF2	\$	1,200,000
MORRIS ACRES	6/29/2008	EFO	\$	35,000
ROCKVILLE	8/1/2012	EFO	\$	-
ROCKVILLE	5/31/2014	EFO	\$	-
MORRIS ACRES	9/24/2015	EF2	\$	1,540,000
(CHS)CHARLESTON AFB	9/11/2017	EFO	\$	-
CHARLESTON JOHNS ARP	9/11/2017	EF1	\$	-
JAMES IS	9/11/2017	EFO	\$	-
THE GROVES	9/11/2017	EFO	\$	-
Total	*45 Events Total		\$	5,956,340.00

No events since September 2017. Source: NOAA Storm Events Database

Hazardous Materials Incidents from May 1, 2013 to April 30, 2019							
As Reported by Charleston County Consolidated 9-1-1							
Category	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	
Hazmat	37	51	18	24	22	15	
Fuel Spill	104	111	102	85	74	67	
Gas Leak/Gas Odor (Natural and LP Gases)	278	201	360	397	395	363	
Total	419	363	480	506	491	445	2704

Suspicious Packages and Bomb Threat							
From May 1, 2013 – April, 30 2019							
As reported by Charleston County Consolidated 9-1-1 Center							
Category	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	
Bomb Threat	21	2	5	12	17	24	
Bomb Threat (Suspected Caller)	2	0	0	1	1	0	
Ordinance/Explosive Found	8	5	8	14	12	10	
Suspicious Package	66	110	111	95	131	81	
Suspicious Package with Leakage Residue	1	1	4	2	6	1	
Total	98	118	128	124	167	116	751

Wildfire Events from 2013-2019							
Year	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019
Fires	19	15	9	6	23	6	Unknown
Acres	656.6	37.5	349.9	134.8	249.2	30.2	Unknown

Source: South Carolina Forestry Commission

Fire Incidents from May 1, 2013 – April 30, 2019							
As Reported by Charleston County Consolidated 9-1-1							
Category	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	
Outside Fires	893	542	632	999	657	573	
Trail/Rail Fires	3	1	2	1	3	0	
Marine Fires	13	5	11	11	21	7	
Vehicle Fire	102	90	111	111	112	124	
Total	1011	638	756	1122	793	704	11,366

Charleston County Severe Rip Tide Occurrences from January 1, 1950 – April 30 th , 2019				
Date	Time	Deaths	Injuries	Event Narrative
5/27/2013	1056	0	0	Lifeguards reported one strong rip current near the Isle of Palms pier. Four rescues were needed.
6/30/2013	1139	0	1	(Charleston Zone) One person drowned trying to rescue another person in a rip current.
7/13/2013	1430	0	2	(Charleston Zone) Lifeguards reported a very strong rip current north of the pier. 2 people were sent to the hospital for water inhalation.
5/7/2014	1245	1	0	Between 1:45 pm and 2:00 pm EDT, three rip currents were reported near and north of the Isle of Palms county park. Two of the rip currents were about 100 yards north of the 21st Street beach access and another just south of the pier. A 20 year old male was pulled from the water near the 21st Street access point by four Good Samaritans, but died soon after. CPR was attempted by a fire and rescue unit.
5/8/2014	1400	0	0	Several rip currents were reported at and near the Isle of Palms county park throughout the day. Five rescues were performed by lifeguards just north of the pier.
5/10/2014	1400	0	0	An Isle of Palms lifeguard reported 10 rescues through the day from rip currents near the pier and 21st Avenue.
5/1/2015	1500	1	0	A 23 year old male drowned between Stations 23 and 24 on Sullivan’s Island due to a rip current.
6/7/2016	900	0	0	The Isle of Palms Fire and Rescue reported the rescue of an individual caught in a rip current between 41st and 42nd Avenue. Bystanders with boogie boards were able to assist in the rescue.
6/7/2016	1050	0	0	The Isle of Palms Fire and Rescue reported that they assisted in the rescue on an individual caught in a rip current between 41st and 42nd Avenue.
6/7/2016	1700	0	0	Lifeguards from Folly Beach County Park assisted in the rescue of an individual caught in a rip current near the Folly Beach Pier.

Charleston County Severe Rip Tide Occurrences from January 1, 1950 – April 30 th , 2019				
Date	Time	Deaths	Injuries	Event Narrative
6/19/2016	1300	0	0	Folly Island lifeguards reported 2 rip currents and 2 rescues at Folly Beach. One rip current was ongoing and approximately 10 yards wide and 50 yards long.
6/20/2016	915	0	1	The Isle of Palms Fire Department rescued 3 adults and 1 child on the northern end of Isle of Palms Beach. One person was taken to the hospital.
6/26/2016	1100	0	0	(Isle of Palms) A rip current was observed near 34th Avenue and required the rescue of at least one person.
6/18/2017	1305	0	0	A lifeguard reported one female rescue in a small rip current about 400 feet east of the groin at Folly Beach State Park.
7/12/2018	900	0	0	Lifeguards at the Isle of Palms County Park observed multiple rip currents, averaging 60 feet and extending up to 75 yards offshore. Four rescues were completed as a result of the rip currents.
7/25/2018	1300	0	0	Lifeguards at Beachwalker County Park on Kiawah Island reported a rip current rescue outside of their guarded area.
Total: 16 Rip Current Events with 2 Deaths and 4 Reported Injuries				
<i>Source: NOAA Storm Events Database</i>				

Severe Storm Events (Thunderstorm Winds) 1956 – April 2019				
Origin	Date	Magnitude (kts)	Property Damage	Event Narrative
Charleston	10/30/1993	57	\$	- Thunderstorm winds with gusts to 57 knots were reported at the Custom House Pier.
JAMES IS	10/8/1996	50	\$	-
CHARLESTON	5/9/1997	50	\$	- Trees and powerlines down several locations.
MT PLEASANT	5/9/1997	71	\$	- Three aircraft were overturned at the East Cooper Airport.
FOLLY BEACH	6/14/1997	50	\$	- Trees and limbs down.
ROCKVILLE	6/17/1997	50	\$	-
NORTH CHARLESTON	7/16/1997	60	\$ 10,000	A 40x80 foot section of the roof at the ABF Freight System, Inc. was blown off.

NORTH CHARLESTON	7/17/1997	60	\$	-	Trees and powerlines down.
NORTH CHARLESTON	7/24/1997	50	\$	-	Powerlines down
LINCOLNVILLE	5/3/1998	50	\$	-	Trees and large limbs down.
CHARLESTON	6/19/1998	50	\$	-	
MC CLELLANVILLE	6/29/1998	50	\$	-	
NORTH CHARLESTON	8/31/1998	60	\$	80,000	Winds blew a 60-foot yacht off its stand and into a shed causing considerable damage to the yacht.
NORTH CHARLESTON	9/3/1998	50	\$	-	Large limbs and power lines down.
CHARLESTON	8/8/1999	50	\$	-	Large limbs down.
CHARLESTON	8/9/1999	50	\$	-	Power lines down and large branches down on car.
FOLLY BEACH	8/10/1999	50	\$	-	Power lines down.
NORTH CHARLESTON	2/14/2000	60	\$	-	An unoccupied mobile home flipped over and was thrown against another mobile home. The unoccupied mobile home was not tied down very well. Approximately 50 other mobile homes had skirting damage or skirting torn away.
NORTH CHARLESTON	12/17/2000	50	\$	-	Limbs and power lines down.
HOLLYWOOD	6/30/2002	50	\$	-	Numerous large limbs were downed by thunderstorm winds.
RAVENEL	6/30/2002	50	\$	-	Several trees were down.
HOLLYWOOD	6/30/2002	50	\$	-	Several large limbs were downed due to thunderstorm winds.
NORTH CHARLESTON	7/11/2002	50	\$	-	A large tree was blown down.
RAVENEL	12/24/2002	50	\$	-	Trees down across Highway 165.
NORTH CHARLESTON	12/24/2002	50	\$	-	Several trees were down across Rutledge Ave near Hampton Park.
CHARLESTON	2/22/2003	50	\$	-	Several trees were down.

HOLLYWOOD	5/6/2003	50	\$	-	Trees, large limbs and power lines down.
NORTH CHARLESTON	5/25/2003	50	\$	-	Several trees were blown down near the intersection of Ashley Phosphate and the Frontage Road.
RAVENEL	6/3/2003	50	\$	-	Thunderstorm winds caused widespread damage across the county. Trees and power lines were knocked down in Hollywood, Ravenel, Kiawah Island, Johns Island, the West Ashley section of Charleston, and in Mount Pleasant. A carport was moved 500 feet in Hollywood.
AWENDAW	6/3/2003	50	\$	-	Thunderstorm winds knocked down large limbs in Awendaw.
NORTH CHARLESTON	7/10/2003	50	\$	-	Thunderstorm winds blew down large limbs.
RAVENEL	8/24/2003	50	\$	-	Large limbs were knocked down along Highway 165 just south of its intersection with Highway 17.
EDISTO IS	5/2/2004	50	\$	-	Thunderstorm winds knocked down large limbs on Bailey Island.
NORTH CHARLESTON	5/2/2004	50	\$	-	Thunderstorm winds knocked down trees along Ashley Phosphate road.
CHARLESTON	6/23/2004	50	\$	-	Several large trees were blown down in the West Ashley section of Charleston.
AWENDAW	6/30/2004	50	\$	-	Thunderstorm winds knocked down a tree and a large limb.
MC CLELLANVILLE	7/9/2004	50	\$	-	60 mph wind gust reported
CHARLESTON	7/10/2004	50	\$	-	Large limbs were knocked down in the West Ashley area of Charleston. Trees were also knocked down near the intersection of Ashley Hall Rd. and Gardenia, west of downtown Charleston.
CHARLESTON	7/10/2004	50	\$	-	Powerlines down near Church Creek in West Ashley.
CHARLESTON	7/10/2004	60	\$	-	Trees and power lines down in several locations downtown and on the peninsula.

LINCOLNVILLE	7/11/2004	50	\$	-	Large tree limbs down on East Randolph St.
MT PLEASANT	8/12/2004	50	\$	-	Thunderstorm winds damage three boats and the dock at Patriots Point.
AWENDAW	8/12/2004	60	\$	-	Thunderstorm winds blew a mobile home off its foundation, blew down a fence, and downed several trees.
HOLLYWOOD	9/6/2004	50	\$	-	Thunderstorm winds knocked down several trees.
NORTH CHARLESTON	9/7/2004	50	\$	-	Two trees were blown along the 52 Connector.
CHARLESTON	3/8/2005	50	\$	-	Thunderstorm winds knocked down trees and large street signs in the West Ashley section of Charleston.
NORTH CHARLESTON	7/21/2005	55	\$	-	Power lines down near intersection of Highway 52 and Rivers Ave.
NORTH CHARLESTON	8/22/2005	65	\$	-	A severe thunderstorm produced estimated 70 to 80 mph wind gusts in the Forest Hills 2 subdivision. Numerous trees were snapped off, shingles were blown off around 25 homes, and wooden fences were damaged. One tree fell into a person's living room. One inch diameter hail also fell in Hanahan.
CHARLESTON	1/30/2006	50	\$	3,000	Thunderstorm winds knocked down trees on Chadwick Drive and Windermere Blvd. in the West Ashley section of Charleston. Two trees were also blown down on Sullivan's Island.
FOLLY BEACH	2/3/2006	56	\$	2,000	Nearby thunderstorm produced a gravity wave caused winds to gust to 65 mph on Folly Beach and strong gusts were reported in Charleston, James Island, and Mt. Pleasant prior to midnight on the 4th. One tree was reported blown down on Rifle Range road in Mt. Pleasant.

FOLLY BEACH	2/3/2006	55	\$ 0	5,00	Strong winds from a gravity wave, produced from nearby thunderstorms, continued past midnight on the 4th. Damage from the winds included a large oak tree blown down in Fort Johnson Estates near the Charleston Harbor on James Island, trees down in the Old Village of Mt. Pleasant, large limbs knocked down in downtown Charleston, and 2 power poles knocked down on Sullivan's Island.
RAVENEL	4/26/2006	50	\$ 0	5,00	Power lines down along Highway 162 near the Savannah Highway.
JAMES IS	4/26/2006	50	\$ 0	1,00	Trees down at intersection of Fort Johnson Road and Landsdowne Drive.
NORTH CHARLESTON	4/26/2006	50	\$ 0	10,00	Wind damaged observed at the Hess Terminal near the base of the Don Holt Bridge. Hess sign bent parallel to the ground. SC DOT portable lighted sign blown down. Rail crossing gate damaged.
JAMES IS	4/26/2006	60	\$ 0	5,00	Sail boat sustained significant damage in the Stono River.
HOLLYWOOD	4/26/2006	50	\$ 0	6,00	Trees and power lines down along Scott White Road.
CHARLESTON	4/26/2006	50	\$ 0	6,00	Trees down on power lines on Bees Ferry Road in West Ashley.
CHARLESTON	4/26/2006	50	\$ 0	1,00	Trees down near intersection of Sam Rittenburg and Ashley Road.
MT PLEASANT	4/26/2006	50	\$	-	Tents blow down and damaged at Blessing of the Fleet event.
CHARLESTON	4/26/2006	50	\$ 0	6,00	Trees and power lines down along Ashley River Road.
RAVENEL	5/7/2006	50	\$ 0	50	

NORTH CHARLESTON	5/14/2006	50	\$ 0	5,00	Trees down on several homes in the Park Circle area.
JOHNS IS	7/6/2006	50	\$ 0	1,00	2 trees down.
CHARLESTON	7/29/2006	50	\$ 0	2,00	Trees down along Highway 61 near Drayton Hall.
LINCOLNVILLE	8/4/2006	50	\$	-	Large branches down.
NORTH CHARLESTON	8/4/2006	50	\$ 0	5,00	Large tree down in bank parking lot at intersection of Rivers and Ashley Phosphate. Street light pole down at Northwoods mall.
NORTH CHARLESTON	8/4/2006	50	\$	-	Large branches down on frontage road.
NORTH CHARLESTON	8/4/2006	55	\$ 0	10,00	60 foot tall oak tree fell and crushed car and did damage to small shed at Midland Park on Stall Road. Numerous large trees down on buildings at midland park. Powerlines down on Stall Road.
NORTH CHARLESTON	8/4/2006	55	\$ 0	10,00	Numerous large trees down on Rivers Ave. Sign down on Dunlap Street. Pool furniture blown into pool at Summit Place Apartments. One trailer blown over.
AWENDAW	6/5/2007	52	\$	-	Wind gusts were estimated at 60 mph by the public. Dime size hail was also reported. The report was relayed by broadcast media.
JAMES IS	7/11/2007	50	\$ 0	50	A maple tree that was 6 inches in diameter was reported down near the Harborview Shopping Center.
HOLLYWOOD	7/11/2007	50	\$ 0	50	Several large tree limbs were reported down in Hollywood, SC.
HOLLYWOOD	7/11/2007	55	\$ 0	3,00	Trees and power lines were reported down at the intersection of Manner Road and Fields Road in Hollywood, SC.

RAVENEL	5/11/2008	50	\$ 0	3,00	A public report was received of trees down and power outages at 165 High Park Road in Ravenel, South Carolina.
JAMES IS	5/11/2008	50	\$ 0	1,50	Several trees were reported down at the corner of Secessionville Road and Camp Road by the broadcast media.
JAMES IS	5/20/2008	50	\$ 0	50	An amateur radio operator reported several 4 to 5 inch diameter tree limbs down on George Griffin Road in James Island, South Carolina.
JAMES IS	6/17/2008	50	\$ 0	25	A trained weather spotter reported a couple large tree branches 8 inches in diameter, were knocked down by strong winds near the intersection of Harborview Road and Quail Drive on James Island.
FOLLY BEACH	6/17/2008	60	\$ 0	25,00	A portion of a roof was torn off of the Marshview Villas on Mariners Cay Drive near Folly Beach. Several Vehicles in the parking lot needed to be towed away due to the damage from the debris. The screen of a screened in porch was also removed. The same storm knocked down a light pole on the Westbury Bridge.
HOLLYWOOD	6/23/2008	50	\$ 0	50	A tree was reported down on Highway 162 in Hollywood, South Carolina.
ROCKVILLE	6/23/2008	50	\$ 0	50	A tree was reported down on Betsy Kerrison Parkway in Kiawah Island, South Carolina.
ROCKVILLE	8/1/2008	50	\$ 0	50	A trained weather spotter reported a 2 to 3 foot diameter tree was knocked down by strong thunderstorm winds in Seabrook Island, South Carolina.
ROCKVILLE	8/1/2008	50	\$ 0	10,00	A trained weather spotter reported that strong thunderstorm winds beached and damaged several yachts and boats along the north Edisto River near Rockville, South

					Carolina. The boats were preparing for the Rockville Regatta.
ROCKVILLE	6/16/2009	50	\$ 0	1,00	A golf course employee reported numerous large tree branches down on Kiawah Island Golf Resort.
RAVENEL	6/16/2009	50	\$ 0	1,50	A National Weather Service employee reported a 100-150 foot tall tree was blown down onto power lines along Highway 165, approximately 1 mile north of the intersection with Highway 162, near Hollywood, South Carolina.
ROCKVILLE	6/16/2009	50	\$ 0	50	A county official reported a tree down at Friarson Elementary School in the 6000 block of Maybank Highway, 2 miles north of Rockville, South Carolina.
ROCKVILLE	6/16/2009	50	\$ 0	4,00	A trained weather spotter reported 10-12 inch diameter Oak trees uprooted outside the Seabrook Property Owners building on Seabrook Island, South Carolina.
ROCKVILLE	6/16/2009	52	\$	-	A trained weather spotter estimated a wind gust of 60 mph at the intersection of River Road and Betty Kerrison Parkway, 4 miles northeast of Rockville, South Carolina.
LINCOLNVILLE	12/2/2009	50	\$ 0	1,00	Broadcast media reported one tree down off Bell Road.
RAVENEL	9/18/2010	50	\$ 0	50	A Fire Department employee reported a tree down at the intersection of State Road 165 and County Line Road, 5 miles northwest of Ravenel, South Carolina.
ISLE OF PALMS	5/10/2011	52	\$	-	The Public reported quarter to golf ball size hail and estimated winds to be around 60 mph near the Wild Dunes resort on Isle of Palms, South Carolina. The individual reported that car

					windows were broken by the large hail.
JAMES IS	6/15/2011	50	\$	1,000	Law enforcement reported a tree down on a house on Fort Johnson Road.
RAVENEL	6/23/2011	55	\$	3,000	Law enforcement reported several trees down along roadways in the Ravenel area.
SULLIVANS IS	8/22/2011	50	\$	1,000	A fire department reported one tree down along Station 912 Street.
ROCKVILLE	6/10/2012	50	\$	1,000	The Charleston County 911 Dispatch reported a tree down along Maybank Highway on Wadmalaw Island.
HOLLYWOOD	6/18/2013	50	\$	1,000	The South Carolina Highway Patrol reported a tree down on Dixie Plantation Road near Highway 162.
LINCOLNVILLE	6/27/2013	52	\$	5,250	A downburst developed just south of Route 78 and traveled northeast about 1 mile before dissipating in the Tall Pines subdivision. Sub severe winds of 40-50 mph mainly occurred with small limbs down in several locations. Winds were estimated near 60 mph near Route 78 where a large tree was uprooted and fell on power lines and along Treeland Road where a pine tree was snapped off.
JAMES IS	10/14/2014	50	\$	-	A spotter reported a large oak tree fell down and snapped a cable line leading to a house along Cottage Road. The tree was snapped about 4 feet above the ground.
CHARLESTON	5/20/2015	50	\$	-	One large tree branch blown down on Bull Street between Rutledge Avenue and Ashley Avenue.
ISLE OF PALMS ARPT	6/25/2015	50	\$	-	Multiple tree limbs reported down on power lines on Waterway Boulevard. Report received through social media.

ROCKVILLE	6/28/2015	50	\$	- South Carolina DOT reported a tree blown down onto Bohicket Road at River Road.
SULLIVANS IS	7/21/2015	53	\$	- A 53 knot wind gust was measured at the Sullivan's Island Fire Department with a passing thunderstorm.
SULLIVANS IS	7/21/2015	57	\$	- The Weatherflow site at Station 28.5 on Sullivan's Island measured a 57 knot wind gust with a passing thunderstorm.
ISLE OF PALMS	7/21/2015	61	\$	- The Weatherflow site at the Isle of Palms pier measured a 61 knot wind gust with a passing thunderstorm.
ROCKVILLE	8/6/2015	50	\$	- A trained spotter reported a tree down about 2 miles from the intersection of Bohicket Road and River Road.
RAVENEL	8/30/2015	50	\$	- The public reported through local media that a small utility shed was destroyed. The shed was moved approximately 10 feet from a cinderblock foundation and collapsed.
ISLE OF PALMS ARPT	6/17/2016	60	\$	- Social media indicated several reports of trees down in the Isle of Palms and Wild Dunes area.
HOLLYWOOD	6/17/2016	50	\$	- The Charleston County Sheriff Office reported a tree down at the intersection of Highway 165 and Ballpark Road.
ROCKVILLE	6/17/2016	50	\$	- The South Carolina State Highway Patrol reported a tree down in the 2800 Block of Roseville Road near the intersection with Bumblebee Road.
ROCKVILLE	6/17/2016	50	\$	- The Charleston County Sheriff Office reported a tree down and blocking Roseville Road.
FOLLY BEACH	3/22/2017	51	\$	- The Weatherflow site at the Folly Beach pier measured a 51 knot wind gust.
ISLE OF PALMS	4/5/2017	50	\$	- The Weatherflow site at the Isle of Palms Pier recorded a 50 knot wind gust.

MT PLEASANT	9/2/2017	51	\$	-	The Weatherflow site at Fort Sumter measured a 51 knot wind gust. The peak gust of 61 knots occurred 10 minutes later.
FOLLY BEACH	9/2/2017	54	\$	-	The Weatherflow site on the Folly Beach pier measured a 54 knot wind gust.
ISLE OF PALMS	9/2/2017	50	\$	-	The Weatherflow site at the Isle of Palms pier measured a 50 knot wind gust.
JAMES IS	9/2/2017	55	\$	-	A report of a tree down near the intersection of Fred Street and Fort Johnson Road was received via social media.
JAMES IS	9/2/2017	55	\$	-	A trained spotter reported several large limbs down on Stillwater Drive.
RAVENEL	8/9/2018	50	\$	-	The Charleston County 911 Call Center reported a tree down along Salters Hill Road near Hollywood.
RAVENEL	8/9/2018	50	\$	-	The Charleston County 911 Call Center reported a tree down on power lines near the intersection of County Line Road and Hyde Park Road.
LINCOLNVILLE	8/9/2018	50	\$	-	The public reported a tree and power line down in Summerville near Gahagan Park.

Source: NOAA Storm Events Database

Severe Storm (Hail) Incidents in Charleston County 1957 – April 2019				
Origin	Date	Magnitude (in)	Property Damage	Event Narrative
N Charleston	8/4/1993	0.75	\$ -	In north Charleston, 0.75-inch hail was reported.
Ravenel 5 WNW	1/28/1995	0.75	\$ -	
North Charleston	5/15/1995	1	\$ -	Large tree limbs down.
Charleston	6/27/1995	0.75	\$ -	Power outages to over 2,500 homes and very heavy rain.

Charleston	7/7/1995	1	\$	
			-	
NORTH CHARLESTON	3/17/1996	0.75	\$	
	6		-	
AWENDAW	3/17/1996	0.75	\$	
	6		-	
CHARLESTON	5/3/1997	1.75	\$	Golf ball sized hail covered the ground at the 18th green at Legends Oak golf course.
			-	
CHARLESTON	5/9/1997	0.88	\$	Nickel sized hail broke a weather service employee's automobile window.
			-	
CHARLESTON	2/28/1998	1	\$	
	8		-	
FOLLY BEACH	4/3/1998	0.88	\$	
			-	
NORTH CHARLESTON	4/9/1998	1	\$	
			-	
NORTH CHARLESTON	5/4/1998	0.75	\$	
			-	
NORTH CHARLESTON	5/4/1998	1.75	\$	
			-	
MC CLELLANVILLE	6/10/1998	0.75	\$	
	8		-	
MT PLEASANT	7/22/1998	0.75	\$	
	9		-	
NORTH CHARLESTON	8/11/2000	1	\$	
	0		-	
MC CLELLANVILLE	8/28/2000	1	\$	
	0		-	
AWENDAW	5/12/2000	0.75	\$	
	1		-	

RAVENEL	5/3/2002	1.75	\$	
			-	
AWENDAW	5/4/2002	0.75	\$	
			-	
HOLLYWOOD	11/11/2002	1	\$	
			-	
ISLE OF PALMS	3/20/2003	1	\$	
			-	
NORTH CHARLESTON	5/6/2003	1	\$	
			-	
MC CLELLANVILLE	8/18/2003	1	\$	
			-	
RAVENEL	5/2/2004	0.75	\$	
			-	
NORTH CHARLESTON	7/9/2004	0.75	\$	Penny size hail occurred at the intersection of Ashley Phosphate and Interstate 26.
			-	
NORTH CHARLESTON	7/10/2004	1	\$	
			-	
CHARLESTON	7/10/2004	1.5	\$	Ping pong ball size hail reported at Charlestowne Landing county park. Large trees also down in park.
			-	
JAMES IS	4/13/2005	1	\$	Hail up to the size of quarters fell on James Island.
			-	
JAMES IS	6/19/2005	0.88	\$	
			-	
FOLLY BEACH	6/19/2005	0.88	\$	
			-	
ROCKVILLE	1/2/2006	0.88	\$	Nickel size hail occurred in the River Road area of Seabrook Island.
			-	
RAVENEL	4/8/2006	0.75	\$	
			-	

CHARLESTON	4/8/2006	1	\$ -	Quarter size hail occurred in the West Ashley section of Charleston.
MT PLEASANT	4/8/2006	1.5	\$ -	Ping Pong size hail occurred in the Dunes West Subdivision.
AWENDAW	4/8/2006	0.88	\$ -	
CHARLESTON	4/26/2006	0.88	\$ -	Hail on Orangegrove Road.
CHARLESTON	4/26/2006	1.5	\$ -	Reported on the Charleston Battery.
CHARLESTON	4/26/2006	1	\$ -	Quarter size hail at MUSC.
JAMES IS	4/26/2006	0.75	\$ -	Reported near Maybank Highway.
CHARLESTON	5/14/2006	1.5	\$ -	Reported on Cedarhurst Ave in West Ashley.
NORTH CHARLESTON	5/14/2006	0.75	\$ -	Penny hail near the Ashley Phosphate and Pepperidge areas.
NORTH CHARLESTON	5/14/2006	1.25	\$ -	Occurred at NWS office on South Aviation Ave.
MT PLEASANT	5/14/2006	1	\$ -	Quarter size hail in Longpoint subdivision.
NORTH CHARLESTON	5/14/2006	1	\$ -	Large hail and a tree down on a house at Merrimac Street off 526.
CHARLESTON	5/14/2006	1	\$ -	Large hail reported in West Ashley.
CHARLESTON	5/14/2006	1.75	\$ -	Numerous reports of penny to golf ball size hail in sections of West Ashley.
CHARLESTON	5/14/2006	1.5	\$ -	Ping Pong ball size hail 1/2 mile south of Citadel Mall.

NORTH CHARLESTON	5/14/2006	0.88	\$ -	Near intersection of Dunlap Street and Rivers Avenue.
MT PLEASANT	5/14/2006	0.88	\$ -	Reported in Longpoint subdivision.
MT PLEASANT	5/14/2006	0.75	\$ -	Penny hail reported off Long Point Rd in Boone Hill Creek subdivision.
MC CLELLANVILLE	7/15/2006	0.88	\$ -	Hail at intersection of Highway 17 and Highway 45.
MT PLEASANT	7/26/2006	0.75	\$ -	Hail in Longpoint subdivision.
MT PLEASANT	7/26/2006	1.75	\$ -	
MT PLEASANT	7/26/2006	0.75	\$ -	Hail off Longpoint Road.
CHARLESTON	8/4/2006	0.88	\$ -	Nickel hail near Trident College.
AWENDAW	6/5/2007	1	\$ -	
JAMES IS	6/13/2007	0.75	\$ -	
JAMES IS	6/13/2007	0.75	\$ -	
CHARLESTON	6/13/2007	0.88	\$ -	
CHARLESTON	6/13/2007	0.88	\$ -	
JAMES IS	3/15/2008	0.88	\$ 500	Nickel sized hail was reported at the Charleston Municipal Golf Course. Several trees were also reported to have been clipped off at the top.
CHARLESTON	3/15/2008	0.88	\$ -	Nickel sized hail was reported by a trained weather spotter in Charleston, South Carolina.

FOLLY BEACH	3/15/2008	0.88	\$ -	Nickel and Dime sized hail was reported by a trained weather spotter along Folly Road.
CHARLESTON	3/15/2008	1.5	\$ -	Hail one and one half inch in diameter was reported in downtown Charleston at the intersection of Market Street and King Street. The hail lasted between 10 and 15 minutes. A funnel cloud was also observed.
JAMES IS	3/15/2008	0.88	\$ -	Nickel sized hail was reported by a trained weather spotter at the intersection of Folly Road and Fort Johnson Road.
AWENDAW	5/5/2008	1	\$ -	Broadcast media relayed a report of one inch hail received from a weather spotter near Awendaw, South Carolina.
JAMES IS	5/11/2008	0.75	\$ -	A public report was received of penny size hail covering the ground in James Island, South Carolina.
JAMES IS	5/11/2008	1	\$ -	A trained weather spotter reported quarter inch hail which fell for 15 minutes.
JAMES IS	5/11/2008	0.88	\$ -	Nickel size hail was reported in James Island, South Carolina.
JAMES IS	5/11/2008	0.75	\$ -	Penny size hail was reported on Harborview Road in James Island, South Carolina.
JAMES IS	5/11/2008	1	\$ -	A report of quarter size hail covering the ground in James Island, South Carolina was relayed by the broadcast media.
JAMES IS	5/11/2008	0.88	\$ -	A trained weather spotter reported nickel size hail at the intersection of Clearview Road and Harborview Road.
JAMES IS	5/20/2008	1	\$ -	An amateur radio operator reported quarter size hail near the intersection of Fort Johnson Road and Folly Road.
CHARLESTON	5/20/2008	1	\$ -	A trained weather spotter reported quarter size hail near MUSC in downtown Charleston, South Carolina. Wind gusts were also estimated at 45 mph.

JAMES IS	5/20/2008	1	\$ -	A trained weather spotter reported dime to quarter size hail covering the ground in James Island, South Carolina.
JAMES IS	5/20/2008	0.88	\$ -	A trained weather spotter observed nickel size hail for 5 minutes at James Island Town Hall.
JAMES IS	6/2/2008	0.88	\$ -	A trained weather spotter reported nickel size hail in James Island, South Carolina.
JAMES IS	6/17/2008	0.88	\$ -	A trained weather spotter reported nickel size hail in James Island, South Carolina.
RAVENEL	6/20/2008	0.88	\$ -	A trained weather spotter reported nickel size hail in Ravenel, South Carolina.
JAMES IS	6/20/2008	1	\$ -	Nickel to quarter size hail was reported on James Island, South Carolina. A wall cloud was also reported.
JAMES IS	6/20/2008	0.88	\$ -	Nickel size hail was reported by a trained weather spotter in James Island, South Carolina.
JAMES IS	6/20/2008	0.88	\$ -	Nickel size hail was reported by the public in James Island, South Carolina.
RAVENEL	4/20/2009	1	\$ -	A trained weather spotter reported dime to quarter size hail along Highway 165 near Delemar Crossroads.
JAMES IS	6/27/2009	0.75	\$ -	The public reported penny size hail on Semaht Street in James Island, South Carolina.
MC CLELLANVILLE	5/23/2010	1.75	\$ -	The public reported golf ball size hail along Highway 17, approximately 5 miles south of McClellanville, South Carolina.
AWENDAW	5/23/2010	1	\$ -	The public reported quarter size hail along Doar Road and estimated winds of 40 to 50 mph in Awendaw, South Carolina.
HOLLYWOOD	5/23/2010	0.75	\$ -	The public reported penny size hail in Hollywood, South Carolina.
LINCOLNVILLE	10/25/2010	1	\$ -	The Public reported dime to quarter size hail in the Lakes of Summerville

				subdivision in Summerville, South Carolina.
ISLE OF PALMS ARPT	5/10/2011	1.75	\$ -	The public reported golf ball size hail in the Wild Dunes resort at the north end of Isle of Palms, South Carolina.
ISLE OF PALMS ARPT	5/10/2011	1.75	\$ -	A Fire Department official reported golf ball size hail at the Isle of Palms Fire Department on Isle of Palms, South Carolina.
ISLE OF PALMS	5/10/2011	2.75	\$ -	The public reported baseball size hail on Isle of Palms, South Carolina.
ISLE OF PALMS	5/10/2011	1.75	\$ 30,000	The Public reported quarter to golf ball size hail and estimated winds to be around 60 mph near the Wild Dunes resort on Isle of Palms, South Carolina. The individual reported that car windows were broken by the large hail.
AWENDAW	7/1/2011	1	\$ -	The Public reported nickel to quarter size hail and tree limbs down, 1 mile west-northwest of Awendaw, South Carolina.
MT PLEASANT	1/21/2011	1	\$ -	Spotter reported quarter size hail at Fort Moultrie.
LINCOLNVILLE	7/14/2011	0.75	\$ -	A trained spotter reported penny sized hail as well as a few small tree limbs down.
CHARLESTON	3/20/2011	0.75	\$ -	Penny sized hail was reported on King Street between George and Calhoun Streets.

Source: NOAA Storm Events Database

Severe Storm (Lightning) Incidents in Charleston County 1998 – April 2019				
Origin	Date	Deaths	Property Damage	Event Narrative
NORTH CHARLESTON	6/29/1998	0	0	Lightning struck a church.
MT PLEASANT	7/21/1999	0	0	Lightning struck a transformer, knocking out power to over 1500 customers for several hours.

Severe Storm (Lightning) Incidents in Charleston County 1998 – April 2019

Origin	Date	Deaths	Property Damage	Event Narrative
MT PLEASANT	4/17/2000	0	500000	Lightning destroyed one house and did considerable damage to two nearby homes.
ISLE OF PALMS	8/20/2001	0	0	<p>A 32 year old man experienced a double jolt from lightening within a 10 minute span. The man was driving a Toyota pickup when a bolt of lightning struck his CB antenna. This caused the antenna to pop off, it broke out the rear window on the cab and blew out the left rear tire.</p> <p>When he stopped the truck to get out to assess the damage, a second bolt of lightning hit the bed of the pickup and the force threw him out into the roadway.</p>
SULLIVANS IS	9/2/2001	1	0	A 38 year old man was struck and killed by lightning as he huddled near a beach umbrella that his family was under.
NORTH CHARLESTON	10/8/2002	0	0	Lightning struck a McDonald's restaurant around 1 a.m., causing a fire that did extensive damage to the roof.
NORTH CHARLESTON	8/18/2005	0	0	Lightning struck a house and nearby light pole.
ISLE OF PALMS ARPT	6/23/2008	0	15000	A house caught on fire in the Wild Dunes Subdivision from a lightning strike.
ISLE OF PALMS ARPT	7/16/2017	0	0	Charleston County dispatch reported that 4 people were injured by a nearby lightning strike on the boardwalk to the beach near Ocean Point Drive in the Wild Dunes area. The 4 injured people were transported to the hospital.
ISLE OF PALMS ARPT	7/7/2018	0	0	The Isle of Palms Fire Department reported that lightning struck and injured 3 people on Isle of Palms

Severe Storm (Lightning) Incidents in Charleston County 1998 – April 2019

Origin	Date	Deaths	Property Damage	Event Narrative
				beach near 21st Avenue. A male lost consciousness for a brief period and a female had to be pulled out of the water in cardiac arrest. CPR was administered on the female on the beach, who was then transported to an area hospital in serious condition. The other 2 were transported in stable condition in a second ambulance.
JAMES IS	7/7/2018	0	5000	A video received via twitter showed a car being struck by lightning.
RAVENEL	7/17/2018	0	5000	Two outdoor sheds at two different locations in Ravenel caught fire due to lightning strikes.
FOLLY BEACH	7/18/2018	0	3000	Lightning struck a power pole on Folly Beach Road between Oak Island Drive and Little Oak Island Drive resulting in a power outage to Folly Beach.
SULLIVANS IS	7/26/2018	0	5000	Lightning struck and badly damaged a brick chimney at a residence.

***NOAA Storm Events Database**

Number of weeks of Drought Events between May 1, 2013 – April 30, 2017							
Year	Category						Description
	None	D0 Abnormally Dry	D1 Moderate Drought	D2 Severe Drought	D3 Extreme Drought	D4 Exceptional Drought	
1999-2000	35	17	2	0	0	0	
2000-2001	17	35	19	5	0	0	
2001-2002	4	48	38	32	19	0	
2002-2003	18	34	20	18	13	0	
2003-2004	46	6	0	0	0	0	
2004-2005	32	20	5	0	0	0	
2005-2006	47	5	0	0	0	0	
2006-2007	27	25	3	0	0	0	
2007-2008	0	53	35	12	0	0	
2008-2009	15	37	22	0	0	0	
2009-2010	38	14	2	0	0	0	
2010-2011	29	23	0	0	0	0	
2011-2012	0	53	50	46	39	3	
2012-2013	7	45	20	9	5	0	
2013-2014	32	20	0	0	0	0	The Region experienced 20 weeks in drought stage. 32 weeks of no drought stage were reported and 20 weeks of D0 drought from October to December.
2014-2015	37	15	0	0	0	0	The Region experienced only 15 weeks of D0 drought. During weeks when drought was experienced, only

							approximately 10-20 percent of the county was affected. 37 weeks of the year, the Region experienced no drought.
2015-2016	36	16	0	0	0	0	The Region experienced 16 weeks of D0 drought. During weeks when drought was experienced, only approximately 10-20 percent of the county was affected. 36 weeks of the year, the Region experienced no drought.
2016-2017	38	14	6	0	0	0	The Region experienced 20 weeks of drought stage. During these 20 weeks, the drought stage remained at D0 for 14 weeks and D1 for 6 weeks. 38 weeks of the year, the Region experienced no drought.
2017-2018	23	29	14	4	0	0	The Region experienced 29 weeks of drought stage D0 and 14 weeks of D1. In addition, 4 weeks were spent at D2; there were 23 weeks where the Region experienced no drought.
2018-2019	26	26	10	0	0	0	The Region experienced 36 total drought weeks. 26 weeks were spent at D0 and an additional 10 weeks were spent at D1. The Region was not experiencing a drought for 26 weeks.

Source: U.S. Drought Monitor

Winter Weather Events Through April 2019			
Date	Event Type	Property Damage	Event Narrative
1/24/2000	Heavy Snow	\$ -	Snowfall of 1 to around 2 inches fell over much of south coastal South Carolina with a mixture of small amounts of sleet and freezing rain. Numerous accidents were caused on roadways as this was the first measurable snowfall in much of the area since 1989.
1/26/2000	Heavy Snow	\$ -	For the first time since records have been kept, measurable snowfall occurred on consecutive days from independent events. Snowfall measured around two (2) inches over much of the area as a shortwave moved across the area overnight. The shortwave intensified over the east central counties of the state as no other places in adjoining counties reported any snow at the surface.
1/26/2004	Ice Storm	\$ -	A strong wedge was in place over the Carolinas and Georgia. An area of low pressure developed off the coast and tracked to the northeast on the 26th and into the early morning hours of the 27th, producing freezing rain and freezing drizzle. Ice accretion was generally in the 1/4 inch to around 1/2 inch range. There were trees, large limbs and power lines down that disrupted the power over the low country for several days.
4/8/2007	Frost/Freeze	\$ -	Temperatures dipped down into the 20s most areas which produced widespread

			damage to crops and fruit trees. Total monetary losses unknown but significant.
2/12/2010	Heavy Snow	\$ 7 3,000	A strong storm system tracked across northern Florida and then northeastward off the Georgia and South Carolina coast. Precipitation initially fell in the form of rain, but quickly changed over to snow in the late afternoon and evening hours as winds shifted to the north and allowed colder air to wrap back into the region. Heavy snow accumulated across all of southern South Carolina.
1/10/2011	Ice Storm	\$ 16 0,000	An area of low pressure developed in the northeast Gulf of Mexico and tracked eastward across the northern Florida peninsula, then northeastward off the southeast Georgia and southern South Carolina coast. Meanwhile, a shallow cold air mass remained in place in the lee of the Appalachians by high pressure north of the area, allowing a continued supply of cold and dry air at the surface. The warm temperatures well above ground level and freezing or sub-freezing temperatures at ground level, resulted in freezing rain and ice accumulation across much of southern South Carolina and southeast Georgia.
1/28/2014	Ice Storm	\$ -	The first reports of impacts due to freezing rain accumulation were of area bridges being closed due to hazardous travel. The Ravenel Bridge, the Ben Sawyer Bridge, and the Isle of Palms Connector Bridge were all closed at various points through the event. Storm total ice accumulations ranged up to three tenths of an inch, with many numerous trees and power lines reported down due to ice. These ice accumulations and associated damage resulted in many power outages. Also of note, melting resulted in ice chunks falling from the towers of the Ravenel Bridge well after the event, 1/31/14, damaging several vehicles and causing one non-life threatening injury.
2/12/2014	Ice Storm	\$ -	Storm total ice accumulations ranged from trace amounts closer to the coast up to three tenths of an inch around North Charleston. The initial verification reports were because of public impact when

			authorities closed several area bridges and overpasses. Numerous trees and power lines were reported down with some power outages noted as well.
12/29/2017	Winter Weather	\$ -	The media, NWS employees and the public reported a thin glaze of ice covering cars, fences, road signs, elevated structures and various vegetation such as trees and plants above the ground in Charleston, North Charleston, Mt Pleasant, James Island, Johns Island, West Ashley, Redtop, Rantowles, Meggett and Cainhoy, SC. Several areas also experienced a thin layer of ice on grass and roadways, especially on elevated bridges in Charleston, SC and Mt Pleasant, SC. The greatest storm total ice accumulation in Charleston County was 0.03 inches, which occurred at the National Weather Service office in North Charleston, SC. Elsewhere, storm total ice accumulation ranged from a trace to a few hundredths of an inch. The greatest impact associated with the ice accumulation was the closing of major bridges and overpasses in the Charleston, SC Metropolitan area including: Arthur Ravenel Bridge, Isle of Palms Connector, Ben Sawyer Bridge, Northbridge and the I-26/Cosgrove Ave overpass.
1/3/2018	Winter Storm	\$ -	Storm total snowfall amounts generally ranged from 2 to 6 inches across Charleston County. The precipitation started as rain then changed to freezing rain in the morning, before a prolonged period of snow began. One report of a quarter of an inch of ice accumulation was received near the Shadowmoss subdivision. Elsewhere, ice accumulations ranged from trace amounts up to 2 tenths of an inch around James Island, Charleston, and Mount Pleasant. The lowest snow totals occurred in the eastern part of the county near Awendaw and McClellanville where 2 inches was measured. Other notable totals include 4 to 5 inches across James Island, Johns Island, and West Ashley. Around Mount Pleasant, amounts were also 4 to 5 inches. The maximum totals for the county occurred around Ladson and Goose Creek where 6.5

inches was measured. A 36 year old female died a few days following the event when a vehicle slid off of an icy road and struck the pedestrian on the sidewalk. The incident occurred on Ladson Road near the intersection with Jamison Road in North Charleston.

Total of 10 Events

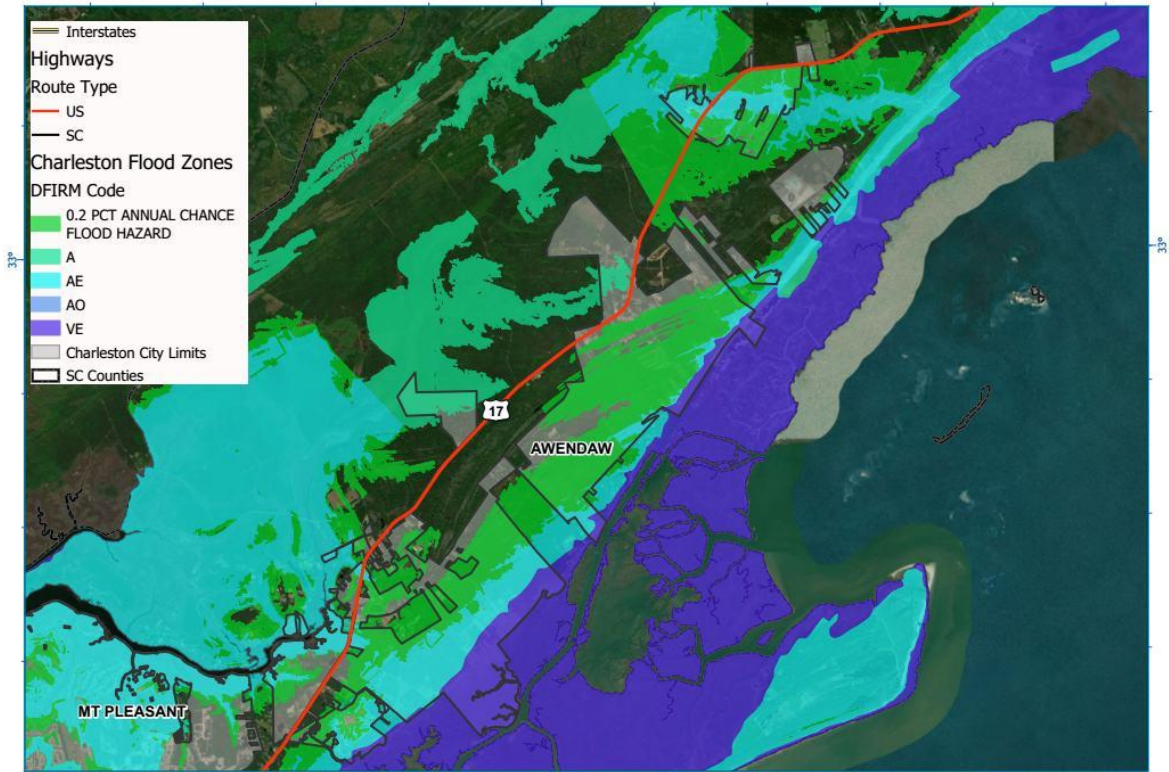
\$ 23
3,000

**NOAA Storm Events Database*

A.10 – Flood Zone Maps

Zone Label	Definition
Zone C, Zone X	Areas determined to be outside 500-year floodplain determined to be outside the 1% and 0.2% annual chance floodplains.
Zone B, Zone X500	Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood. An area inundated by 0.2% annual chance flooding.
Zone A	An area inundated by 1% annual chance flooding, for which no BFEs have been determined.
Zone AE	An area inundated by 1% annual chance flooding, for which BFEs have been determined.
Zone AH	An area inundated by 1% annual chance flooding (usually an area of ponding), for which BFEs have been determined; flood depths range from 1 to 3 feet.
Zone AO	An area inundated by 1% annual chance flooding (usually sheet flow on sloping terrain), for which average depths have been determined; flood depths range from 1 to 3 feet.
Zone AR	An area inundated by flooding, for which BFEs or average depths have been determined. This is an area that was previously, and will again, be protected from the 1% annual chance flood by a Federal flood protection system whose restoration is Federally funded and underway

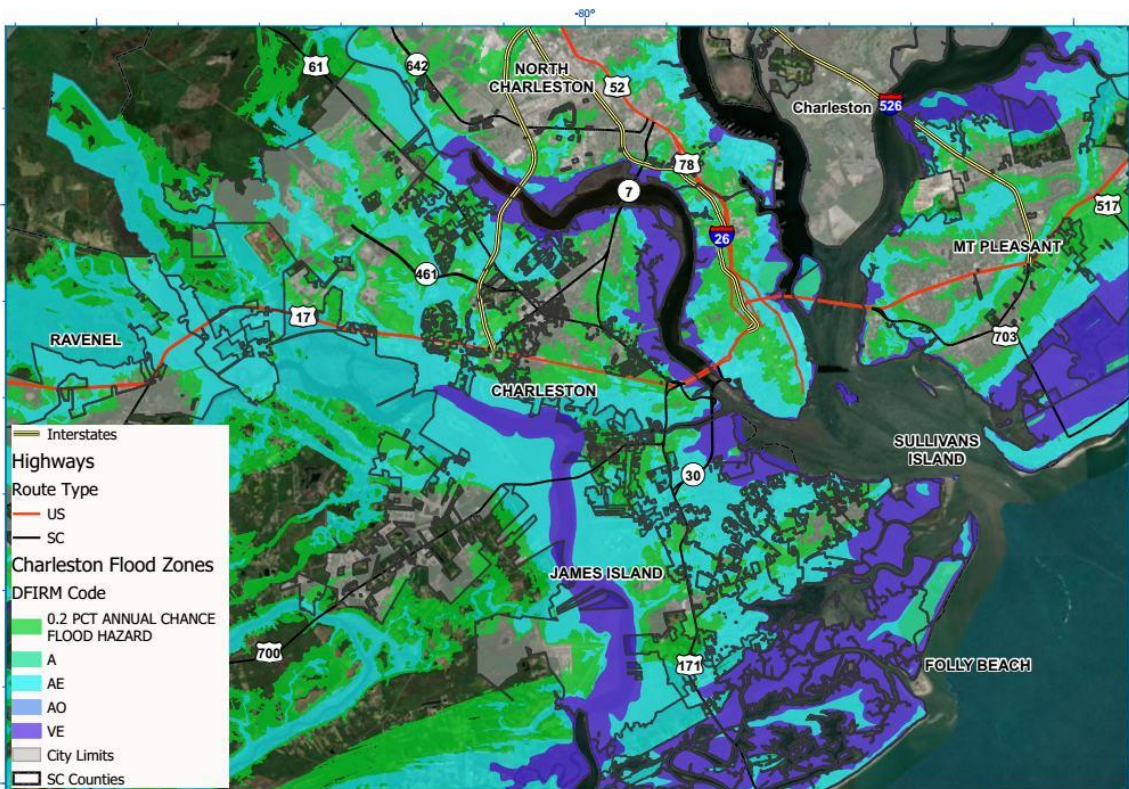
Zone A1-A30	An area inundated by 1% annual chance flooding, for which BFEs have been determined.
Area Not Included (ANI),(N)	An area that is located within a community or county that is not mapped on any published FIRM.
Zone D	An area of undetermined but possible flood hazards.
Undescribed (UNDES)	Area of Undesignated Flood Hazard. A body of open water, such as a pond, lake, ocean, etc., located within a community's jurisdictional limits that has no defined flood hazard.
Zone VE	An area inundated by 1% annual chance flooding with velocity hazard (wave action); BFEs have been determined.
Zone V(1-30)	Coastal flood with velocity hazard.



Disclaimer: This map is a graphic representation of data obtained from various sources. All efforts have been made to warrant the accuracy of this map. However, SC EMD disclaims all responsibility and liability for the use of this map.

Town of Awendaw, SC Flood Zones

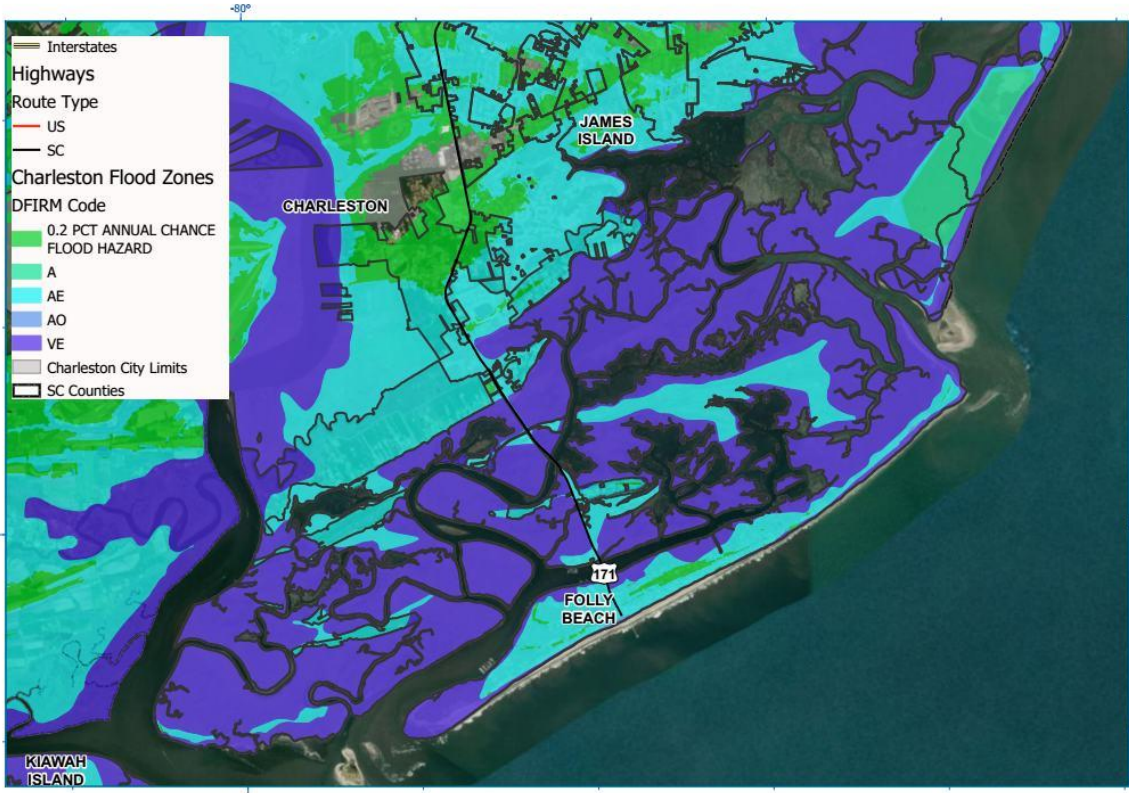

 SC Emergency Management Division
 2779 Fish Hatchery Road
 West Columbia, SC 29172
 (803) 737-8588
 E-mail: ckaufman@emd.sc.gov
 Charlie Kaufman -- 2/4/2019 10:26 AM



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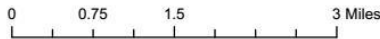
City of Charleston, SC Flood Zones


 SC Emergency Management Division
 2779 Fish Hatchery Road
 West Columbia, SC 29172
 (803) 737-8588
 E-mail: ckaufman@emd.sc.gov
 Charlie Kaufman -- 1/30/2019 9:00 AM



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Folly Beach, SC Flood Zones



SC Emergency Management Division
 2779 Fish Hatchery Road
 West Columbia, SC 29172
 (803) 737-8588
 E-mail: ckaufman@emd.sc.gov
 Charlie Kaufman -- 2/4/2019 9:58 AM

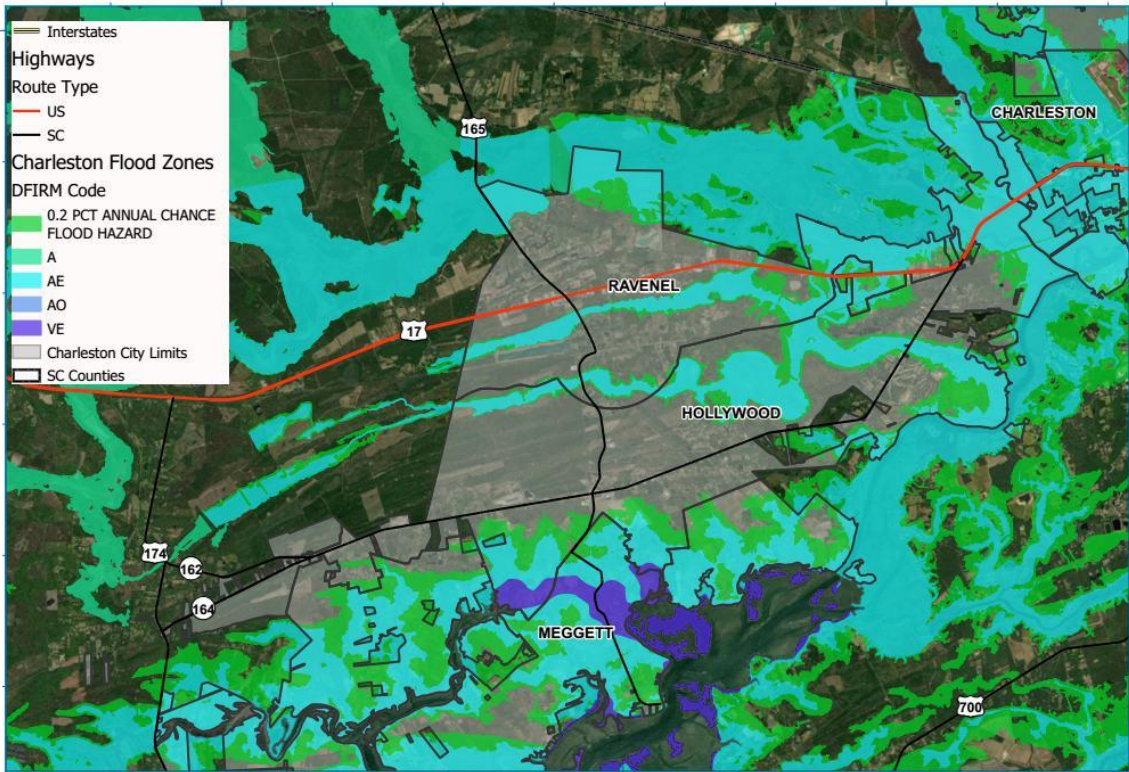


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Town of Goose Creek, SC Flood Zones

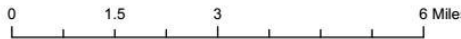


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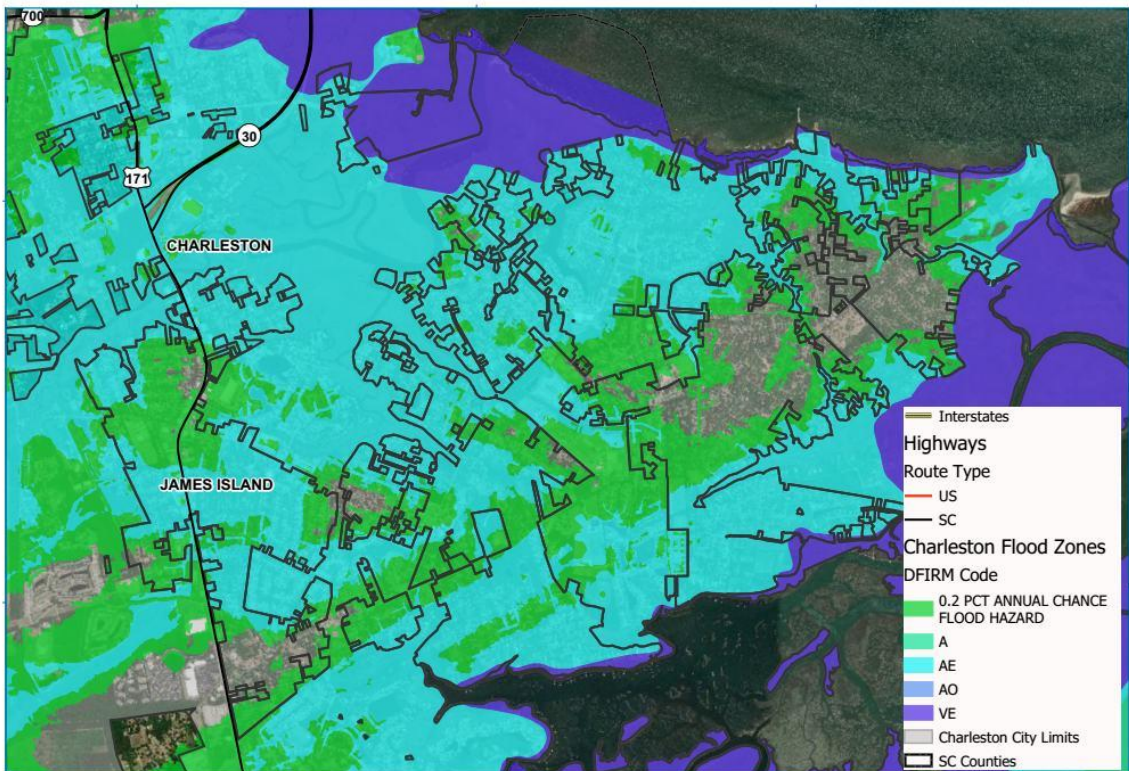


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Town of Hollywood, SC Flood Zones

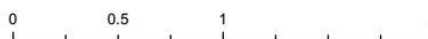


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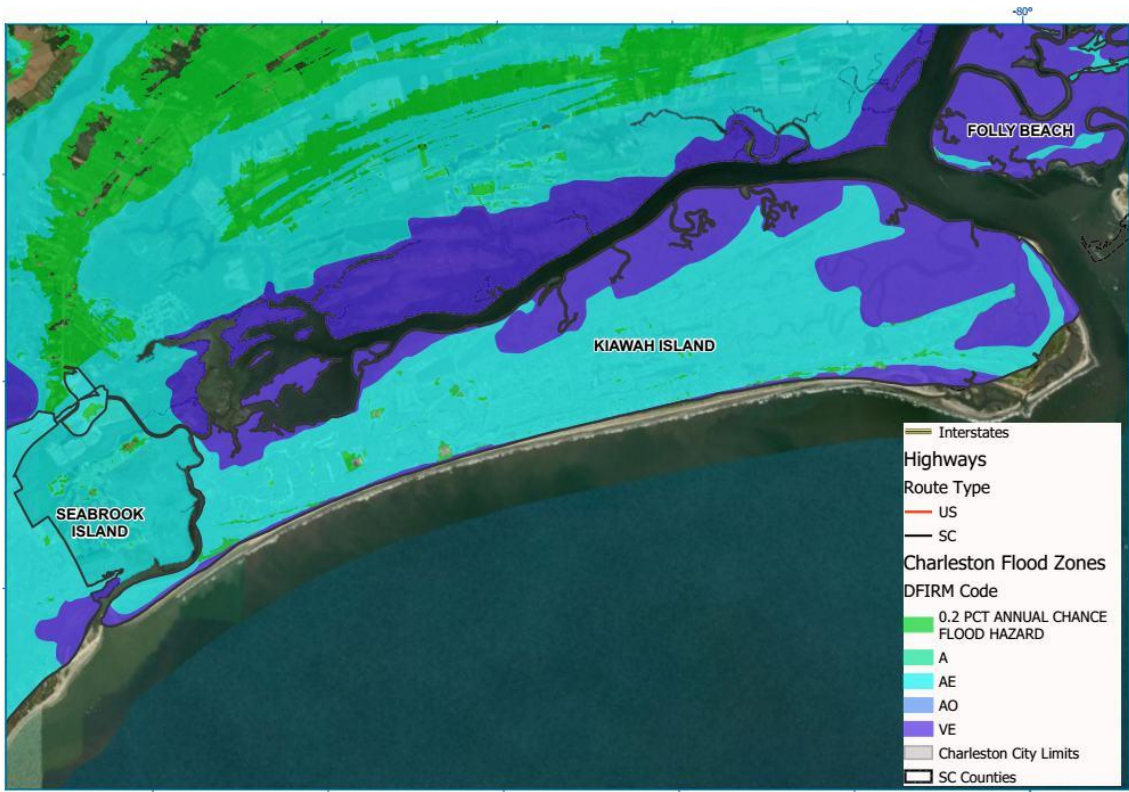


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Town of James Island, SC Flood Zones



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Kiawah Island, SC Flood Zones

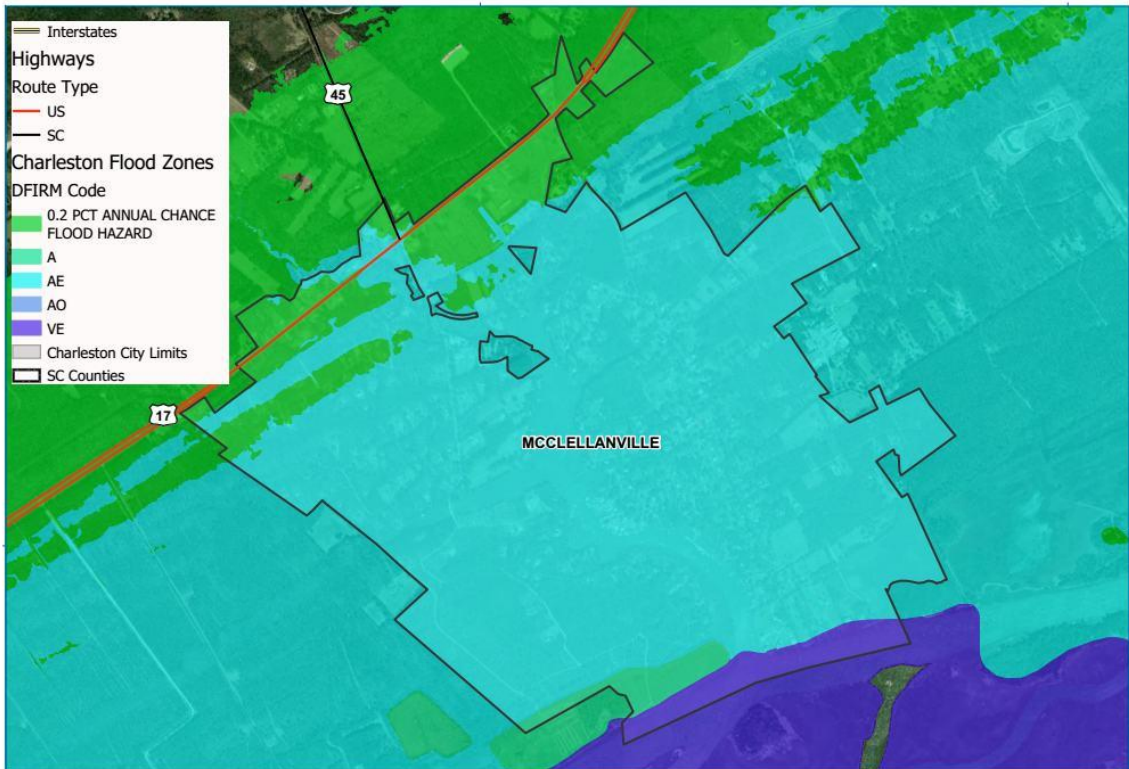

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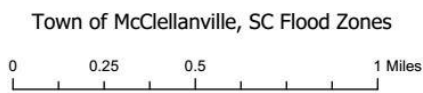
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Town of Lincolnville, SC Flood Zones

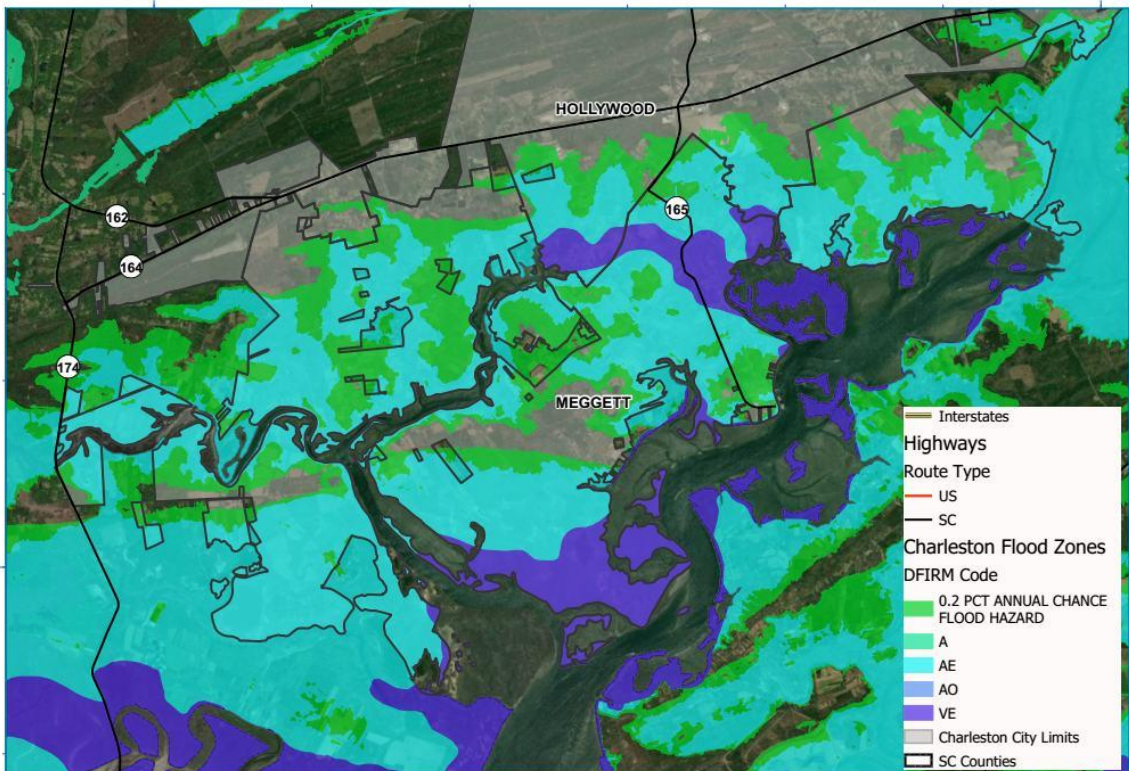

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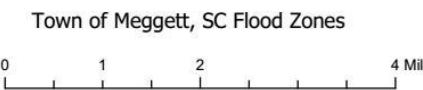
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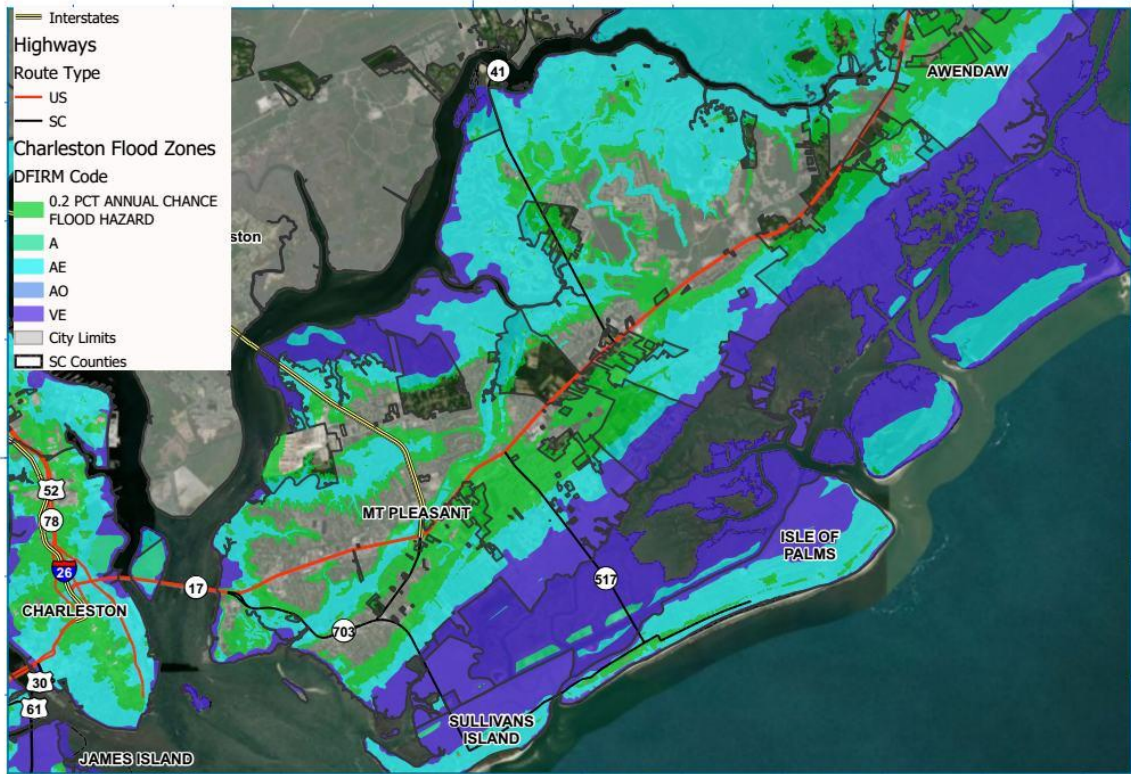
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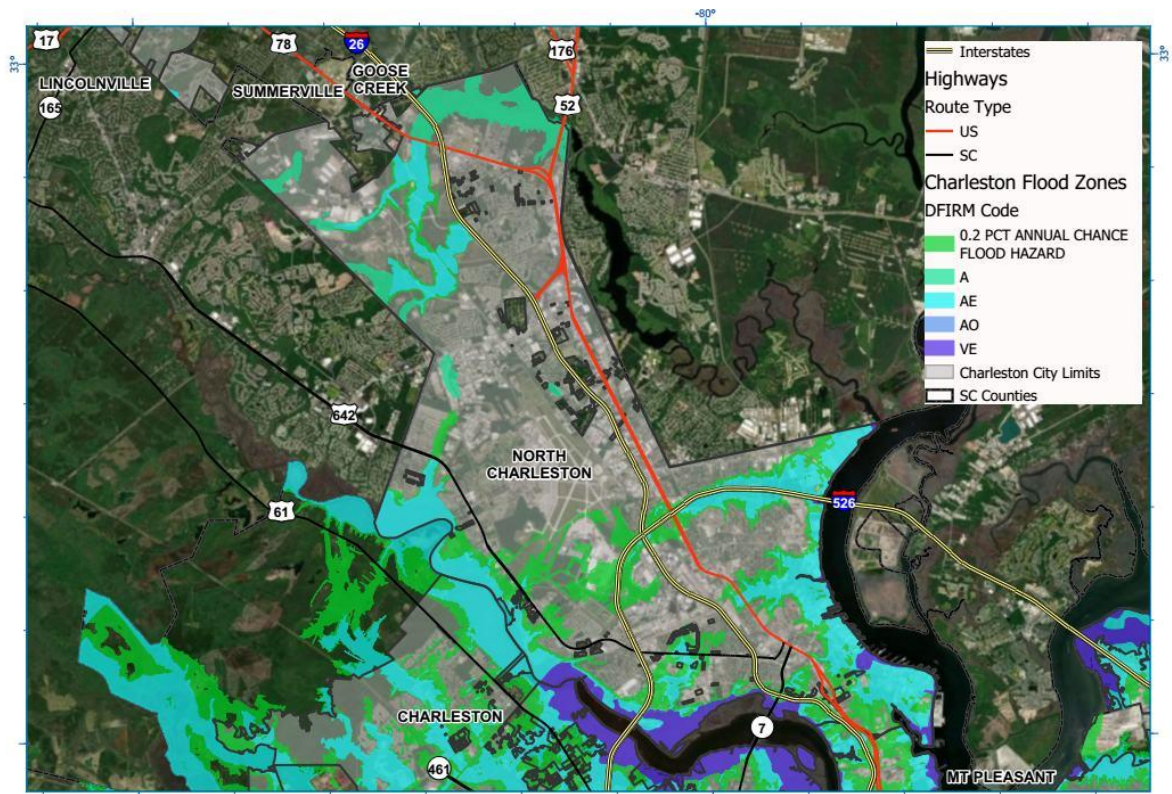
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Town of Mt Pleasant, SC Flood Zones

0 1.5 3 6 Miles



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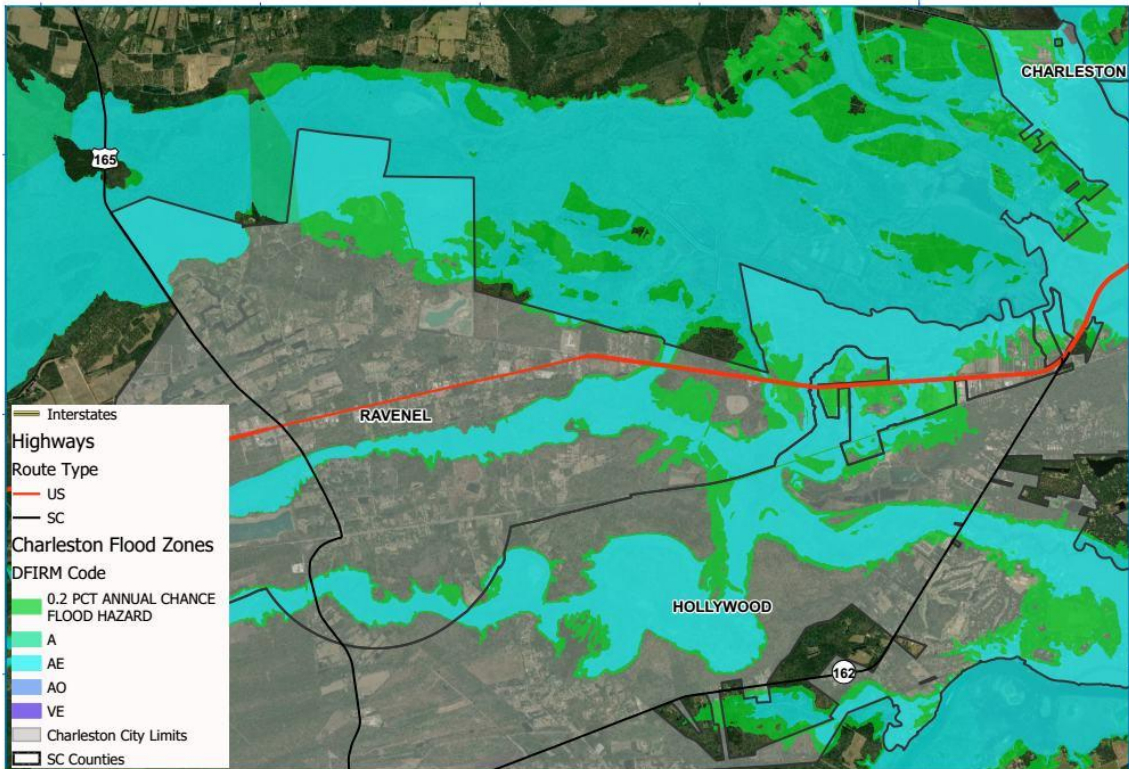
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City of N. Charleston, SC Flood Zones

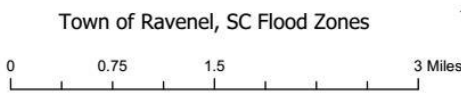
0 1.75 3.5 7 Miles



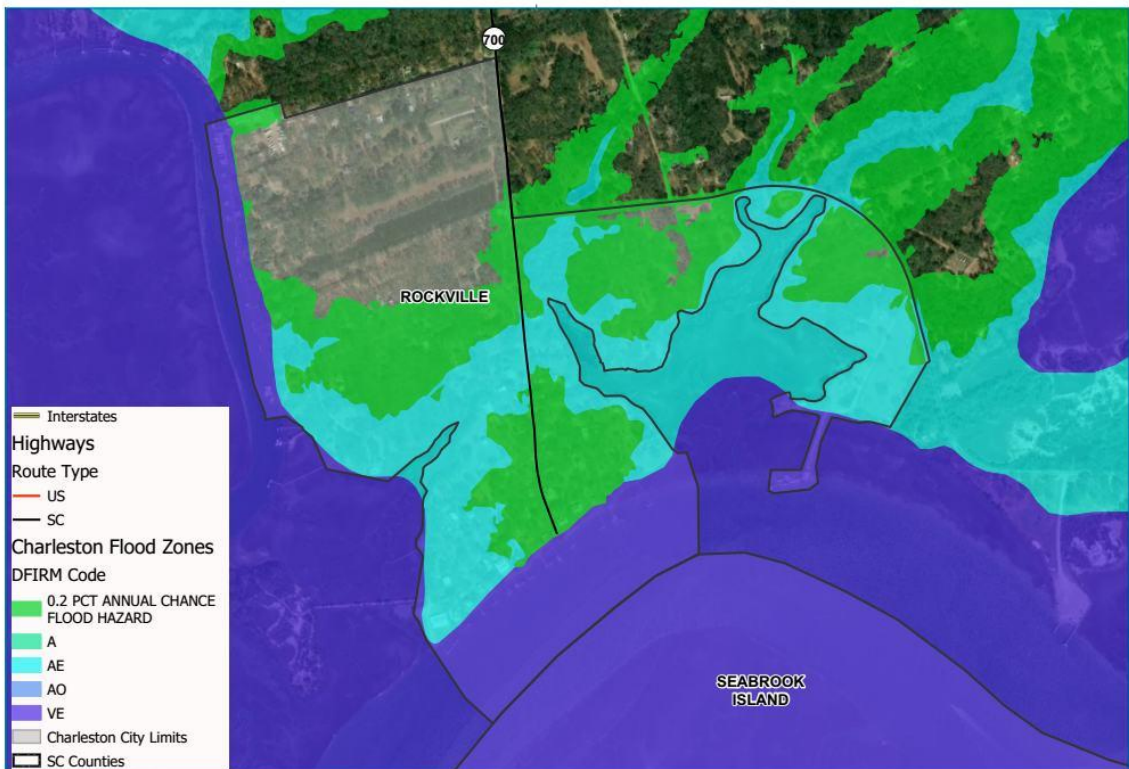
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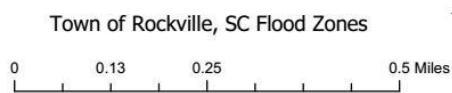
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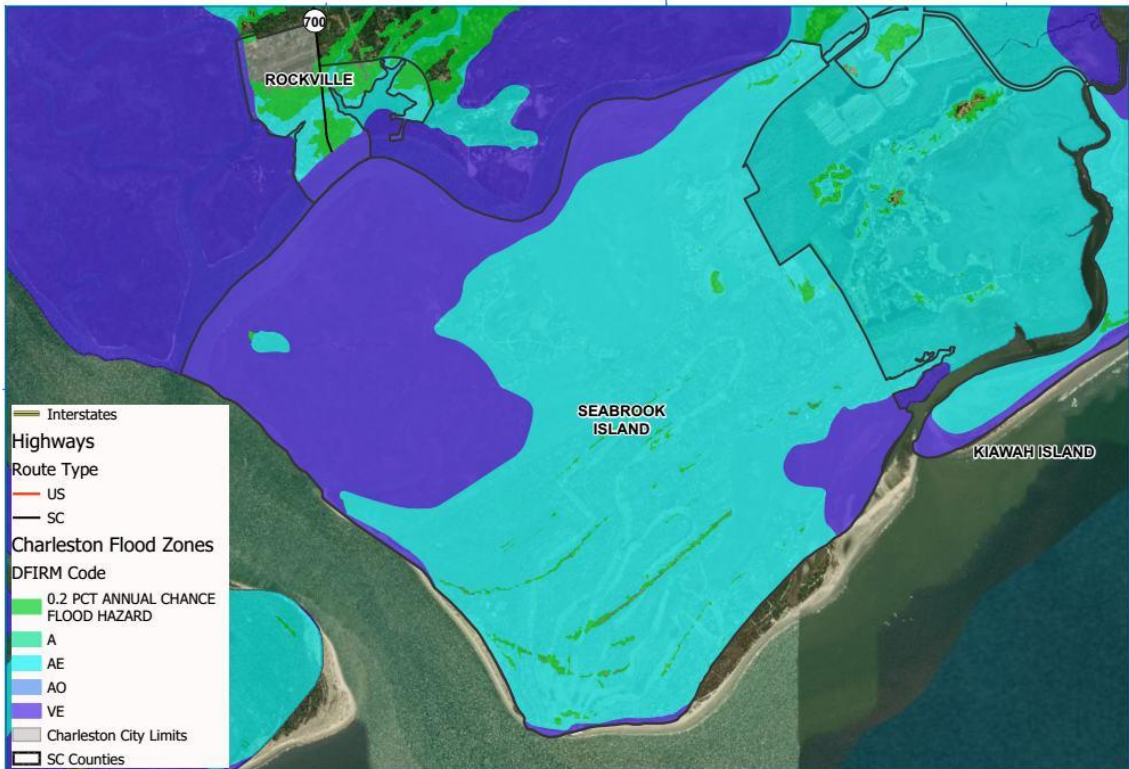
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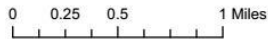


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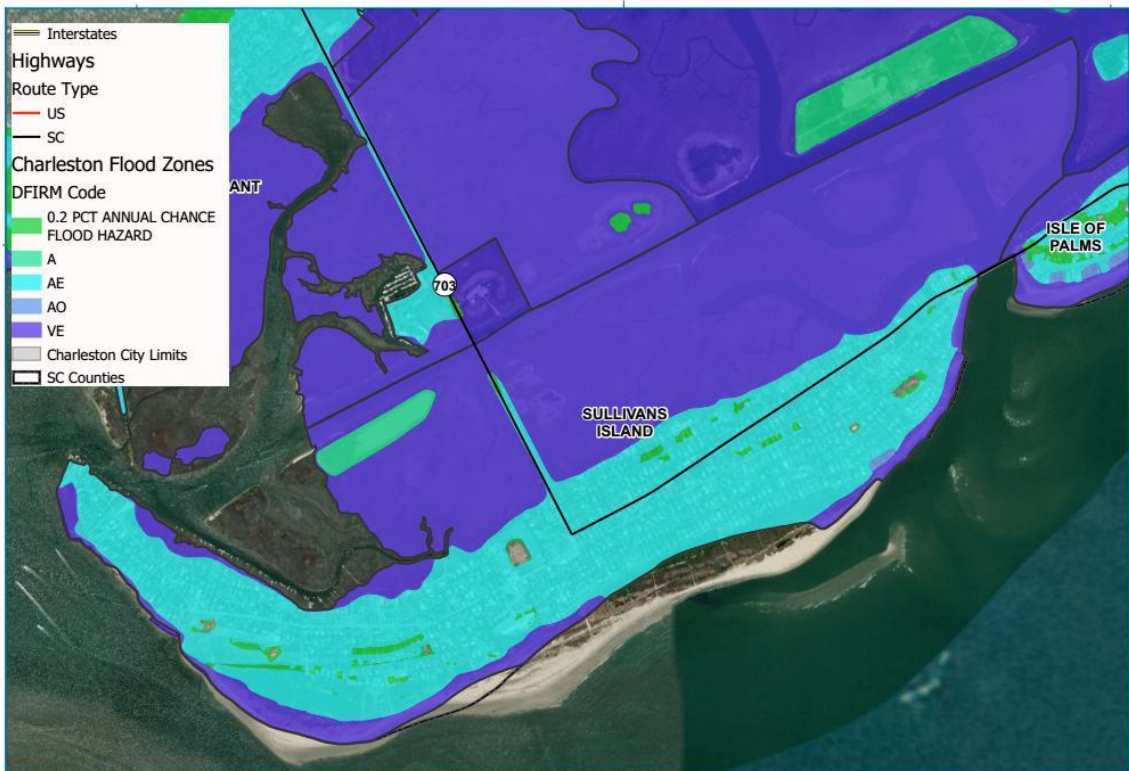


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Seabrook Island, SC Flood Zones

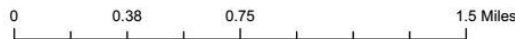


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Sullivans Island, SC Flood Zones

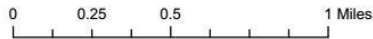


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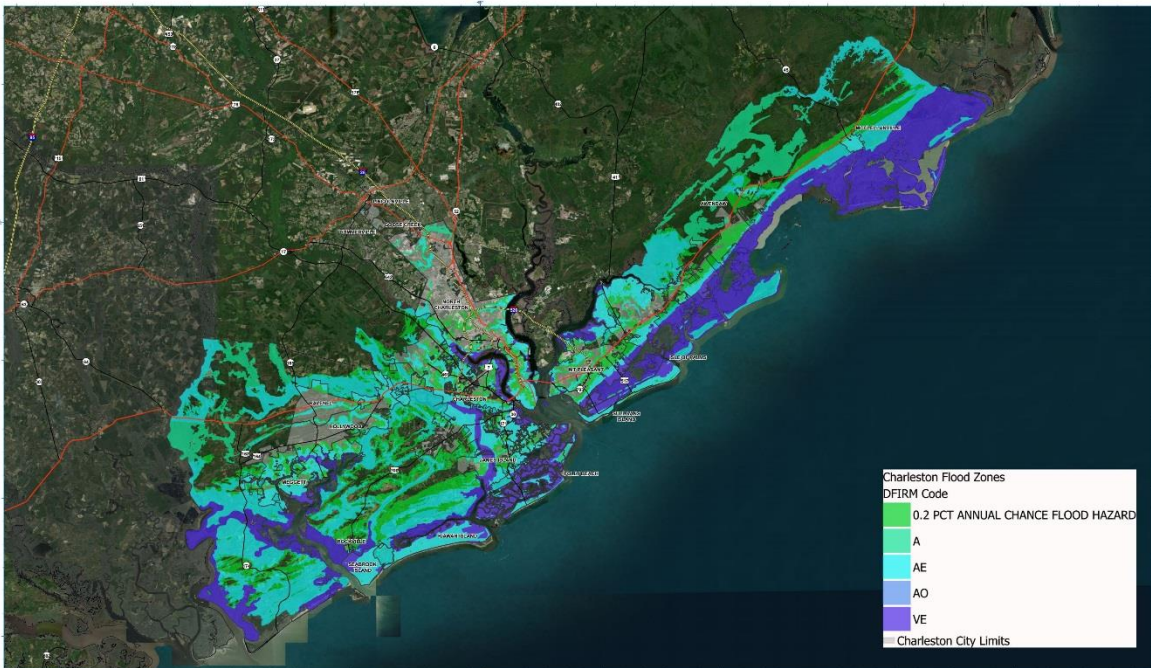


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City of Summerville, SC Flood Zones




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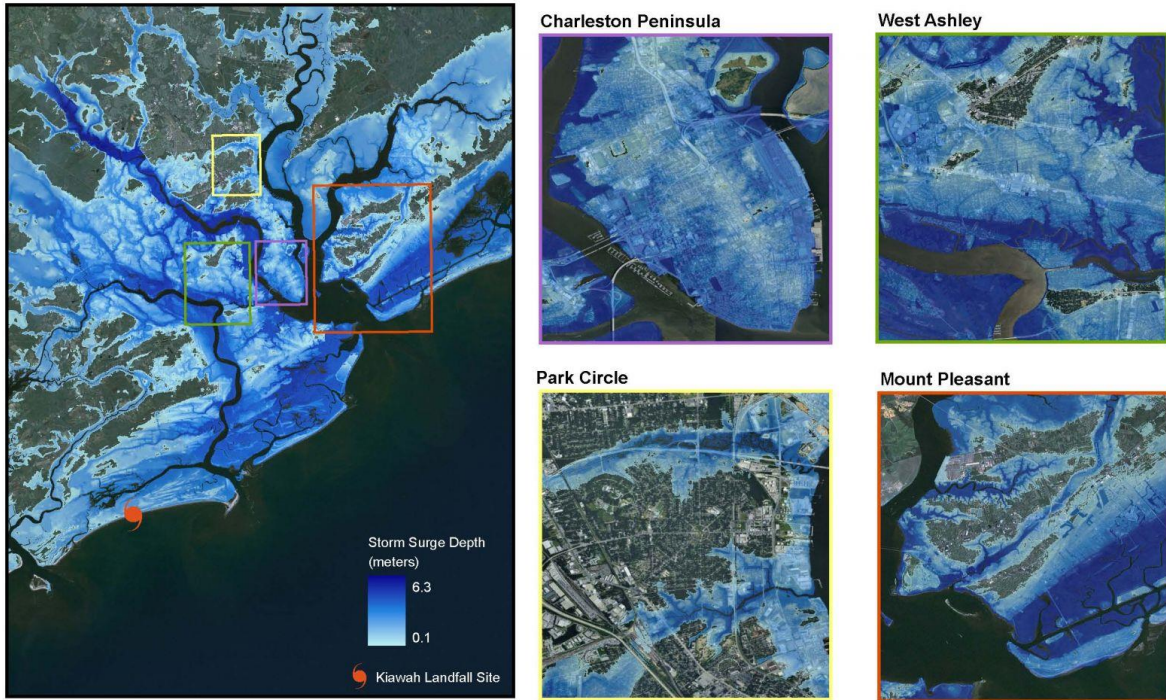
Unincorporated Charleston County, SC Flood Zones




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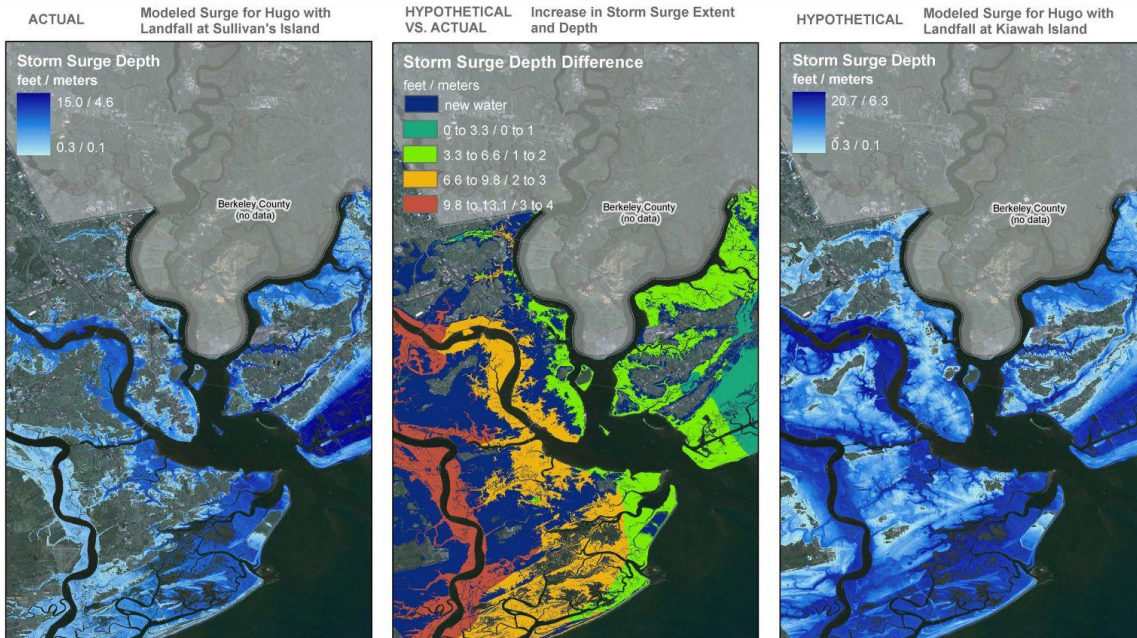
A.11 - Flooding Extent (Hurricane Hugo Scenario)

Storm Surge Depth If Hugo Made Landfall at Kiawah Island...



It Could've Been Worse! A Visualization of Storm Surge if Hurricane Hugo Had Made Landfall Just 20 Miles to the South

Hurricane Hugo Characteristics at Landfall: Category 4; Winds=120 knots (138 mph); Pressure=935 MB; Northwest Movement=23 knots (26 mph); Tide=0.6 m (2.1 ft)



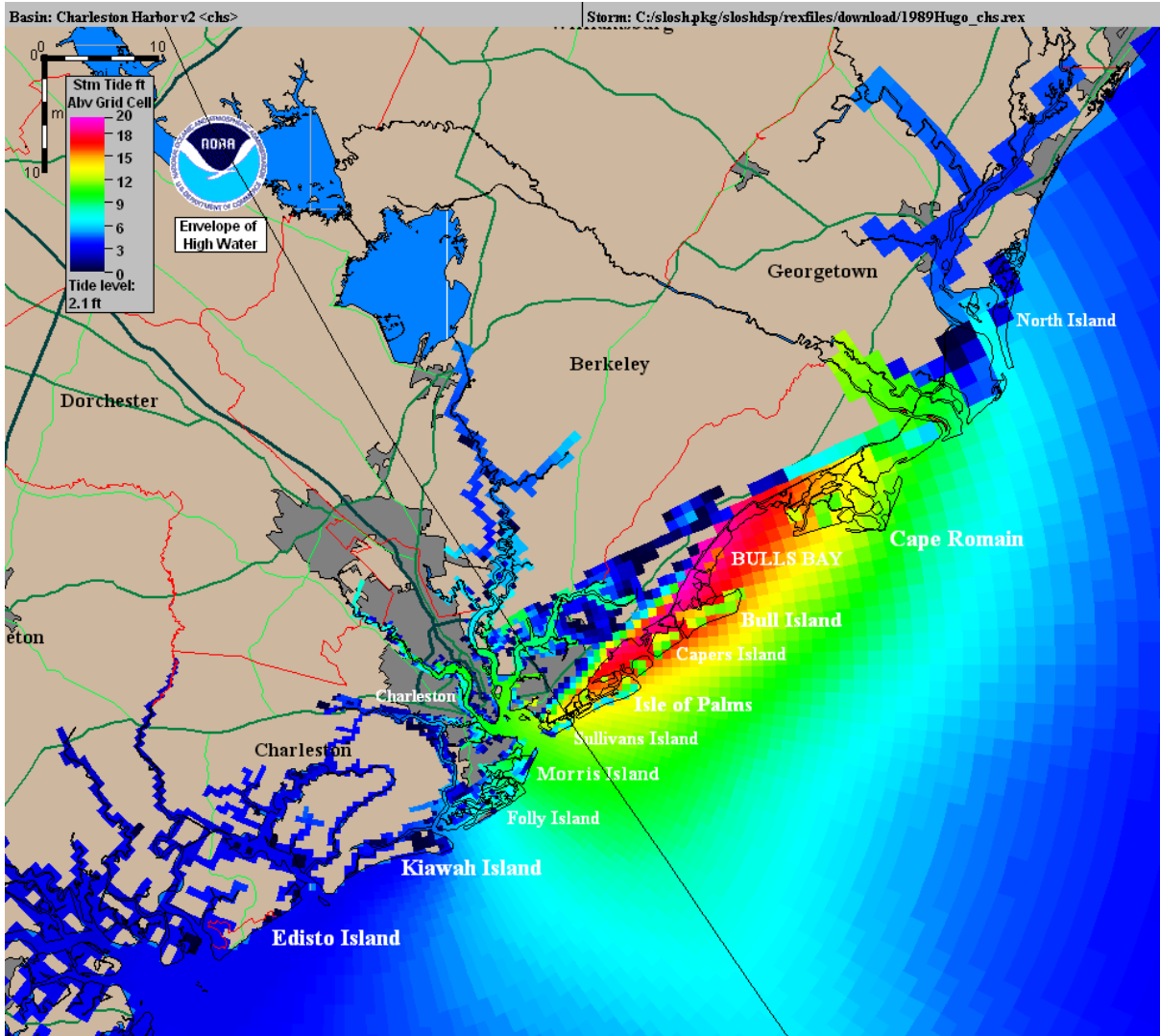


Table 1.--High-water marks; location, description, and elevations

Plate number (see fig. 1)	Quad-range	Mark no.	Nearest town	Latitude	Longitude	Type and/or quality	(1)Inside (0)Outside	Water-surface elevation (feet, NGVD ¹)	Ground-surface elevation (feet, NGVD ¹)
2	Wampee	1	North Myrtle Beach	33° 49' 48"	78° 38' 28"	Good mark	0	9.4	8.0e
2	Wampee	2	North Myrtle Beach	33° 49' 46"	78° 38' 29"	Good mark	I	9.2	8.0e
2	Wampee	3	North Myrtle Beach	33° 49' 20"	78° 39' 36"	Good mark	0	9.4	9.0e
2	Wampee	4	North Myrtle Beach	33° 49' 20"	78° 39' 40"	Poor mark	0	13.0	8.0e
2	Wampee	5	North Myrtle Beach	33° 51' 05"	78° 39' 22"	Data from USGS ² gaging station 02110777		8.6	--
3	Hand	1	Myrtle Beach	33° 45' 48"	78° 46' 56"	Poor debris line	0	11.8	11.8
3	Hand	2	Myrtle Beach	33° 45' 47"	78° 46' 54"	Good stain line	0	12.1	11.5e
3	Hand	3	Myrtle Beach	33° 45' 47"	78° 46' 54"	Good stain line	0	12.1	11.5e
4	Myrtle Beach	1	Myrtle Beach	33° 40' 45"	78° 53' 52"	Good mark	I	13.6	10.0e
4	Myrtle Beach	2	Myrtle Beach	33° 40' 44"	78° 53' 33"	Good mark	I	13.9	10.0e
4	Myrtle Beach	3	Myrtle Beach	33° 40' 50"	78° 53' 56"	Good mark	I	10.8	10.0e

Table 1.--High-water marks; location, description, and elevations--Continued

Plate number (see fig. 1.)	Quad-range	Mark no.	Nearest town	Latitude	Longitude	Type and/or quality	(I)inside (O)outside	Water-surface elevation (feet, NGVD'1)	Ground-surface elevation (feet, NGVD'1)
4	Myrtle Beach	4	Myrtle Beach	33° 39' 34"	78° 55' 07"	Good mark	I	12.1	8.0e
4	Myrtle Beach	5	Myrtle Beach	33° 39' 34"	78° 55' 10"	Good mark	I	12.3	8.0e
4	Myrtle Beach	6	Myrtle Beach	33° 38' 33"	78° 56' 10"	Good mark	I	12.5	8.0e
4	Myrtle Beach	7	Myrtle Beach	33° 38' 28"	78° 56' 26"	Good mark	I	12.2	9.0e
4	Myrtle Beach	8	Myrtle Beach	33° 39' 40"	78° 55' 09"	Good mark	O	12.0	12.0
5	Ocean Forest	1	Myrtle Beach	33° 42' 09"	78° 52' 02"	Poor debris line	O	11.0	11.0
5	Ocean Forest	2	Myrtle Beach	33° 42' 09"	78° 52' 02"	Good seed line	O	11.7	10.0e
5	Ocean Forest	3	Myrtle Beach	33° 42' 09"	78° 52' 02"	Good seed line	O	11.7	10.0e
6	Surfside Beach	1	Surfside Beach	33° 36' 20"	78° 58' 26"	Good mark	I	12.6	10.0e
6	Surfside Beach	2	Surfside Beach	33° 36' 15"	78° 58' 21"	Good mark	I	12.9	11.0e

Table 1.--High-water marks; location, description, and elevations--Continued

Plate number (see fig. 1)	Quad-range	Mark no.	Nearest town	Latitude	Longitude	Type and/or quality	(I)inside (O)outside	Water-surface elevation (feet, NGVD ¹)	Ground-surface elevation (feet, NGVD ¹)
6	Surfside Beach	3	Surfside Beach	33°34'38"	78°59'57"	Good mark	I	12.4	11.0e
6	Surfside Beach	4	Surfside Beach	33°34'37"	78°59'59"	Good mark	I	12.0	11.0e
6	Surfside Beach	5	Surfside Beach	33°34'33"	78°59'58"	Good mark	I	12.6	11.0e
7	Brookgreen	1	Garden City	33°34'41"	79°00'01"	Good mud line	I	12.2	5.0e
7	Brookgreen	2	Garden City	33°34'46"	79°00'23"	Good mark	I	11.6	6.0e
7	Brookgreen	3	Garden City	33°34'34"	79°00'05"	Good seed line	I	12.5	6.0e
7	Brookgreen	4	Garden City	33°34'40"	79°00'26"	Good seed line	I	12.0	6.0e
7	Brookgreen	5	Garden City	33°34'36"	79°00'30"	Good seed line	O	12.0	6.5
7	Brookgreen	6	Garden City	33°34'16"	79°00'19"	Good seed line	I	12.7	6.0
7	Brookgreen	7	Garden City	33°34'14"	79°01'03"	Good seed line	I	11.7	8.0e
7	Brookgreen	8	Garden City	33°34'15"	79°01'10"	Good seed line	O	11.8	8.0e

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Table 1.--High-water marks; location, description, and elevations--Continued

Plate number (see fig. 1)	Quad-angle	Mark no.	Nearest town	Latitude	Longitude	Type and/or quality	(1) Inside (0) Outside	Water-surface elevation (feet, NGVD ¹)	Ground-surface elevation (feet, NGVD ¹)
7	Brookgreen	9	Garden City	33° 34' 14"	79° 01' 28"	Good seed line	0	11.7	8.9
7	Brookgreen	10	Garden City	33° 33' 09"	79° 01' 08"	Good mark	I	11.1	8.1
7	Brookgreen	11	Garden City	33° 33' 02"	79° 01' 12"	Good mark	I	11.7	8.2
7	Brookgreen	12	Garden City	33° 33' 03"	79° 01' 19"	Good mark	I	11.5	6.6
7	Brookgreen	13	Murrells Inlet	33° 33' 06"	79° 02' 28"	Good seed line	0	11.6	8.9
7	Brookgreen	14	Garden City	33° 32' 37"	79° 01' 30"	Good debris line	I	11.2	7.7
7	Brookgreen	15	Garden City	33° 32' 28"	79° 01' 26"	Good stain line	I	12.5	9.2
7	Brookgreen	16	Garden City	33° 32' 24"	79° 01' 40"	Good seed line	I	11.5	7.1
7	Brookgreen	17	Garden City	33° 32' 21"	79° 01' 39"	Good mark	I	11.1	5.4
7	Brookgreen	18	Garden City	33° 32' 17"	79° 01' 34"	Good mark	0	11.3	8.3
7	Brookgreen	19	Garden City	33° 32' 09"	79° 01' 52"	Good mark	0	11.0	7.4
7	Brookgreen	20	Garden City	33° 32' 00"	79° 01' 50"	Good mark	I	12.6	6.9

Table 1.--High-water marks; location, description, and elevations--Continued

Plate number (see fig. 1)	Quad-range	Mark no.	Nearest town	Latitude	Longitude	Type and/or quality	(1)inside (0)outside	Water-surface elevation (feet, NGVD ¹)	Ground-surface elevation (feet, NGVD ¹)
7	Brookgreen	21	Murrells Inlet	33° 32' 07"	79° 03' 16"	Good seed line	0	11.7	11.0 ^e
7	Brookgreen	22	Garden City	33° 34' 45"	79° 00' 12"	Fair seed line	1	12.0	5.0 ^e
7	Brookgreen	23	Garden City	33° 34' 49"	79° 00' 19"	Good seed line	1	11.6	6.0 ^e
7	Brookgreen	24	Garden City	33° 34' 56"	79° 00' 21"	Poor debris	0	11.5	11.5
8	Magnolia Beach	1	Litchfield Beach	33° 29' 45"	79° 04' 32"	Good seed line	0	11.1	10.5
8	Magnolia Beach	2	Litchfield Beach	33° 29' 43"	79° 04' 28"	Good seed line	0	11.1	8.4
8	Magnolia Beach	3	Litchfield Beach	33° 29' 38"	79° 04' 28"	Poor mud line	0	13.8	12.4
8	Magnolia Beach	4	Litchfield Beach	33° 29' 20"	79° 04' 54"	Good seed/stain line	0	10.6	7.9
8	Magnolia Beach	5	Litchfield Beach	33° 29' 17"	79° 05' 06"	Good seed line	0	10.4	8.0 ^e
8	Magnolia Beach	6	Litchfield Beach	33° 29' 12"	79° 04' 59"	Good mark	0	10.8	9.5
8	Magnolia Beach	7	Litchfield Beach	33° 29' 05"	79° 05' 11"	Good seed line	0	10.7	6.9

Table 1.--High-water marks; location, description, and elevations--Continued

Plate number (see fig. 1)	Quad-range	Mark no.	Nearest town	Latitude	Longitude	Type and/or quality	(I)Inside (O)Outside	Water-surface elevation (feet, NGVD ¹)	Ground-surface elevation (feet, NGVD ¹)
8	Magnolia Beach	8	Litchfield Beach	33°28'16"	79°06'11"	Good seed line	I	12.1	7.1
8	Magnolia Beach	9	Litchfield Beach	33°28'09"	79°05'54"	Good seed line	O	11.9	6.8
8	Magnolia Beach	10	Litchfield Beach	33°28'09"	79°05'57"	Good seed line	O	11.8	6.8
8	Magnolia Beach	11	Litchfield Beach	33°28'01"	79°06'00"	Good debris line	I	12.1	7.1
8	Magnolia Beach	12	Litchfield Beach	33°28'01"	79°06'04"	Good seed line	O	11.5	6.5
8	Magnolia Beach	13	Litchfield Beach	33°27'56"	79°05'59"	Good seed/stain line	O	12.2	9.1
8	Magnolia Beach	14	Litchfield Beach	33°27'52"	79°06'02"	Poor stain line	I	11.0	8.6
8	Magnolia Beach	15	Litchfield Beach	33°27'43"	79°06'06"	Good seed line	I	12.9	9.4
8	Magnolia Beach	16	Litchfield Beach	33°27'36"	79°06'17"	Good seed line	I	13.0	7.8
8	Magnolia Beach	17	Litchfield Beach	33°27'30"	79°06'12"	Good seed line	I	13.4	10.2

Table 1.--High-water marks; location, description, and elevations--Continued

Plate number (see fig. 1)	Quad-range	Mark no.	Nearest town	Latitude	Longitude	Type and/or quality	(I)nside (O)utside	Water-surface elevation (feet, NGVD ¹)	Ground-surface elevation (feet, NGVD ¹)
8	Magnolia Beach	18	Pawleys Island	33°26'35"	79°06'49"	Good seed line	I	12.7	6.2
8	Magnolia Beach	19	Pawleys Island	33°26'23"	79°06'58"	Good seed line	O	12.8	7.2
8	Magnolia Beach	20	Pawleys Island	33°26'20"	79°07'04"	Good debris line	I	11.9	5.2
8	Magnolia Beach	21	Pawleys Island	33°26'13"	79°07'05"	Good seed/mud line	I	12.4	5.8
8	Magnolia Beach	22	Pawleys Island	33°26'11"	79°07'10"	Good mud line	I	11.7	6.6
8	Magnolia Beach	23	Pawleys Island	33°26'11"	79°07'28"	Good seed line	O	11.9	9.0 ^e
8	Magnolia Beach	24	Pawleys Island	33°25'43"	79°07'20"	Poor mud/stain line	I	15.3	5.0 ^e
8	Magnolia Beach	25	Pawleys Island	33°25'43"	79°07'22"	Good seed line	I	11.7	5.0 ^e
9	Waverly Mills	1	Pawleys Island	33°25'38"	79°07'53"	Good seed line	I	12.0	8.0 ^e
9	Waverly Mills	2	Pawleys Island	33°25'36"	79°07'54"	Good seed/stain line	I	11.8	8.0 ^e

Table 1.--High-water marks; location, description, and elevations--Continued

Plate number (see fig. 1)	Quad-range	Mark no.	Nearest town	Latitude	Longitude	Type and/or quality	(I)inside (O)outside	Water-surface elevation (feet, NGVD ¹)	Ground-surface elevation (feet, NGVD ¹)
9	Waverly Mills	3	Pawleys Island	33°25'35"	79°07'56"	Good stain line	I	11.9	8.1
9	Waverly Mills	4	Pawleys Island	33°25'12"	79°07'38"	Fair stain line	O	11.1	8.0 ^e
9	Waverly Mills	5	Pawleys Island	33°25'12"	79°07'39"	Fair mark	O	12.1	8.0 ^e
9	Waverly Mills	6	Pawleys Island	33°24'39"	79°07'58"	Fair seed line	I	11.9	6.0 ^e
10	North Island	1	Georgetown	33°22'26"	79°09'03"	Good mark	O	11.3	8.9
10	North Island	2	Georgetown	33°22'16"	79°09'57"	Good mark	O	11.4	9.0
10	North Island	3	Georgetown	33°21'59"	79°10'11"	Good mark	I	10.8	8.7
10	North Island	4	Georgetown	33°21'59"	79°10'11"	Fair mark	O	10.8	8.7
10	North Island	5	Georgetown	33°21'46"	79°09'23"	Fair mark	O	10.8	7.0 ^e
10	North Island	6	Georgetown	33°21'46"	79°09'07"	Good mark	O	11.3	9.2

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Table 1.--High-water marks; location, description, and elevations--Continued

Plate number (see fig. 1)	Quad-range	Mark no.	Nearest town	Latitude	Longitude	Type and/or quality	(1) Inside (0) Outside	Water-surface elevation (feet, NGVD ¹)	Ground-surface elevation (feet, NGVD ¹)
10	North Island	7	Georgetown	33° 21' 30"	79° 09' 07"	Good mark	0	11.6	8.3
10	North Island	8	Georgetown	33° 20' 57"	79° 11' 42"	Good seed line	0	11.6	5.0 ^e
10	North Island	9	Georgetown	33° 20' 06"	79° 11' 40"	Good seed line	0	12.1	5.0 ^e
10	North Island	10	Georgetown	33° 18' 09"	79° 14' 06"	Good seed line	0	12.6	6.0 ^e
11	Georgetown South	1	Georgetown	33° 22' 10"	79° 16' 38"	Good mark	0	6.9	6.0 ^e
11	Georgetown South	2	Georgetown	33° 21' 52"	79° 16' 15"	Good mark	0	7.7	7.5
11	Georgetown South	3	Georgetown	33° 21' 44"	79° 21' 15"	Fair mark	0	8.1	7.0 ^e
11	Georgetown South	4	Georgetown	33° 20' 33"	79° 17' 23"	Good mark	0	9.2	5.6
11	Georgetown South	5	Georgetown	33° 19' 37"	79° 17' 36"	Fair mark	0	9.7	9.4
11	Georgetown South	6	Georgetown	33° 15' 21"	79° 17' 45"	Fair mark	0	8.7	7.0 ^e

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Table 1.--High-water marks; location, description, and elevations--Continued

Plate number (see fig. 1)	Quad-range	Mark no.	Nearest town	Latitude	Longitude	Type and/or quality	(I) Inside (0) Outside	Water-surface elevation (feet, NGVD ¹)	Ground-surface elevation (feet, NGVD ¹)
11	Georgetown South	7	Georgetown	33° 18' 39"	79° 16' 28"	Good debris line	0	9.0	9.0
11	Georgetown South	8	Georgetown	33° 17' 55"	79° 15' 26"	Fair debris line	0	9.0	8.1
11	Georgetown South	9	Georgetown	33° 15' 03"	79° 16' 09"	Good mark	0	8.4	5.0e
11	Georgetown South	10	Georgetown	33° 15' 00"	79° 16' 04"	Good debris line	I	8.6	5.2
12	Santee Point	1	Georgetown	33° 14' 07"	79° 12' 16"	Good seed line	I	7.7	5.0e
12	Santee Point	2	Georgetown	33° 14' 03"	79° 12' 15"	Good seed line	I	7.6	5.0e
12	Santee Point	3	Georgetown	33° 13' 20"	79° 11' 07"	Good seed line	I	8.2	5.0
12	Santee Point	4	Georgetown	33° 13' 20"	79° 11' 05"	Good seed line	I	8.1	5.0
12	Santee Point	5	Georgetown	33° 10' 00"	79° 14' 12"	Good debris line	0	12.1	12.0
13	Minim Island	1	Georgetown	33° 13' 04"	79° 16' 19"	Good seed line	0	8.2	5.0e

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Table 1.--High-water marks; location, description, and elevations--Continued

Plate number (see fig. 1)	Quad-angle	Mark no.	Nearest town	Latitude	Longitude	Type and/or quality	(I)inside (O)outside	Water-surface elevation (feet, NGVD ¹)	Ground-surface elevation (feet, NGVD ¹)
13	Minim Island	2	Georgetown	33°12'49"	79°17'47"	Poor debris line	0	6.8	5.4
13	Minim Island	3	Georgetown	33°12'28"	79°19'45"	Fair mark	0	7.7	4.0e
13	Minim Island	4	Georgetown	33°09'05"	79°21'41"	Good mark	I	7.7	5.0e
14	Santee	1	Georgetown	33°12'36"	79°23'03"	Data from USGS ² gaging station 02171800		6.6	--
14	Santee	2	Georgetown	33°10'52"	79°24'11"	Good debris line	0	7.4	7.4
15	Cape Romain	1	McClellanville	33°01'07"	79°22'25"	Good stain/seed line	I	14.0	7.5
15	Cape Romain	2	McClellanville	33°01'05"	79°22'27"	Good stain/seed line	I	14.0	5.9
16	McClellanville	1	McClellanville	33°05'43"	79°27'12"	Fair seed line	0	13.4	9.3
16	McClellanville	2	McClellanville	33°05'27"	79°27'20"	Fair mark	0	16.1	9.3
16	McClellanville	3	McClellanville	33°05'22"	79°27'45"	Good seed line	0	15.5	9.8

Table 1.--High-water marks; location, description, and elevations--Continued

Plate number (see fig. 1)	Quad-range	Mark no.	Nearest town	Latitude	Longitude	Type and/or quality	(I)inside (O)outside	Water-surface elevation (feet, NGVD ¹)	Ground-surface elevation (feet, NGVD ¹)
16	McClellan-ville	4	McClellan-ville	33°05'34"	79°28'00"	Good seed line	0	15.2	10.7
16	McClellan-ville	5	McClellan-ville	33°05'44"	79°28'34"	Good mark	0	14.8	12.8
16	McClellan-ville	6	McClellan-ville	33°05'35"	79°28'29"	Good seed line	I	15.3	10.4
16	McClellan-ville	7	McClellan-ville	33°04'46"	79°27'34"	Good mud line	I	16.4	6.8
16	McClellan-ville	8	McClellan-ville	33°06'31"	79°24'16"	Good seed line	0	13.4	5.4
17	Awendaw	1	Awendaw	33°04'25"	79°30'53"	Good seed line	0	16.5	13.0e
17	Awendaw	2	Awendaw	33°04'11"	79°30'52"	Good seed line	0	18.5	9.8
17	Awendaw	3	Awendaw	33°03'36"	79°32'17"	Good mark	0	17.4	16.5
17	Awendaw	4	Awendaw	33°01'51"	79°37'26"	Good mark	0	15.4	8.7
17	Awendaw	5	Awendaw	33°01'45"	79°37'35"	2 good marks	I 0	14.8 14.4	11.1
17	Awendaw	6	Awendaw	33°01'36"	79°37'11"	Good seed line	I	13.8	13.0e

Table 1.--High-water marks; location, description, and elevations--Continued

Plate number (see fig. 1.)	Quad-range	Mark no.	Nearest town	Latitude	Longitude	Type and/or quality	(I)inside (O)outside	Water-surface elevation (feet, NGVD ¹)	Ground-surface elevation (feet, NGVD ¹)
17	Awendaw	7	Awendaw	33° 01' 19"	79° 36' 03"	Good seed line	0	16.8	15.1
17	Awendaw	8	Awendaw	33° 00' 56"	79° 35' 34"	Good seed line	0	20.2	19.5
19	Bull Island	1	Awendaw	32° 54' 29"	79° 36' 46"	Good seed line	I	16.2	8.2
19	Bull Island	2	Awendaw	32° 54' 27"	79° 36' 45"	Good seed line	I	16.2	8.9
19	Bull Island	3	Awendaw	32° 54' 27"	79° 36' 43"	Good seed line	I	16.2	9.7
20	Sewee Bay	1	Awendaw	32° 58' 08"	79° 38' 15"	Fair mark	I	19.5	16.3
20	Sewee Bay	2	Awendaw	32° 58' 13"	79° 38' 15"	Good mark	0	19.4	17.6
20	Sewee Bay	3	Awendaw	32° 57' 42"	79° 39' 02"	Fair mark	0	18.8	18.0 ^e
20	Sewee Bay	4	Awendaw	32° 57' 29"	79° 38' 51"	2 Good marks	I 0	18.8 19.2	14.9
20	Sewee Bay	5	Awendaw	32° 57' 28"	79° 38' 44"	Good mark	0	19.7	13.1
20	Sewee Bay	6	Awendaw	32° 57' 20"	79° 38' 42"	Good mark	I	19.4	13.2
20	Sewee Bay	7	Awendaw	32° 57' 20"	79° 38' 46"	Good mark	0	20.0	14.0

Table 1.--High-water marks: location, description, and elevations--Continued

Plate number (see fig. 1)	Quad-range	Mark no.	Nearest town	Latitude	Longitude	Type and/or quality	(I)inside (O)outside	Water-surface elevation (feet, NGVD ¹)	Ground-surface elevation (feet, NGVD ¹)
20	Sewee Bay	8	Awendaw	32° 57' 16"	79° 38' 48"	Good mark	I	20.2	11.3
20	Sewee Bay	9	Awendaw	32° 56' 29"	79° 39' 30"	Good seed line	I	19.3	11.3
20	Sewee Bay	10	Awendaw	32° 56' 29"	79° 39' 30"	Good seed line	I	18.8	11.3
20	Sewee Bay	11	Awendaw	32° 55' 56"	79° 41' 10"	Fair debris lines	O	16.2 Avg ³	16.0
20	Sewee Bay	12	Awendaw	32° 55' 55"	79° 41' 09"	Fair seed lines	O	16.4 16.9	10.0e
20	Sewee Bay	13	Awendaw	32° 55' 10"	79° 41' 10"	Good mark	I	18.2 Avg ³	9.5
20	Sewee Bay	14	Mount Pleasant	32° 52' 36"	79° 44' 55"	Good marks	I	15.2 15.2	10.4
21	Cainhoy	1	North Charleston	32° 52' 49"	79° 45' 08"	Good mark	O	15.0	11.8
22	North Charleston	1	North Charleston	32° 58' 06"	79° 56' 11"	Good debris line	O	8.2	8.0e
22	North Charleston	2	North Charleston	32° 58' 00"	79° 56' 12"	Fair debris line	O	8.3	8.3
22	North Charleston	3	North Charleston	32° 53' 33"	79° 58' 23"	Fair debris line	O	7.7	7.7

Table 1.--High-water marks; location, description, and elevations--Continued

Plate number (see fig. 1)	Quac- rangle	Mark no.	Nearest town	Latitude	Longitude	Type and/or quality	(1)inside (0)outside	Water- surface elevation (feet, NGVD ¹)	Ground- surface elevation (feet, NGVD ¹)
22	North Charleston	4	North Charleston	32°52'31"	79°58'29"	Fair debris line	0	9.0	6.0e
23	Capers Inlet	1	Mount Pleasant	32°52'26"	79°44'45"	Fair mark	I	16.4	5.0e
23	Capers Inlet	2	Isle of Palms	32°52'29"	79°44'50"	Good mark	0	15.4	9.2
23	Capers Inlet	3	Isle of Palms	32°48'49"	79°43'26"	Good mark	0	14.2	10.4
23	Capers Inlet	4	Isle of Palms	32°48'37"	79°43'26"	Good mark	0	14.1	8.6
23	Capers Inlet	5	Isle of Palms	32°48'39"	79°43'44"	Good mark	0	12.7	7.0
23	Capers Inlet	6	Isle of Palms	32°48'09"	79°44'12"	Good mark	0	14.5	8.2
23	Capers Inlet	7	Isle of Palms	32°48'19"	79°44'13"	Good mark	0	13.0	9.7
23	Capers Inlet	8	Isle of Palms	32°48'04"	79°44'45"	Good mark	0	12.6	8.4
23	Capers Inlet	9	Isle of Palms	32°48'28"	79°44'56"	Good mark	0	12.7	8.0

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Table 1.--High-water marks; location, description, and elevations--Continued

Plate number (see fig. 1)	Quad-range	Mark no.	Nearest town	Latitude	Longitude	Type and/or quality	(I)nside (O)utside	Water-surface elevation (feet, NGVD ¹)	Ground-surface elevation (feet, NGVD ¹)
23	Capers Inlet	10	Isle of Palms	32° 48' 28''	79° 44' 23''	Good mark	0	12.5	7.2
23	Capers Inlet	11	Isle of Palms	32° 48' 27''	79° 44' 14''	Good mark	0	13.8	8.0
23	Capers Inlet	12	Isle of Palms	32° 48' 25''	79° 44' 36''	Good mark	0	12.6	7.0
24	Fort Moultrie	1	Mount Pleasant	32° 49' 01''	79° 48' 27''	2 Good seed lines	0	13.1 13.0	11.0e
24	Fort Moultrie	2	Isle of Palms	32° 47' 03''	79° 47' 42''	Good mark	I	12.1	8.6
24	Fort Moultrie	3	Isle of Palms	32° 46' 56''	79° 47' 38''	Good mark	I	16.2	11.7
24	Fort Moultrie	4	Isle of Palms	32° 46' 46''	79° 48' 18''	Good mark	0	10.9	8.3
24	Fort Moultrie	5	Isle of Palms	32° 46' 41''	79° 48' 15''	Good mark	I	14.4	8.9
24	Fort Moultrie	6	Sullivans Island	32° 46' 26''	79° 48' 58''	Fair mark	I	13.4	9.0e
24	Fort Moultrie	7	Sullivans Island	32° 46' 19''	79° 49' 17''	Good mark	I	11.7	6.0e

Table 1.--High-water marks; location, description, and elevations--Continued

Plate number (see fig. 1)	Quad-range	Mark no.	Nearest town	Latitude	Longitude	Type and/or quality	(I)nside (O)utside	Water-surface elevation (feet, NGVD ¹)	Ground-surface elevation (feet, NGVD ¹)
24	Fort Moultrie	8	Sullivans Island	32° 46' 12"	79° 49' 02"	Fair mark	0	16.0	15.4
24	Fort Moultrie	9	Sullivans Island	32° 46' 12"	79° 49' 06"	Good mark	0	16.2	15.0 ^e
24	Fort Moultrie	10	Sullivans Island	32° 46' 12"	79° 49' 15"	Fair mark	0	13.3	7.5
24	Fort Moultrie	11	Sullivans Island	32° 46' 06"	79° 49' 15"	Good mark	I	13.8	12.0
24	Fort Moultrie	12	Sullivans Island	32° 46' 04"	79° 49' 14"	Good mark	0	15.8	7.0 ^e
24	Fort Moultrie	13	Sullivans Island	32° 45' 49"	79° 49' 38"	Fair mark	I	15.8	10.5
24	Fort Moultrie	14	Sullivans Island	32° 46' 04"	79° 49' 49"	Good mark	0	11.6	8.0 ^e
24	Fort Moultrie	15	Sullivans Island	32° 46' 03"	79° 49' 58"	Good mark	I	10.0	6.0 ^e
24	Fort Moultrie	16	Sullivans Island	32° 45' 56"	79° 50' 12"	Good mark	0	10.2	6.0 ^e
24	Fort Moultrie	17	Sullivans Island	32° 45' 45"	79° 50' 03"	Poor mark	I	11.0	8.1

Table 1.--High-water marks; location, description, and elevations--Continued

Plate number (see fig. 1)	Qued-rangle	Mark no.	Nearest town	Latitude	Longitude	Type and/or quality	(I)inside (O)outside	Water-surface elevation (feet, NGVD ¹)	Ground-surface elevation (feet, NGVD ¹)
24	Fort Moultrie	18	Sullivans Island	32°45'54"	79°50'18"	Good seed line	I	11.6	8.3
24	Fort Moultrie	19	Sullivans Island	32°45'43"	79°50'15"	Good seed line	I	13.5	8.4
24	Fort Moultrie	20	Sullivans Island	32°45'33"	79°50'22"	Fair seed line	I	12.3	10.5
24	Fort Moultrie	21	Sullivans Island	32°45'26"	79°50'31"	2 Good seed lines	I O	13.0 13.0	8.1
24	Fort Moultrie	22	Sullivans Island	32°45'24"	79°51'05"	Good seed line	I	11.6	10.7
24	Fort Moultrie	23	Sullivans Island	32°45'32"	79°51'06"	Good seed line	I	11.0	8.2
24	Fort Moultrie	24	Sullivans Island	32°45'35"	79°51'14"	Good seed lines	I O	10.9 10.9	8.3
24	Fort Moultrie	25	Sullivans Island	32°45'36"	79°51'28"	Good seed line	O	10.9	8.0e
24	Fort Moultrie	26	Sullivans Island	32°45'37"	79°51'34"	Good seed line	O	11.5	6.9
24	Fort Moultrie	27	Mount Pleasant	32°48'38"	79°49'44"	Fair seed line	I	12.4	9.0e

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Table 1.--High-water marks: location, description, and elevations--Continued

Plate number (see fig. 1)	Quad-range	Mark no.	Nearest town	Latitude	Longitude	Type and/or quality	(I)inside (O)outside	Water-surface elevation (feet, NGVD ¹)	Ground-surface elevation (feet, NGVD ¹)
24	Fort Moultrie	28	Mount Pleasant	32° 48' 09"	79° 50' 31"	Good mark	I	11.7	10.0e
24	Fort Moultrie	29	Mount Pleasant	32° 52' 13"	79° 46' 06"	Fair debris line	0	14.3	14.0e
24	Fort Moultrie	30	Mount Pleasant	32° 51' 20"	79° 46' 50"	Good seed line Fair seed line	0 0	12.2 11.7	8.0e
24	Fort Moultrie	31	Mount Pleasant	32° 50' 35"	79° 47' 23"	Good mark	0	13.7	11.3
24	Fort Moultrie	32	Mount Pleasant	32° 50' 14"	79° 46' 57"	Good seed lines	I 0	14.2 14.2	8.0e
24	Fort Moultrie	33	Mount Pleasant	32° 49' 50"	79° 47' 36"	Good mark	I	12.7	7.0e
24	Fort Moultrie	34	Mount Pleasant	32° 47' 40"	79° 50' 51"	Good mark	0	11.8	9.0e
24	Fort Moultrie	35	Mount Pleasant	32° 47' 38"	79° 50' 52"	Good mark	I	12.0	9.0e
24	Fort Moultrie	36	Mount Pleasant	32° 47' 36"	79° 50' 54"	Good seed line	I	11.8	9.0e
24	Fort Moultrie	37	Mount Pleasant	32° 47' 34"	79° 50' 56"	Good seed line	I	12.0	9.0e

Table 1.--High-water marks; location, description, and elevations--Continued

Plate number (see fig. 1)	Quad-range	Mark no.	Nearest town	Latitude	Longitude	Type and/or quality	(I)Inside (O)Outside	Water-surface elevation (feet, NGVD ¹)	Ground-surface elevation (feet, NGVD ¹)
24	Fort Moultrie	38	Mount Pleasant	32° 47' 27"	79° 51' 05"	Good seed line	0	12.3	10.0e
24	Fort Moultrie	39	Mount Pleasant	32° 47' 21"	79° 51' 10"	2 Good marks	I 0	12.1 12.2	9.0e
24	Fort Moultrie	40	Mount Pleasant	32° 47' 12"	79° 51' 03"	Good mark	I	11.8	7.4
24	Fort Moultrie	41	Mount Pleasant	32° 46' 32"	79° 50' 46"	2 Good marks	I I	11.6 11.7	6.0e
24	Fort Moultrie	42	Mount Pleasant	32° 47' 14"	79° 51' 03"	Good mark	0	12.0	7.0
24	Fort Moultrie	43	Mount Pleasant	32° 46' 52"	79° 51' 45"	Good mark	0	12.0	11.0e
24	Fort Moultrie	44	Mount Pleasant	32° 46' 49"	79° 51' 48"	Good mark	0	11.4	6.0e
24	Fort Moultrie	45	Mount Pleasant	32° 46' 46"	79° 51' 52"	2 Good marks	I I	11.4 11.5	6.0e
24	Fort Moultrie	46	Mount Pleasant	32° 46' 48"	79° 51' 54"	Good mark	0	10.8	6.0e
24	Fort Moultrie	47	Mount Pleasant	32° 46' 47"	79° 52' 04"	Good mark	0	11.3	6.0e

Table 1.--High-water marks, location, description, and elevations--Continued

Plate number (see fig. 1)	Qued-rangle	Mark no.	Nearest town	Latitude	Longitude	Type and/or quality	(I)inside (O)outside	Water-surface elevation (feet, NGVD-1)	Ground-surface elevation (feet, NGVD-1)
24	Fort Moultrie	48	Mount Pleasant	32° 46' 49" "	79° 52' 08" "	Good mark	I	12.0	7.0e
24	Fort Moultrie	49	Mount Pleasant	32° 46' 55" "	79° 52' 14" "	Good mark	O	11.9	6.0e
24	Fort Moultrie	50	Mount Pleasant	32° 46' 52" "	79° 52' 17" "	Good mark	I	12.2	8.0e
24	Fort Moultrie	51	Mount Pleasant	32° 46' 52" "	79° 52' 18" "	Good mark	I	12.1	6.0e
24	Fort Moultrie	52	Sullivan's Island	32° 45' 58" "	79° 49' 22" "	Good mark	I	14.1	9.3
24	Fort Moultrie	53	Isle of Palms	32° 48' 19" "	79° 45' 30" "	Good mark	O	12.9	7.4
24	Fort Moultrie	54	Isle of Palms	32° 48' 16" "	79° 45' 21" "	Good seed line	O	12.7	7.4
24	Fort Moultrie	55	Isle of Palms	32° 47' 55" "	79° 45' 06" "	Good mark	O	15.4	9.2
24	Fort Moultrie	56	Isle of Palms	32° 47' 56" "	79° 45' 19" "	Good debris line	I	15.1	10.0
24	Fort Moultrie	57	Isle of Palms	32° 48' 02" "	79° 45' 20" "	Good seed line	O	12.9	10.8

Table 1.--High-water marks; location, description, and elevations--Continued

Plate number (see fig. 1)	Quad-range	Mark no.	Nearest town	Latitude	Longitude	Type and/or quality	(I)inside (O)outside	Water-surface elevation (feet, NGVD ¹)	Ground-surface elevation (feet, NGVD ¹)
24	Fort Moultrie	58	Isle of Palms	32° 48' 08"	79° 45' 45"	Good mark	0	12.6	7.0
24	Fort Moultrie	59	Isle of Palms	32° 47' 52"	79° 45' 37"	Good mark	0	15.5	11.2
24	Fort Moultrie	60	Isle of Palms	32° 48' 03"	79° 46' 04"	Good mark	0	12.6	7.7
24	Fort Moultrie	61	Isle of Palms	32° 47' 57"	79° 46' 03"	Good mark	I	12.4	6.4
24	Fort Moultrie	62	Isle of Palms	32° 47' 47"	79° 45' 55"	Fair mark Good mark	I 0	12.4 12.6	11.5 12.1
24	Fort Moultrie	63	Isle of Palms	32° 47' 54"	79° 46' 27"	Good mark	0	12.6	7.0e
24	Fort Moultrie	64	Isle of Palms	32° 47' 38"	79° 46' 12"	Good mark	I	14.7	10.7
24	Fort Moultrie	65	Isle of Palms	32° 47' 31"	79° 46' 25"	Good mark	I	13.9	9.2
24	Fort Moultrie	66	Isle of Palms	32° 47' 45"	79° 46' 43"	Good mark	0	12.4	7.2
24	Fort Moultrie	67	Isle of Palms	32° 47' 43"	79° 46' 48"	Good mark	0	12.4	7.1

Table 1.--High-water marks; location, description, and elevations--Continued

Plate number (see fig. 1)	Quad-range	Mark no.	Nearest town	Latitude	Longitude	Type and/or quality	(I)inside (O)outside	Water-surface elevation (feet, NGVD ¹)	Ground-surface elevation (feet, NGVD ¹)
24	Fort Moultrie	68	Isle of Palms	32° 47' 37"	79° 47' 08"	Good mark	I	12.3	7.7
24	Fort Moultrie	69	Isle of Palms	32° 47' 28"	79° 47' 02"	Good mark	I	12.5	7.0
24	Fort Moultrie	70	Isle of Palms	32° 47' 28"	79° 46' 50"	Fair mark	O	12.6	7.6
24	Fort Moultrie	71	Isle of Palms	32° 47' 18"	79° 46' 58"	Good mark	I	14.0	9.2
24	Fort Moultrie	72	Isle of Palms	32° 47' 42"	79° 46' 02"	Good mark	I	15.3	10.8
24	Fort Moultrie	73	Isle of Palms	32° 46' 56"	79° 47' 56"	Good mark	I	12.0	9.9
24	Fort Moultrie	74	Isle of Palms	32° 46' 50"	79° 47' 54"	Good mark	I	15.2	10.8
24	Fort Moultrie	75	Sullivans Island	32° 45' 48"	79° 51' 49"	Good seed line	I	10.9	6.7
24	Fort Moultrie	76	Sullivans Island	32° 45' 56"	79° 51' 45"	Good seed line	O	11.5	8.0
24	Fort Moultrie	77	Sullivans Island	32° 45' 57"	79° 51' 52"	Poor seed line	O	12.7	8.6

Table 1.--High-water marks; location, description, and elevations--Continued

Plate number (see fig. 1)	Quadrangle	Mark no.	Nearest town	Latitude	Longitude	Type and/or quality	(I)inside (O)outside	Water-surface elevation (feet, NGVD ¹)	Ground-surface elevation (feet, NGVD ¹)
24	Fort Moultrie	78	Sullivans Island	32°45'32"	79°51'16"	Good seed line	0	10.8	8.0 ^e
24	Fort Moultrie	79	Sullivans Island	32°45'26"	79°51'05"	Good seed line	I	11.1	7.6
24	Fort Moultrie	80	Sullivans Island	32°45'39"	79°50'43"	Good seed line	0	11.2	8.0
24	Fort Moultrie	81	Sullivans Island	32°45'39"	79°50'24"	Good seed line	I	10.7	9.4
24	Fort Moultrie	82	Sullivans Island	32°45'55"	79°50'19"	Good seed line	I	11.3	5.3
25	Charleston 1		Mount Pleasant	32°47'35"	79°52'58"	Poor mark	I	13.5	6.0 ^e
25	Charleston 2		Mount Pleasant	32°47'40"	79°52'48"	Poor mark	0	14.8	6.0 ^e
25	Charleston 3		Mount Pleasant	32°47'37"	79°52'47"	Poor mark	0	14.1	6.0 ^e
25	Charleston 4		Mount Pleasant	32°47'32"	79°52'57"	Good mark	I	12.2	6.0 ^e
25	Charleston 5		Mount Pleasant	32°47'42"	79°53'23"	Fair mark	0	11.3	6.2

Table 1.--High-water marks; location, description, and elevations--Continued

Plate number (see fig. 1)	Quadrangle	Mark no.	Nearest town	Latitude	Longitude	Type and/or quality	(I)inside (O)outside	Water-surface elevation (feet, NGVD ¹)	Ground-surface elevation (feet, NGVD ¹)
25	Charleston	6	Mount Pleasant	32° 47' 06"	79° 52' 35"	Good mark	I	12.3	8.0e
25	Charleston	7	Mount Pleasant	32° 47' 03"	79° 52' 34"	Good mark	I	11.8	8.0e
25	Charleston	8	Mount Pleasant	32° 47' 00"	79° 52' 40"	Good mark	O	15.2	8.0e
25	Charleston	9	Mount Pleasant	32° 47' 19"	79° 52' 52"	2 Good marks	I	11.9	7.5
25	Charleston	10	Mount Pleasant	32° 47' 46"	79° 53' 43"	Good seed line	I	11.5	8.5
25	Charleston	11	Mount Pleasant	32° 47' 47"	79° 53' 43"	Good seed line	I	10.2	8.5
25	Charleston	12	Mount Pleasant	32° 48' 04"	79° 54' 20"	2 Good debris lines	O	12.1	12.0e
25	Charleston	13	Mount Pleasant	32° 48' 05"	79° 54' 22"	Good debris line	O	11.0	9.5
25	Charleston	14	Mount Pleasant	32° 48' 05"	79° 54' 19"	Good debris line	O	10.2	9.5
25	Charleston	15	Mount Pleasant	32° 48' 06"	79° 54' 16"	Poor debris line	O	9.5	9.5

Table 1.--High-water marks; location, description, and elevations--Continued

Plate number (see fig. 1)	Quad-range	Mark no.	Nearest town	Latitude	Longitude	Type and/or quality	(I)inside (O)outside	Water-surface elevation (feet, NGVD ¹)	Ground-surface elevation (feet, NGVD ¹)
25	Charleston 16		Charleston	32° 45' 05" "	79° 52' 33" "	2 Good marks	I	11.6 11.8	5.0 ^e
25	Charleston 17		Charleston	32° 45' 03" "	79° 53' 54" "	Good mark	O	11.3	8.0 ^e
25	Charleston 18		Charleston	32° 44' 59" "	79° 54' 05" "	Good mark	I	10.3	7.0 ^e
25	Charleston 19		Charleston	32° 46' 12" "	79° 54' 46" "	2 Good marks	I	10.8 10.9	9.5
25	Charleston 20		Charleston	32° 46' 11" "	79° 55' 48" "	Good seed line	O	10.7	9.5
25	Charleston 21		Charleston	32° 46' 12" "	79° 55' 52" "	Good mark	O	10.4	9.5
25	Charleston 22		Charleston	32° 46' 46" "	79° 55' 34" "	Good mark	I	9.1	8.0 ^e
25	Charleston 23		Charleston	32° 46' 47" "	79° 55' 30" "	Good mark	O	10.5	8.0 ^e
25	Charleston 24		Charleston	32° 46' 51" "	79° 55' 35" "	2 Good marks	I	10.2 12.9	8.0 ^e
25	Charleston 25		Charleston	32° 46' 51" "	79° 55' 39" "	Good mark	I	10.4	6.0 ^e
25	Charleston 26		Charleston	32° 47' 24" "	79° 55' 49" "	Good mark	O	10.1	8.0 ^e
25	Charleston 27		Charleston	32° 47' 34" "	79° 56' 02" "	Good mark	I	7.1	5.6
25	Charleston 28		Charleston	32° 48' 02" "	79° 56' 09" "	Good seed line	I	9.7	8.0 ^e

6

Table 1.--High-water marks: location, description, and elevations--Continued

Plate number (see fig. 1)	Quad-range	Mark no.	Nearest town	Latitude	Longitude	Type and/or quality	(I)inside (O)outside	Water-surface elevation (feet, NGVD ¹)	Ground-surface elevation (feet, NGVD ¹)
25	Charleston	29	Charleston	32° 48' 04"	79° 56' 12"	Fair seed line	0	7.9	6.0e
25	Charleston	30	Charleston	32° 48' 05"	79° 56' 43"	Fair seed line	I	10.7	6.1
25	Charleston	31	Charleston	32° 48' 01"	79° 56' 51"	Fair seed line	I	10.3	6.0e
25	Charleston	32	Charleston	32° 47' 59"	79° 56' 55"	Fair seed line	I	8.9	6.0e
25	Charleston	33	Charleston	32° 47' 36"	79° 57' 44"	Good seed line	0	9.0	8.0e
25	Charleston	34	Charleston	32° 47' 35"	79° 57' 43"	Good seed line	0	9.0	8.0e
25	Charleston	35	Charleston	32° 47' 34"	79° 57' 41"	Good seed line	0	9.1	8.0e
25	Charleston	36	Charleston	32° 47' 02"	79° 57' 26"	Good debris line	0	10.0	10.0
25	Charleston	37	Charleston	32° 46' 37"	79° 57' 33"	Good seed line	0	9.1	6.0e
25	Charleston	38	Charleston	32° 46' 36"	79° 57' 39"	Fair seed line	0	9.4	6.0e

Table 1.--High-water marks; location, description, and elevations--Continued

Plate number (see fig. 1)	Quad-range	Mark no.	Nearest town	Latitude	Longitude	Type and/or quality	(I)inside (O)outside	Water-surface elevation (feet, NGVD ¹)	Ground-surface elevation (feet, NGVD ¹)
25	Charleston	39	Charleston	32° 46' 34"	79° 57' 46"	Fair seed line	0	9.3	5.0e
25	Charleston	40	Charleston	32° 46' 01"	79° 58' 25"	2 Good seed lines	0	8.1 8.7	5.0e
25	Charleston	41	Charleston	32° 46' 01"	79° 58' 29"	2 Good seed lines	0	9.1 8.6	5.0e
25	Charleston	42	Charleston	32° 46' 50"	79° 58' 05"	Good debris line	0	9.0	8.9
25	Charleston	43	Charleston	32° 46' 50"	79° 58' 17"	Good debris line	0	8.9	8.9
25	Charleston	44	Charleston	32° 49' 35"	79° 59' 00"	Fair mark	0	7.5	7.5
25	Charleston	45	Charleston	32° 49' 48"	79° 59' 08"	Good seed line	0	8.8	5.0e
25	Charleston	46	Charleston	32° 49' 55"	79° 59' 09"	Good mark	0	9.7	8.0e
25	Charleston	47	Charleston	32° 45' 23"	79° 57' 17"	Good mark	0	9.6	5.7
25	Charleston	48	Charleston	32° 52' 09"	79° 58' 47"	Good mark	0	8.7	8.0e
25	Charleston	49	Charleston	32° 52' 09"	79° 58' 47"	Good mark	0	8.7	8.0e
25	Charleston	50	Charleston	32° 52' 09"	79° 58' 47"	Poor mark	0	8.1	8.0e

Table 1.--High-water marks; location, description, and elevations--Continued

Plate number (see fig. 1)	Quad-range	Mark no.	Nearest town	Latitude	Longitude	Type and/or quality	(I)inside (O)outside	Water-surface elevation (feet, NGVD ¹)	Ground-surface elevation (feet, NGVD ¹)
26	Johns Island	1	Charleston	32° 50' 09"''	80° 02' 47"''	Good debris line	0	7.1	7.0
27	James Island	1	Charleston	32° 42' 15"''	79° 56' 20"''	Good mark	0	8.8	8.0e
27	James Island	2	Charleston	32° 42' 14"''	79° 56' 21"''	Good mark	0	9.0	8.0e
27	James Island	3	Folly Beach	32° 39' 41"''	79° 55' 34"''	Good mark	I	11.9	7.0e
27	James Island	4	Folly Beach	32° 39' 40"''	79° 55' 38"''	Good mark	0	12.1	7.0e
27	James Island	5	Folly Beach	32° 39' 38"''	79° 59' 43"''	Fair mark	I	8.5	7.0e
27	James Island	6	Folly Beach	32° 40' 07"''	79° 56' 24"''	Fair mark	0	9.1	6.0e
27	James Island	7	Folly Beach	32° 40' 09"''	79° 56' 23"''	Fair mark	0	9.1	6.0e
27	James Island	8	Folly Beach	32° 39' 23"''	79° 56' 26"''	Fair mark	I	8.2	6.5
27	James Island	9	Folly Beach	32° 39' 23"''	79° 56' 29"''	Good mark	0	9.9	6.5

Table 1.--High-water marks; location, description, and elevations--Continued

Plate number (see fig. 1)	Quad-range	Mark no.	Nearest town	Latitude	Longitude	Type and/or quality	(1) Inside (0) Outside	Water-surface elevation (feet, NGVD ¹)	Ground-surface elevation (feet, NGVD ¹)
27	James Island	10	Folly Beach	32° 39' 20''	79° 56' 27''	Fair mark	I	11.0	6.5
27	James Island	11	Charleston	32° 41' 29''	79° 57' 49''	Poor debris line	0	6.0	6.0
27	James Island	12	Charleston	32° 41' 27''	79° 57' 51''	Fair mark	0	6.9	6.0
27	James Island	13	Charleston	32° 41' 56''	79° 59' 02''	Good debris line	0	7.1	7.1
27	James Island	14	Charleston	32° 43' 16''	79° 59' 21''	Good debris line	0	7.2	7.1
28	Legareville	1	Charleston	32° 43' 32''	80° 00' 38''	Good mark	0	4.3	4.0e
28	Legareville	2	Charleston	32° 42' 49''	80° 00' 24''	Good mark	0	7.3	7.0e
28	Legareville	3	Kiawah Island	32° 38' 42''	80° 03' 53''	Good mark	0	4.3	4.0e
30	Rockville	1	Rockville	32° 35' 56''	80° 11' 39''	Good mark	0	5.7	5.0e
30	Rockville	2	Kiawah Island	32° 35' 18''	80° 07' 38''	Fair mark	0	10.6	6.0e

Table 1.--High-water marks; location, description, and elevations--Continued

Plate number (see fig. 1)	Quad-range	Mark no.	Nearest town	Latitude	Longitude	Type and/or quality	(I)inside (O)outside	Water-surface elevation (feet, NGVD ¹)	Ground-surface elevation (feet, NGVD ¹)
30	Rock-ville	3	Kiawan Island	32° 35' 25''	80° 07' 52''	Good mark	0	6.3	6.2
30	Rock-ville	4	Kiawan Island	32° 33' 49''	80° 10' 48''	Good mark	0	7.4	7.0 ^e
31	Edisto Island	1	Edisto Beach	32° 31' 26''	80° 16' 36''	Good mark	0	4.9	4.8
31	Edisto Island	2	Edisto Beach	32° 30' 11''	80° 17' 47''	Good mark	0	9.9	7.0 ^e

¹National Geodetic Vertical Datum of 1929 (NGVD of 1929).

²USGS - U.S. Geological Survey
e estimate.

AVG³ - Water-surface elevation is average of 3 marks.

A.12 - Liquefaction Potential Maps

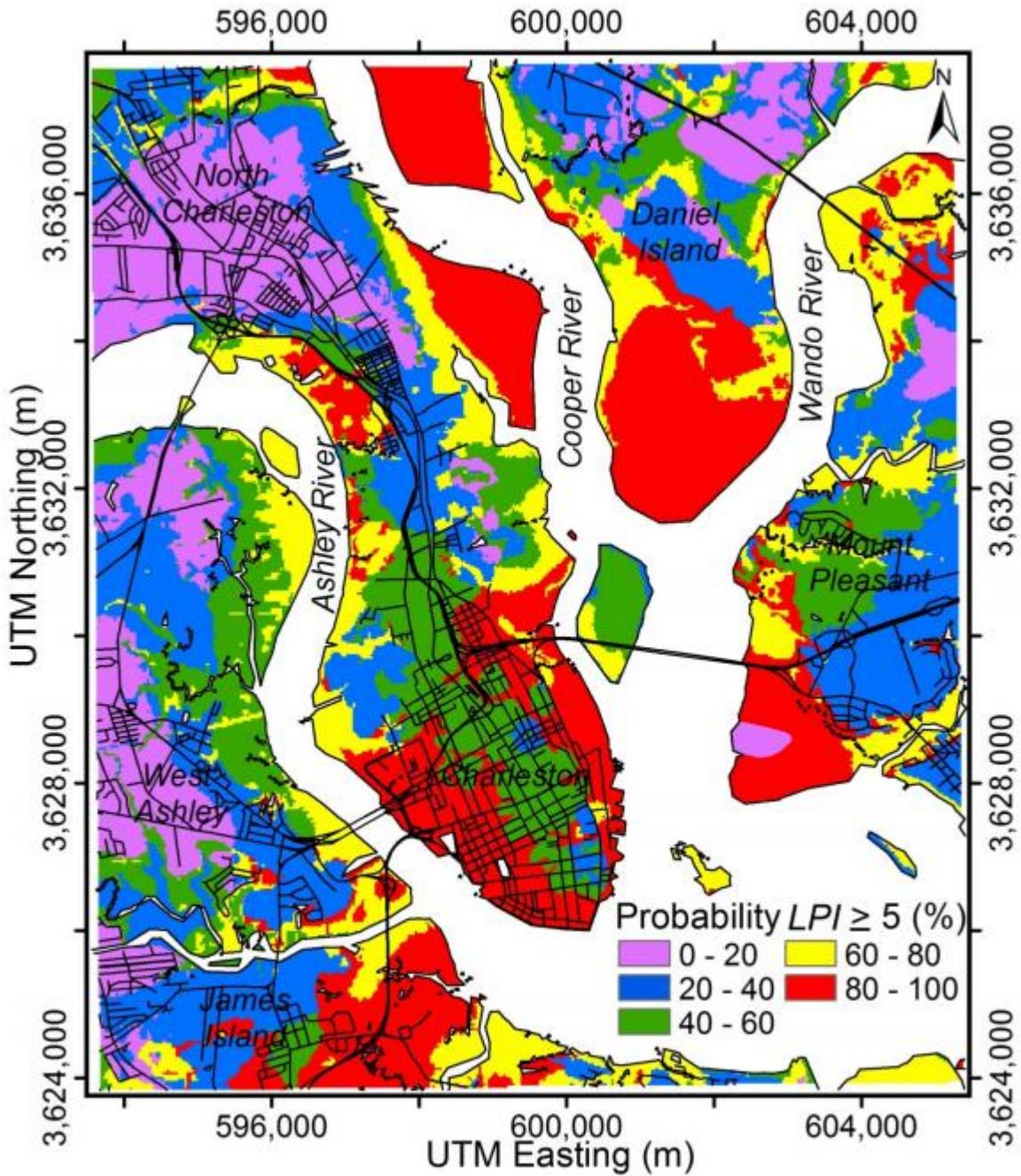


Figure 4.1: Liquefaction potential map of the Charleston quadrangle for 475-year-return-period accelerations and $M_w=6.9$, with roadways maintained by SCDOT (dbw.scdot.org/GISMapping/default.aspx).

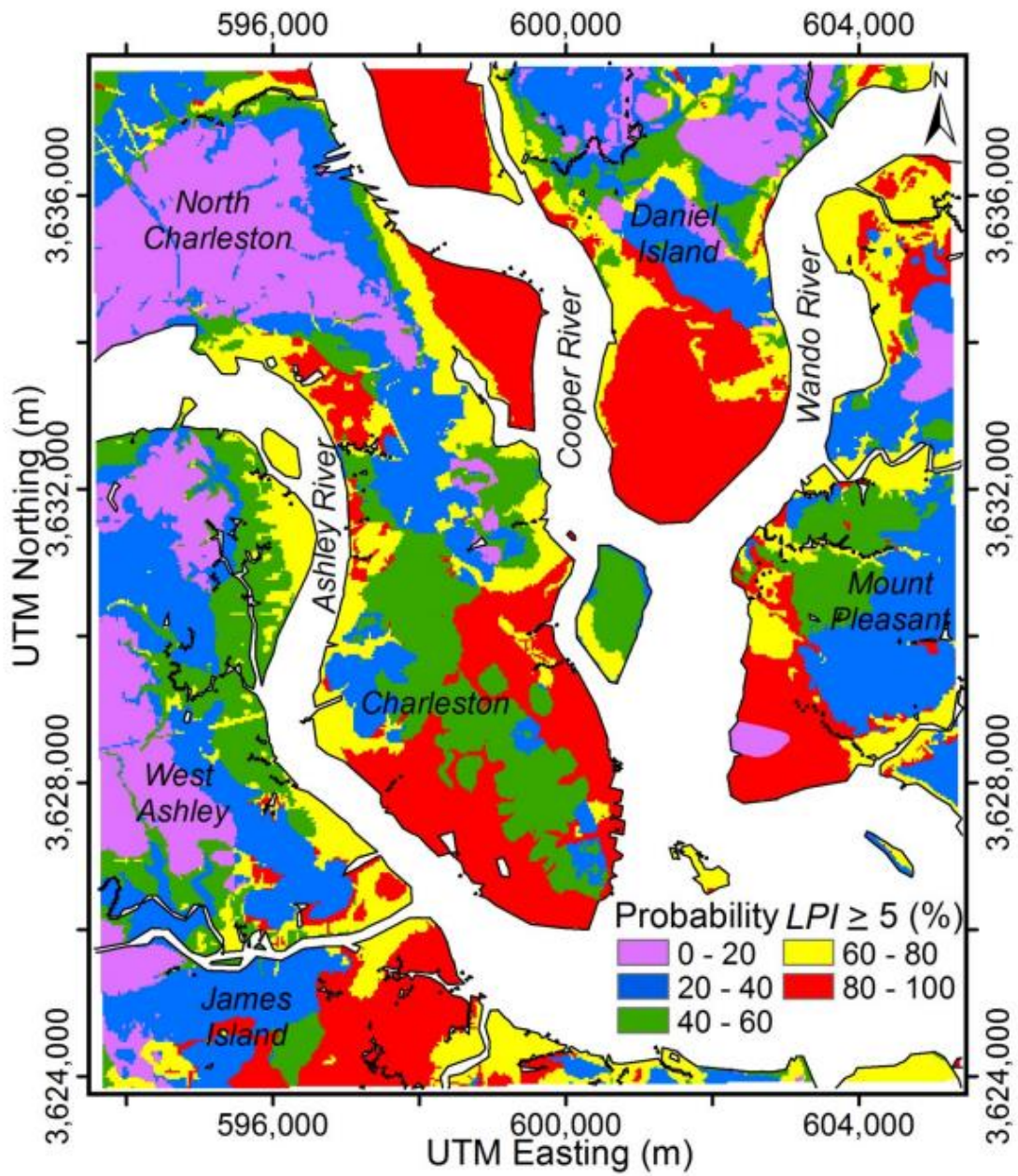


Figure 3.7: Liquefaction potential map of the Charleston quadrangle for 475-year return period accelerations and assuming $M_W=6.9$ and $GWT=2.0$ m for the Wando and 1.0 m for all other areas.

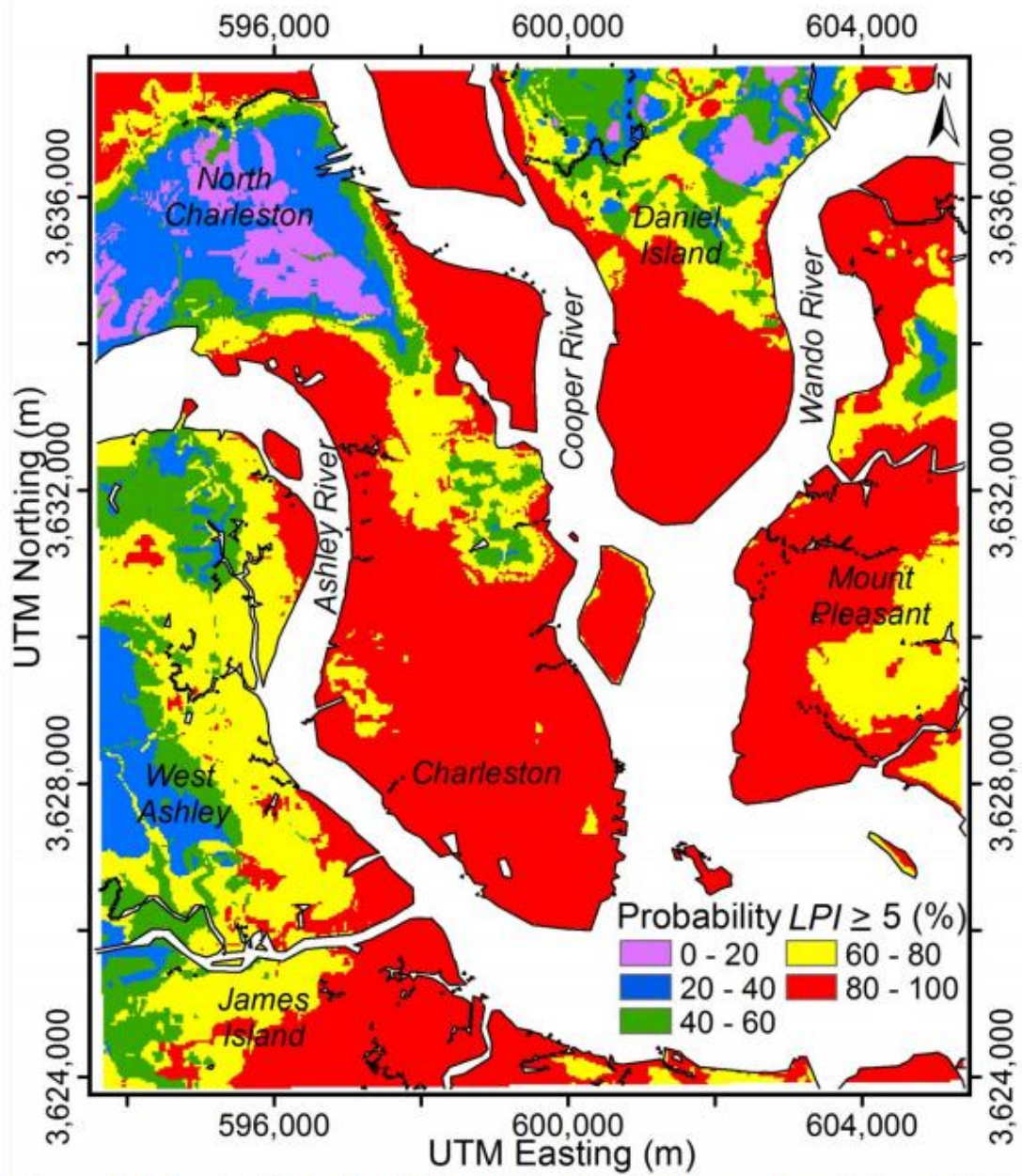
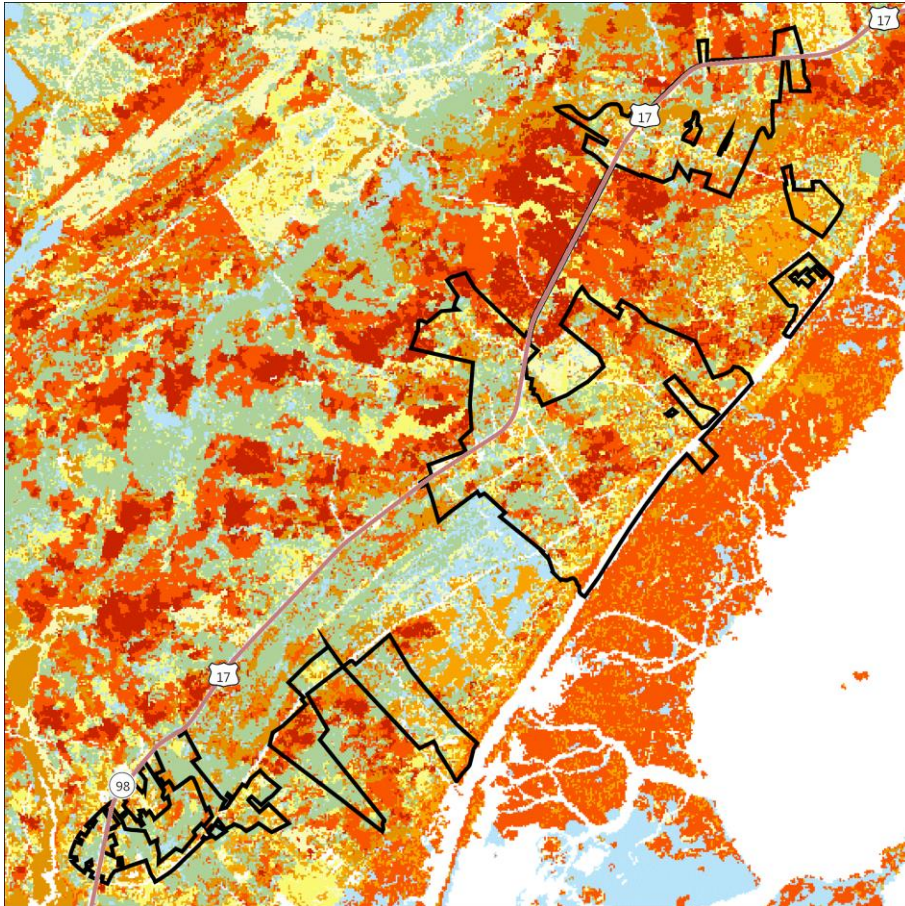


Figure 3.4: Liquefaction potential map of the Charleston quadrangle for a 475-year return period accelerations and assuming $M_w=7.3$ and $GWT=1.0$ m for all areas.

A.13 – Wildfire Intensity Maps

Characteristic Fire Intensity Scale (FIS) specifically identifies areas where significant fuel hazards and associated dangerous fire behavior potential exist based on a weighted average of four percentile weather categories. Similar to the Richter scale for earthquakes, FIS provides a standard scale to measure potential wildfire intensity. FIS consist of 5 classes where the order of magnitude between classes is ten-fold. The minimum class, Class 1, represents very low wildfire intensities and the maximum class, Class 5, represents very high wildfire intensities. Refer to descriptions below.

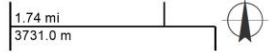
- **Class 1, Very Low:**
Very small, discontinuous flames, usually less than 1 foot in length; very low rate of spread; no spotting. Fires are typically easy to suppress by firefighters with basic training and non-specialized equipment.
- **Class 2, Low:**
Small flames, usually less than two feet long; small amount of very short range spotting possible. Fires are easy to suppress by trained firefighters with protective equipment and specialized tools.
- **Class 3, Moderate:**
Flames up to 8 feet in length; short-range spotting is possible. Trained firefighters will find these fires difficult to suppress without support from aircraft or engines, but dozer and plows are generally effective. Increasing potential for harm or damage to life and property.
- **Class 4, High:**
Large Flames, up to 30 feet in length; short-range spotting common; medium range spotting possible. Direct attack by trained firefighters, engines, and dozers is generally ineffective, indirect attack may be effective. Significant potential for harm or damage to life and property.
- **Class 5, Very High:**
Very large flames up to 150 feet in length; profuse short-range spotting, frequent long-range spotting; strong fire-induced winds. Indirect attack marginally effective at the head of the fire. Great potential for harm or damage to life and property.



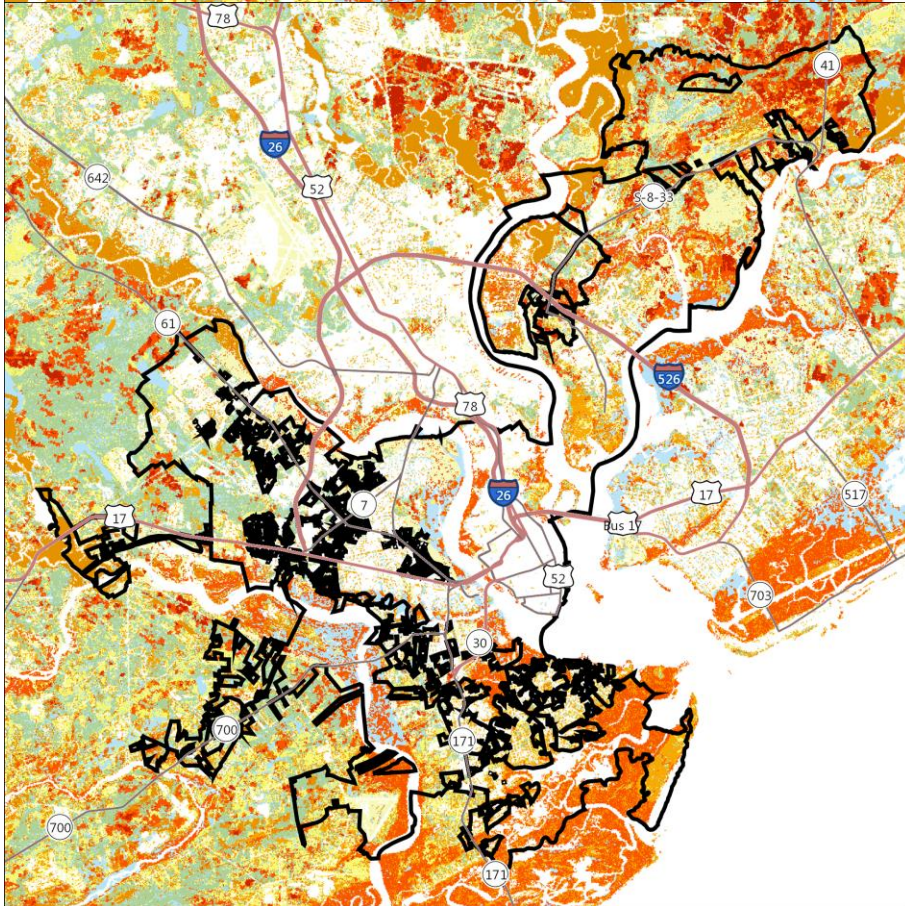
Awendaw Charleston, SC

Fire Intensity Scale

- 1 - Lowest Intensity
- 1.5
- 2 - Low
- 2.5
- 3 - Moderate
- 3.5
- 4 - High
- 4.5
- 5 - Highest Intensity



Southern Wildfire Risk Assessment
<https://southernwildfirerisk.com/>



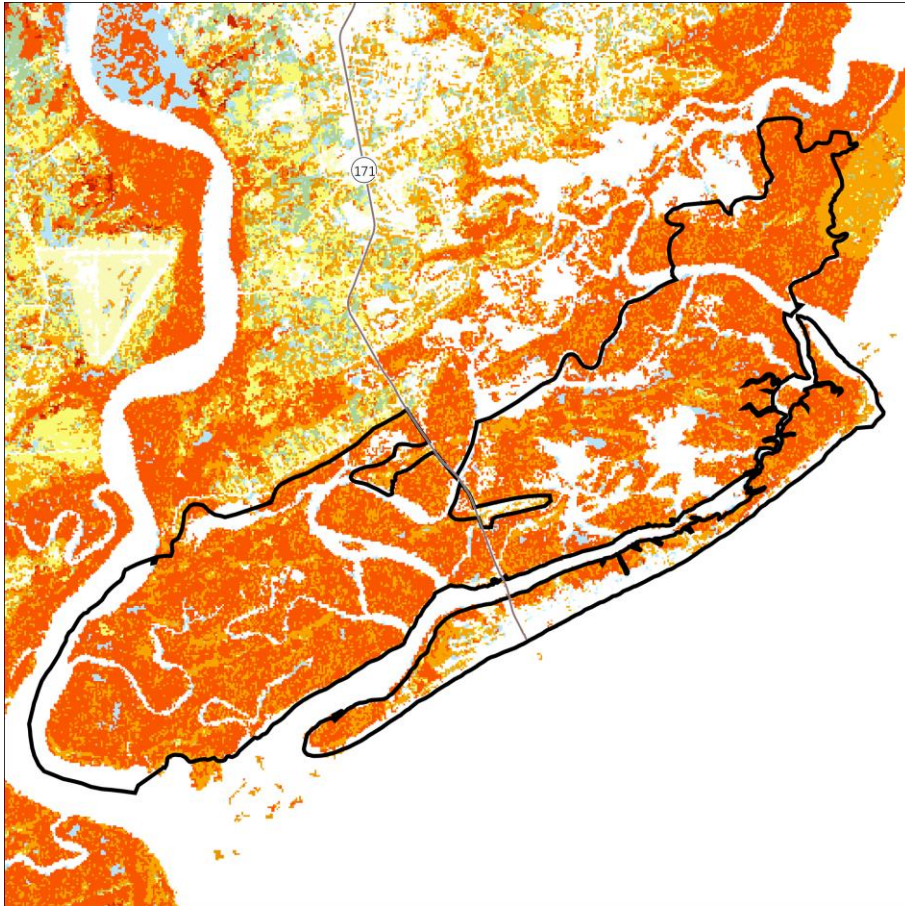
City of Charleston, Charleston, SC

Fire Intensity Scale

- 1 - Lowest Intensity
- 1.5
- 2 - Low
- 2.5
- 3 - Moderate
- 3.5
- 4 - High
- 4.5
- 5 - Highest Intensity



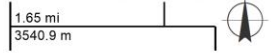
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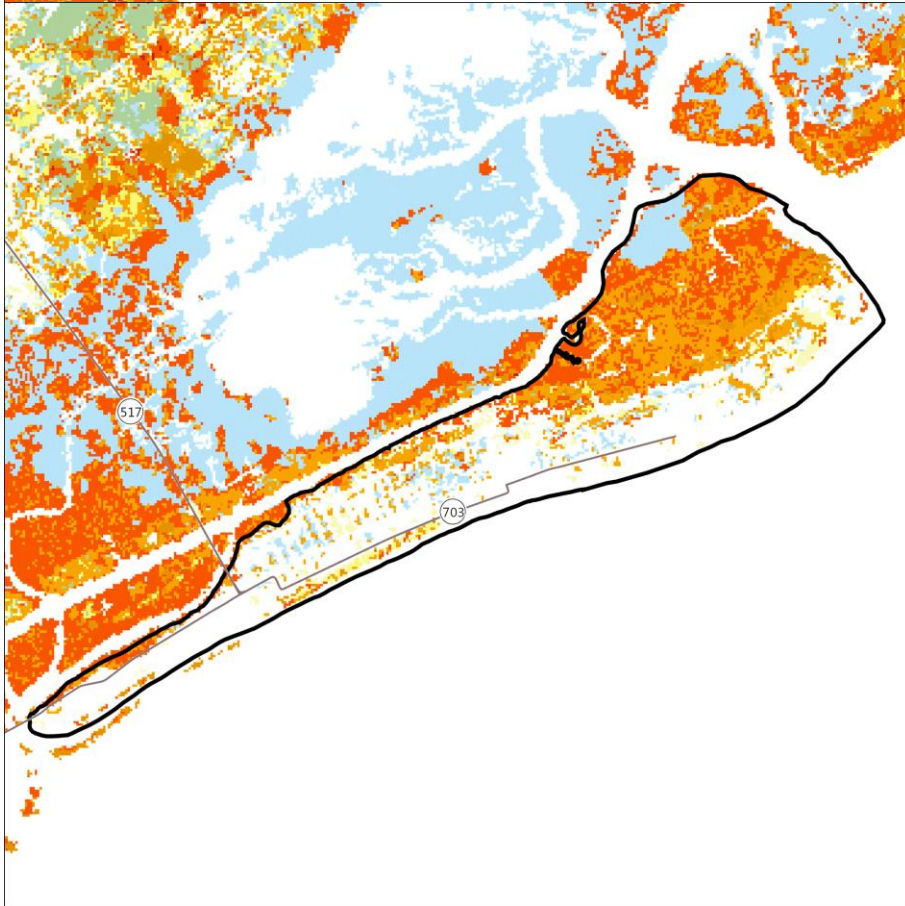
Folly Beach, Charleston, SC

Fire Intensity Scale

- 1 - Lowest Intensity
- 1.5
- 2 - Low
- 2.5
- 3 - Moderate
- 3.5
- 4 - High
- 4.5
- 5 - Highest Intensity



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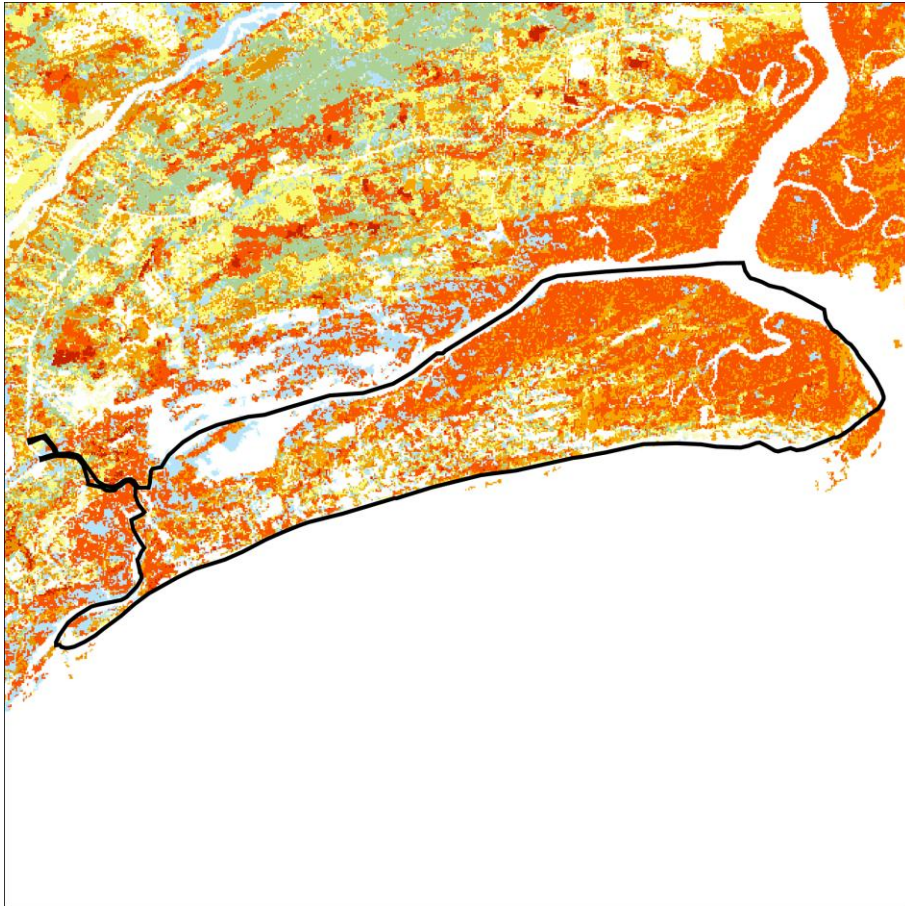
Isle of Palms, Charleston, SC

Fire Intensity Scale

- 1 - Lowest Intensity
- 1.5
- 2 - Low
- 2.5
- 3 - Moderate
- 3.5
- 4 - High
- 4.5
- 5 - Highest Intensity



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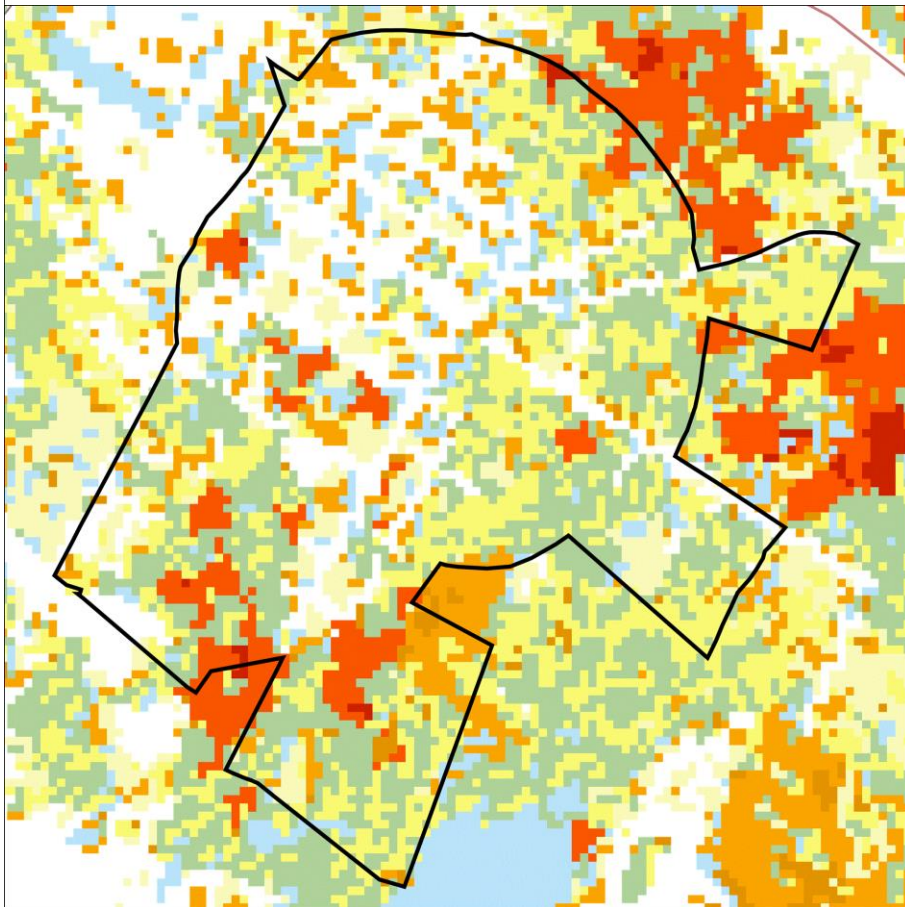
Kiawah Island, Charleston, SC

Fire Intensity Scale

- 1 - Lowest Intensity
- 1.5
- 2 - Low
- 2.5
- 3 - Moderate
- 3.5
- 4 - High
- 4.5
- 5 - Highest Intensity



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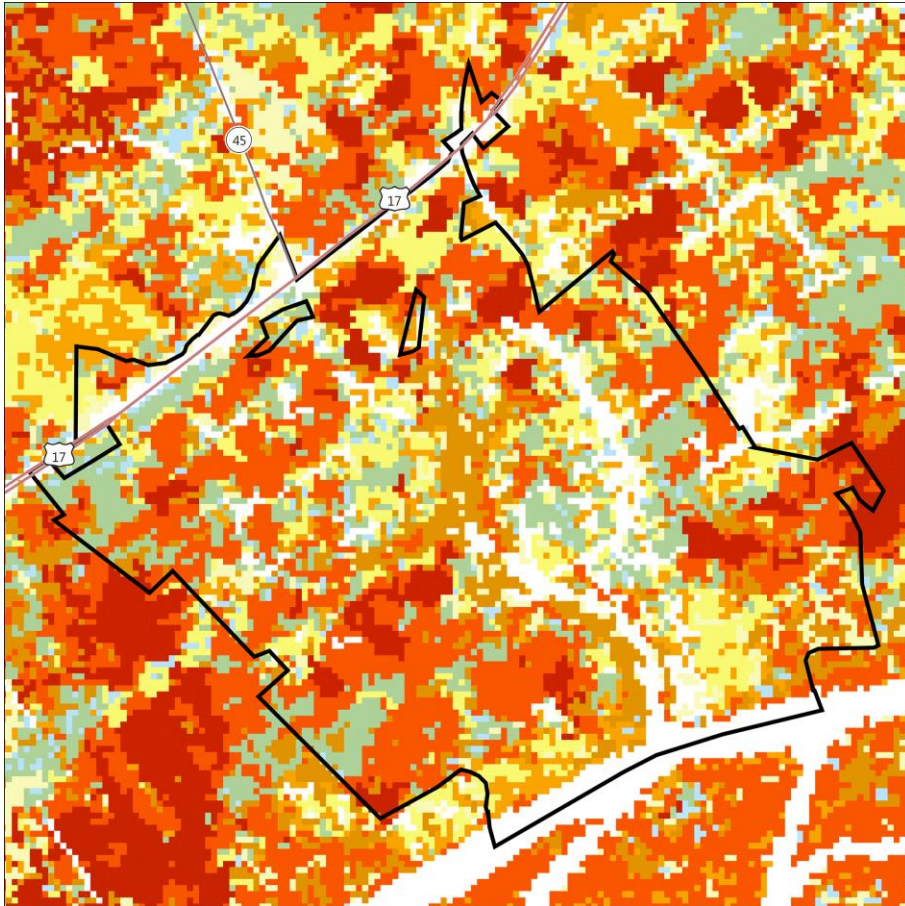
Lincolnville, Charleston, SC

Fire Intensity Scale

- 1 - Lowest Intensity
- 1.5
- 2 - Low
- 2.5
- 3 - Moderate
- 3.5
- 4 - High
- 4.5
- 5 - Highest Intensity

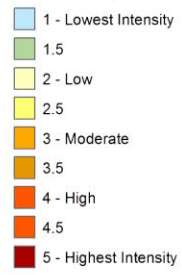


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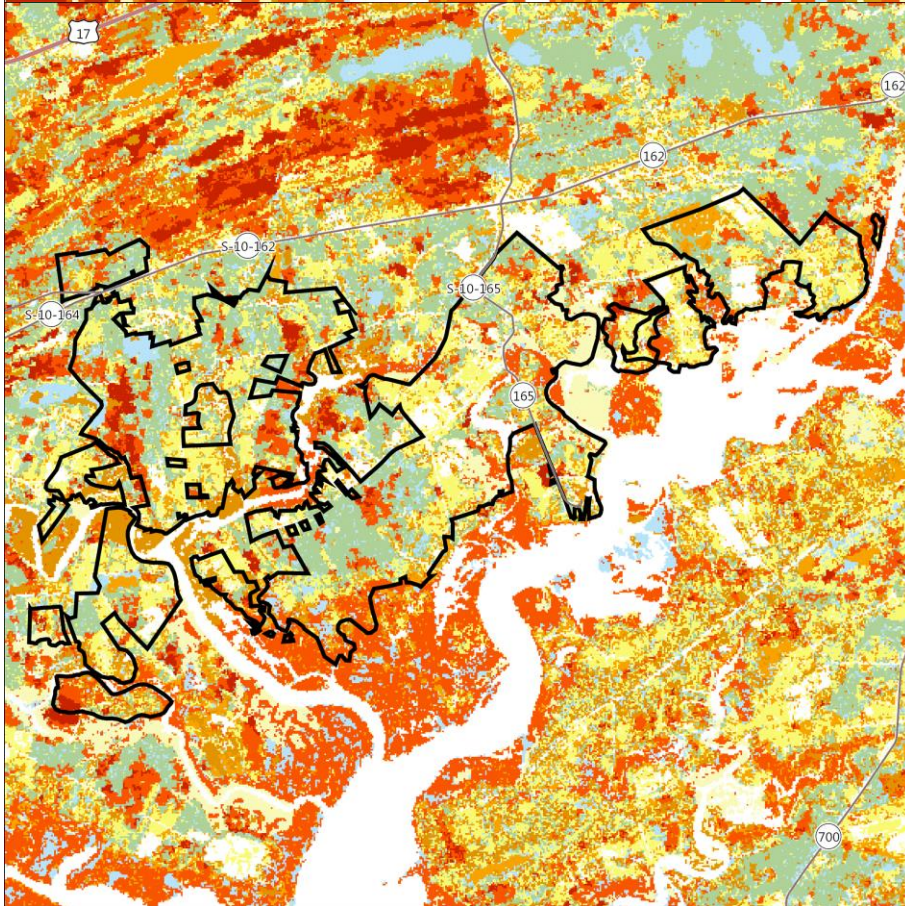


McClellanville, Charleston, SC

Fire Intensity Scale



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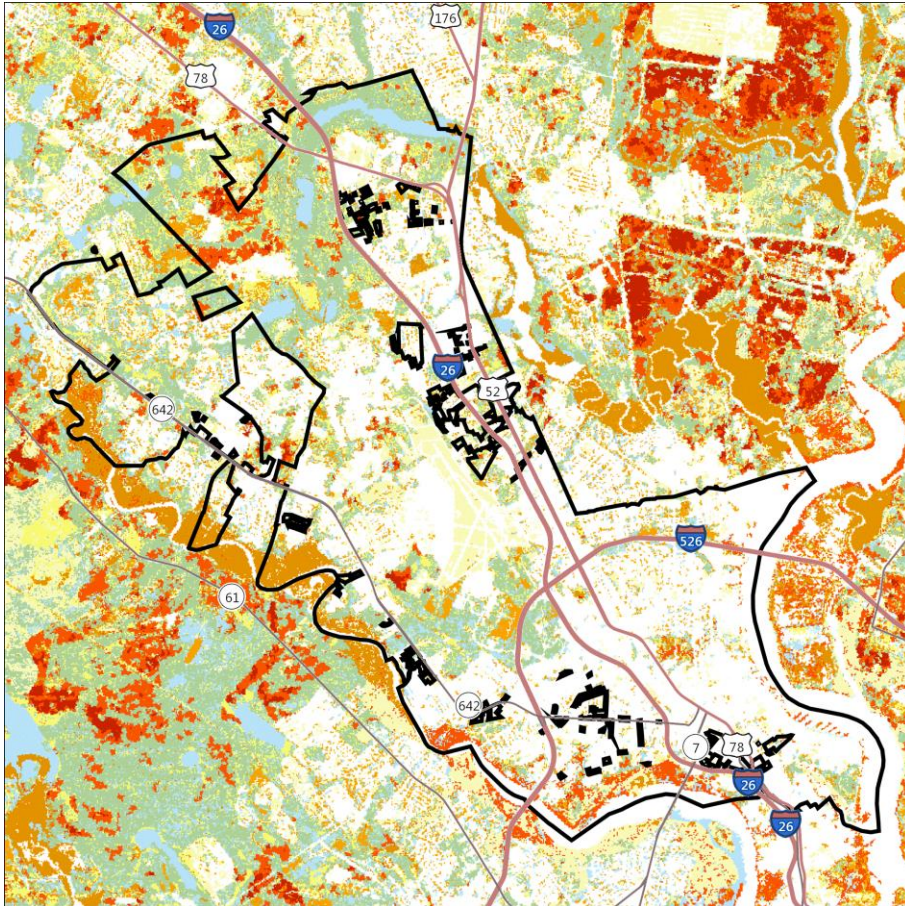


Meggett, Charleston, SC

Fire Intensity Scale



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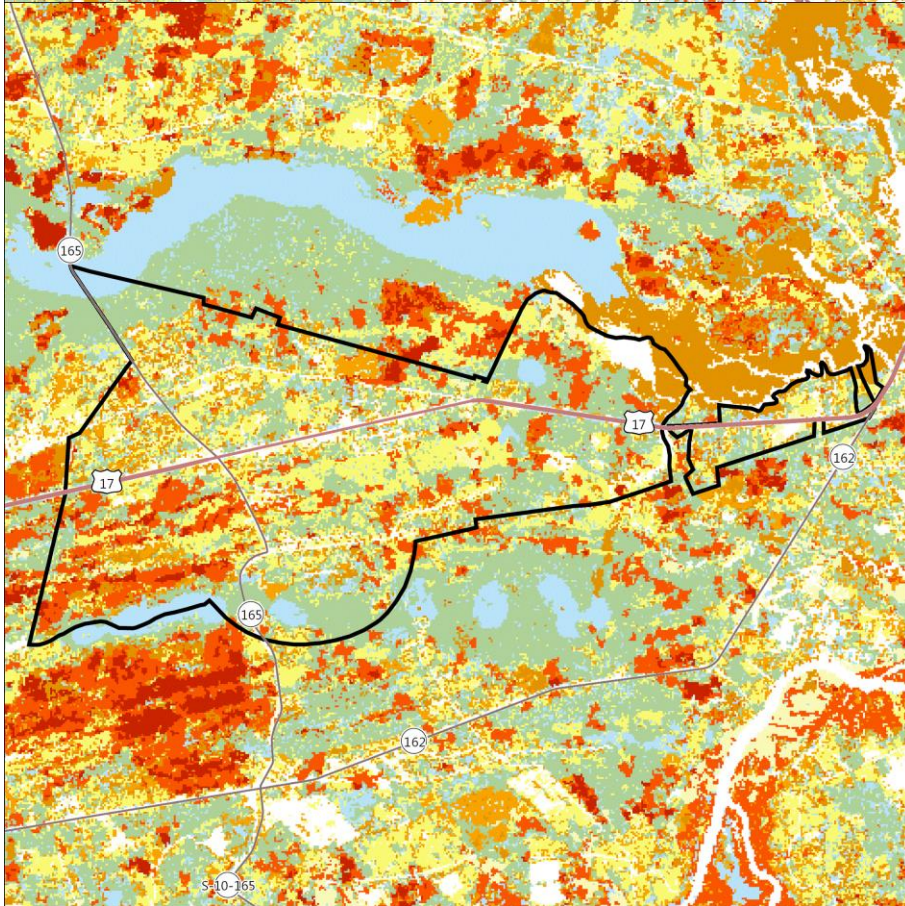
North Charleston, Charleston, SC

Fire Intensity Scale

- 1 - Lowest Intensity
- 1.5
- 2 - Low
- 2.5
- 3 - Moderate
- 3.5
- 4 - High
- 4.5
- 5 - Highest Intensity



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<https://southernwildfirerisk.com/>



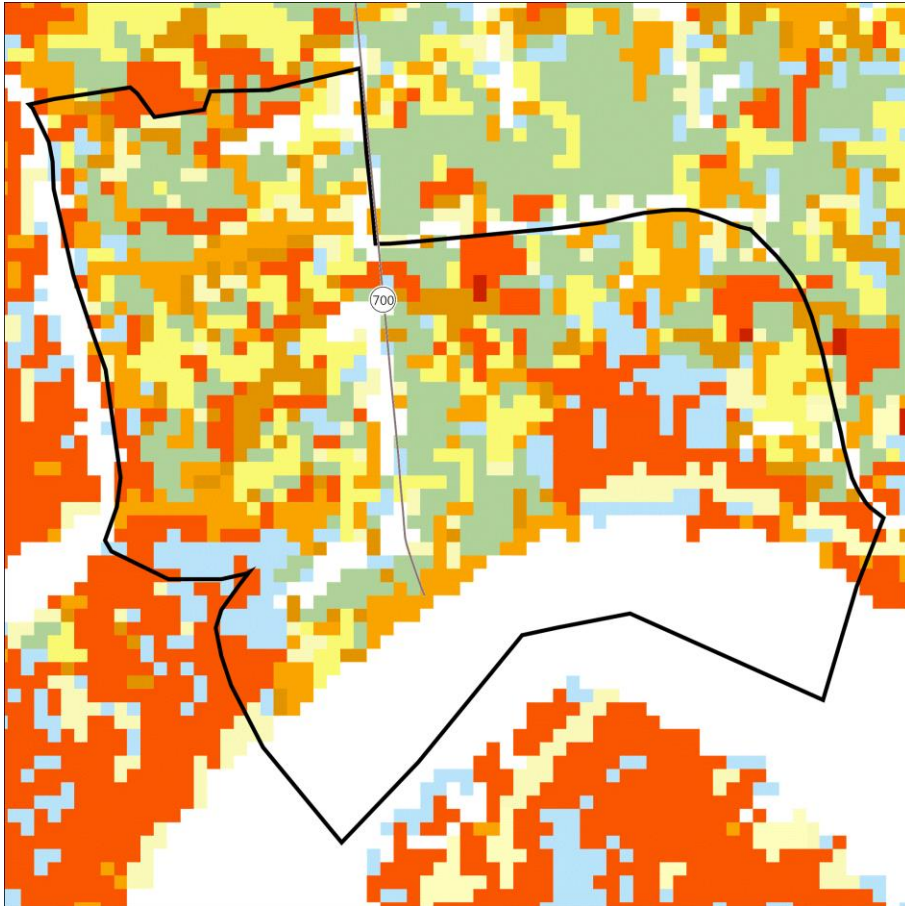
Ravenel, Charleston, SC

Fire Intensity Scale

- 1 - Lowest Intensity
- 1.5
- 2 - Low
- 2.5
- 3 - Moderate
- 3.5
- 4 - High
- 4.5
- 5 - Highest Intensity



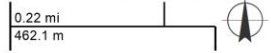
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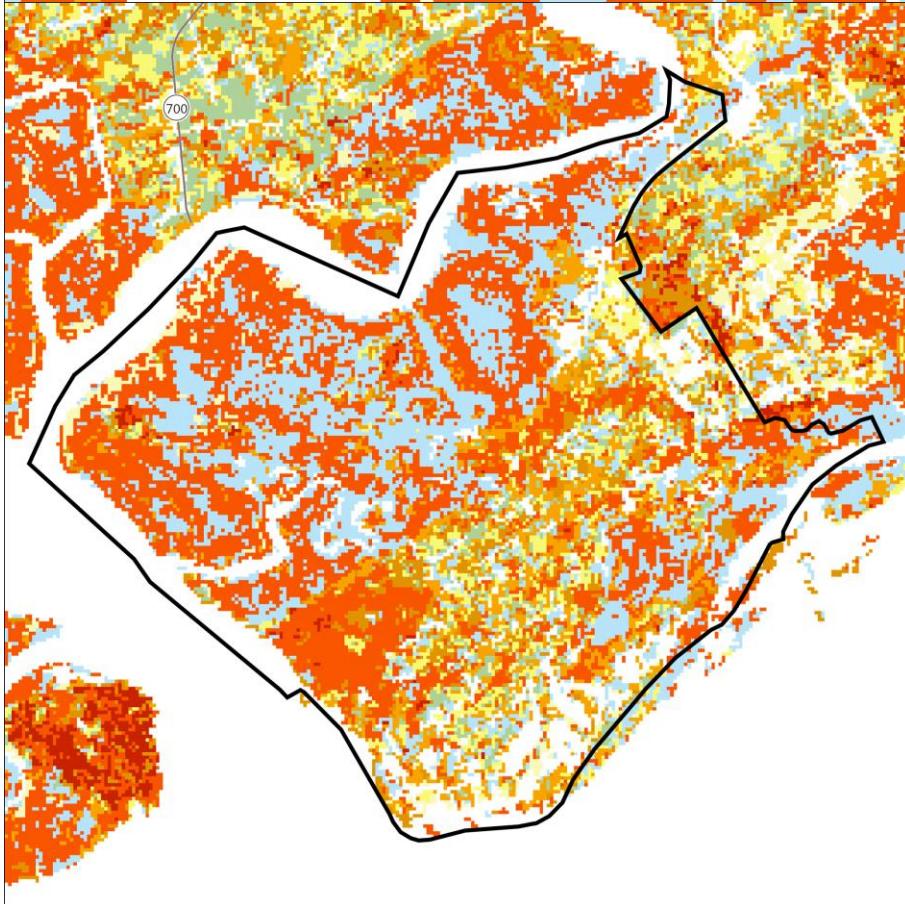
Rockville, Charleston, SC

Fire Intensity Scale

- 1 - Lowest Intensity
- 1.5
- 2 - Low
- 2.5
- 3 - Moderate
- 3.5
- 4 - High
- 4.5
- 5 - Highest Intensity



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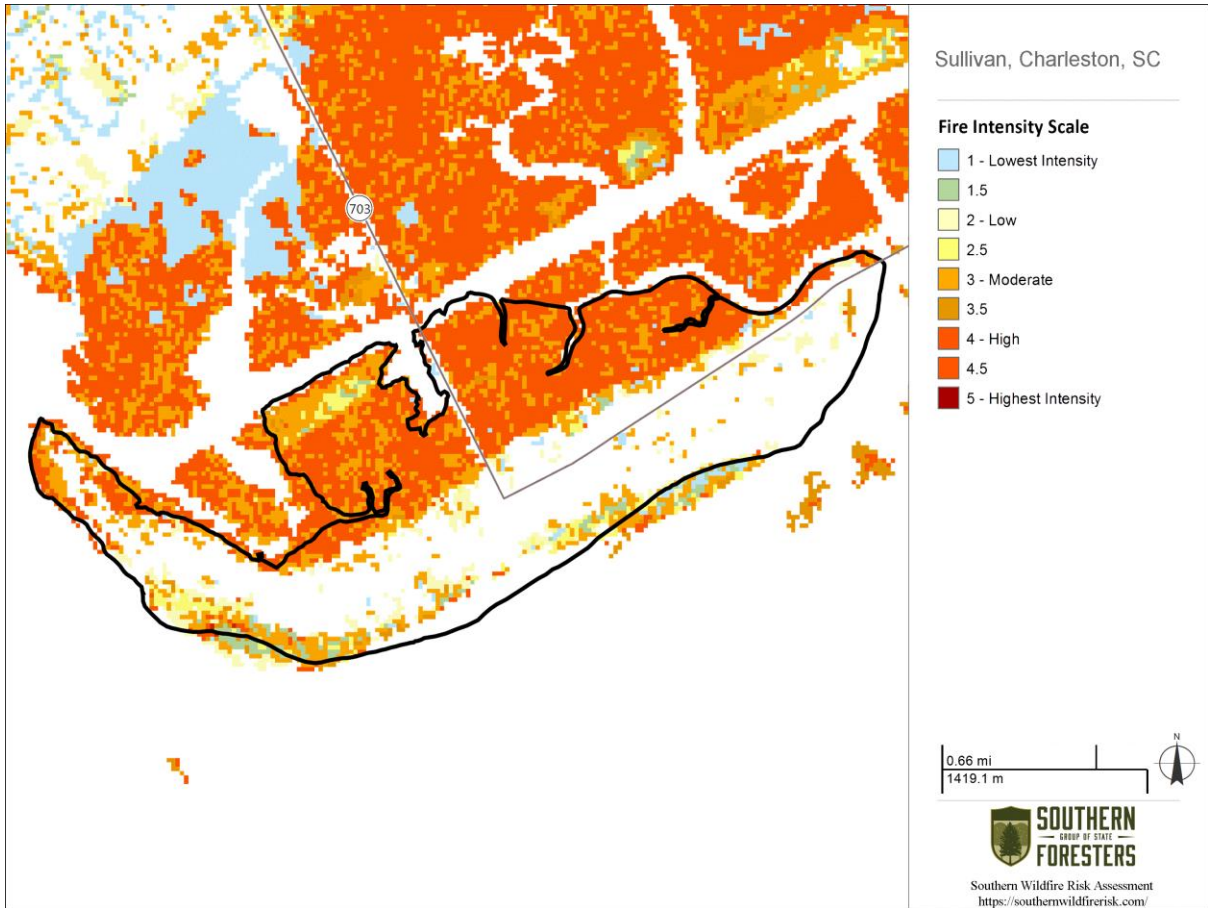
Seabrook, Charleston, SC

Fire Intensity Scale

- 1 - Lowest Intensity
- 1.5
- 2 - Low
- 2.5
- 3 - Moderate
- 3.5
- 4 - High
- 4.5
- 5 - Highest Intensity



Southern Wildfire Risk Assessment
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A.14 - Pepperhill/McChune Branch Drainage Study

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



FEMA

August 23, 2019

Ms. Elizabeth Melton
State Hazard Mitigation Officer
South Carolina Emergency Management Division
2779 Fish Hatchery Road
West Columbia, South Carolina 29172

Reference: Limited Amendment: Charleston County Multi-jurisdictional Hazard Mitigation Plan

Dear Ms. Melton:

We are pleased to have received, the Pepperhill-McChune Study, as information and a limited amendment to the Charleston County Multi-jurisdictional Hazard Mitigation Plan from your office via email on July 11, 2019.

Although the limited amendments do not require FEMA review and approval, they confirm the community's commitment to implement the Federal recommendation for the community to perform an annual review and assessment of the effectiveness of their hazard mitigation plan and ultimately to complete the required comprehensive plan update as required at least every five (5) years.

We continue to encourage each community to conduct a plan update process within one (1) year of being included in a Presidential Disaster Declaration or of the adoption of major modifications to their local Comprehensive Land Use Plan or other plans that affect hazard mitigation or land use and development. When you prepare a comprehensive plan update, it must be submitted through the State as a "comprehensive plan update" and is subject to a formal review and approval by our office at that time.

If you or the participants in the Charleston County Multi-jurisdictional Hazard Mitigation Plan have any questions or need any additional information, please do not hesitate to contact Kenya Grant, of the Hazard Mitigation Assistance Branch, at (770) 220-8893 or Marlene Dawkins, of my staff, at (770) 220-8715.

Sincerely,

A handwritten signature in cursive script that reads "Kristen M. Martinenza".

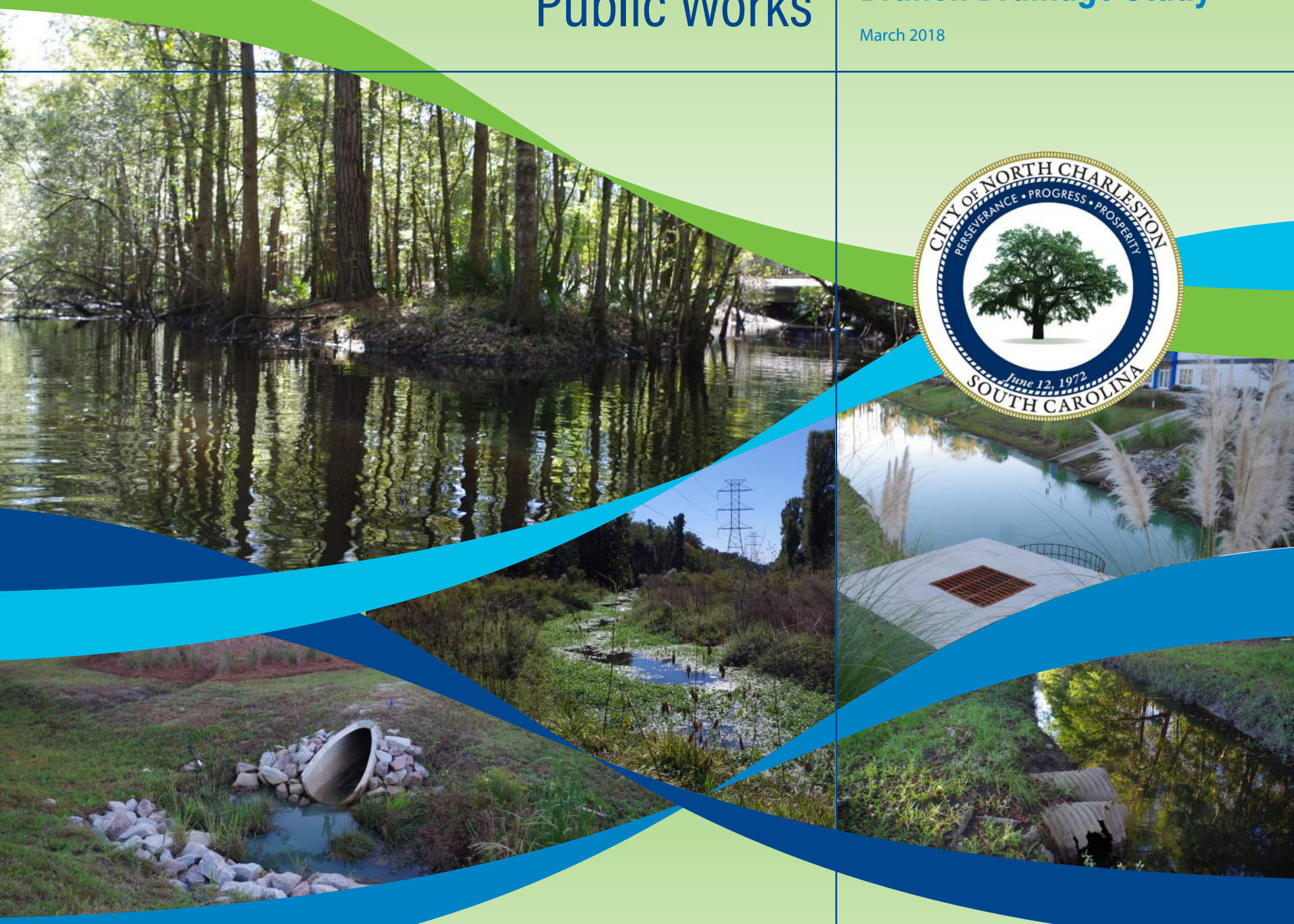
Kristen M. Martinenza, P.E., CFM
Branch Chief
Risk Analysis
FEMA Region IV

www.fema.gov

City of North Charleston Public Works

Pepperhill/McChune Branch Drainage Study

March 2018



**CDM
Smith**



5400 Glenwood Avenue Suite 400
Raleigh, North Carolina 27612
tel: 919 325-3500
fax: 919 781-5730

April 5, 2018

Mr. Mike Dalrymple
Assistant Public Works Director
North Charleston Public Works
5800 Casper Padgett Way
North Charleston, SC 29406

Subject: Pepperhill/McChune Branch Drainage Study Report

Dear Mr. Dalrymple:

CDM Smith is pleased to submit to the City of North Charleston three (3) copies of the McChune Branch Drainage Study for your review and consideration. The report is based on information gathered and provided by the City, and modeling and evaluations conducted over the last six months. The report is intended to be used as information in the management of flooding concerns in the Pepperhill area. Following our meeting with you, discussing the content of the draft report and conclusions of the study we incorporated additional information regarding the downstream Goose Creek. Following review, CDM Smith will address any comments the City may have on the report, and complete the Pepperhill/McChune Branch Drainage Study.

On behalf of the CDM Smith project team, we thank you for the opportunity to assist the City on this important project and look forward to continuing to support the City with its stormwater management needs. If you have additional questions, please do not hesitate to contact me.

Very truly yours,

A handwritten signature in blue ink, appearing to read 'Robert Hopper'.

Robert Hopper, PE
Project Engineer
CDM Smith Inc.

CC.
Jim Hutto, Public Works Director, City of North Charleston
Brian Cully, CDM Smith



City of North Charleston

Pepperhill/McChune Branch Drainage Study

CDM Smith Project No. 221909

April 2018



A handwritten signature in blue ink, appearing to read "Seungho Song", written over the bottom portion of the professional seal.

Seungho Song, P.E.
South Carolina P.E. No. 19544

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Executive Summary

McChune Branch Drainage Study

Purpose

The City of North Charleston commissioned CDM Smith to conduct a drainage study for McChune Branch and Popperdam Creek around the Pepperhill subdivision. This area has experienced repeated flooding associated with a series of large rainfall events over the last three years. The flooding has been attributed by some to recent urban development in the area and drainage conditions have come under scrutiny. This study investigates and utilizes watershed modeling to quantify and evaluate flooding and drainage conditions and potential improvements to alleviate recurring flooding. The issues of how much water is entering the area, how fast is it flowing out, and which of the factors contributing to flooding can be improved upon to alleviate structural flooding are explored in depth.

The purpose of this study is to identify causal factors and provide recommendations for structural and nonstructural improvements that may be implemented in the watershed to address existing drainage and flooding issues. The study includes the following major items:

- Collection of Watershed Data and Physical Characteristics
- Development of Models to Evaluate Existing and Future Flooding Conditions
- Evaluation of Stormwater and Floodplain Management Alternatives
- Recommended Improvements

Watershed Description

The McChune Branch watershed drains approximately 17.3 square miles at the crossing of I-26. The coastal, non-tidal drainage area flows north through the extensive wetlands of Bluehouse Swamp before joining with Goose Creek in flowing into the Goose Creek Reservoir. Drainage

from the Pepperhill focus area also flows into Popperdam Creek to the south which is a well-defined and maintained urban stream conveyance channel discharging to the Ashley River.

This study focused on the flooding and drainage conditions in and around the Pepperhill subdivision,

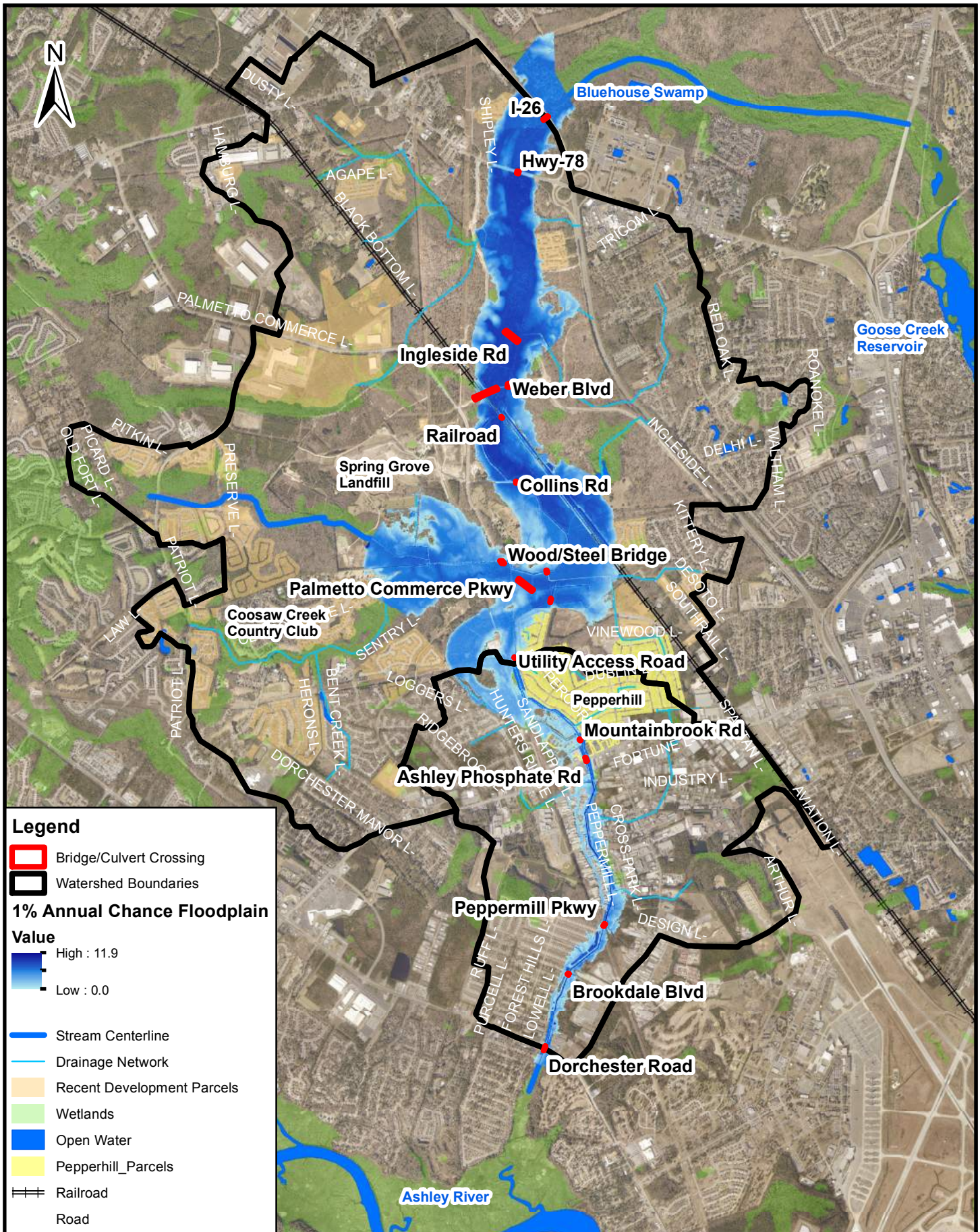
particularly the north end of Peppercorn Lane. This

subdivision is located within the City of N. Charleston boundaries in Charleston County. **Figure ES-1** shows a map of the McChune Branch and Popperdam Creek watersheds.

Currently, the McChune Branch watershed is partially developed, with most of the developed land occupied by single family residential uses. A majority of commercial and office/institutional uses are concentrated south of Ashley Phosphate Road in the Popperdam Creek watershed. Development in the watersheds is expected to consist of additional residential and commercial land uses and proceed to buildout with only wetland areas and a protected riparian buffer to remain undeveloped.



McChune Branch and Popperdam Creek Watersheds Map



Model Analysis Methodology

To evaluate watershed flooding condition this study included two engineering analysis: a hydrologic model to predict the quantity of stormwater runoff, and a hydraulic model to predict resulting water surface elevations. Each analysis included the development of three basic modeling scenarios: pre-development, existing, and build-out land use conditions. These three land use scenarios were derived from GIS and zoning information and were confirmed through correspondence with City of N. Charleston staff. The existing land use scenario represents land use as of 2015 while the pre-development scenario represents conditions prior to 2000 before Palmetto Commerce Parkway was built. The future land use scenario represents potential build-out under current zoning and is not associated with a specific point in time. The future condition includes development of all areas throughout the headwaters and along McChune Branch outside of the wetlands and protected buffer.

For each of these analyses, six rainfall events of various return periods, were modeled ranging from smaller, more frequent storms such as a 2-year design storm up to larger, less frequent storms such as the 500-year design storm. The rainfall events used in this evaluation become more severe as the recurrence interval increases. As such, roads or structures expected to flood in a more frequent storm event (such as a 10-year event) will also be expected to flood in the less frequent event (such as a 25-year event).



Pepperhill Flooding October 2015
Source - Google Earth Pro

The crossings downstream of McChune Branch at the headwaters of the Goose Creek Reservoir were shown to significantly affect flood stages in McChune Branch. A discrepancy was identified between the McChune Branch Flood Insurance Rate Map (FIRM) and the Goose Creek (FIRM). The McChune Branch map shows the base flood elevation (BFE) at Hwy 78 at 9 feet, but further downstream where McChune Branch joins with Goose Creek, the BFE is 13 feet. Revisions to the Preliminary model are recommended before the updated mapping is issued as Effective.

To gauge the magnitude of rain event capable of producing flooding and to validate the hydrologic and hydraulic models, hourly rainfall data from the 2015 historic rain event and Hurricane Mathew in 2016 was used in a model run. The modeled flood stages for the 2015 and 2016 storms correspond closely with the 100-year return interval and the 50-year, respectively, as do the rainfall depths for the events.

Flooding and Improvement Evaluations

Rainfall data from the historic period of record dating back to the 1800's indicates that the flood events in 2015 and 2016 were associated with recurrence intervals of approximately 950 years and 130 years, respectively. Events similar in magnitude to the 2016 storm were recorded in 1973 and 1998. The Pepperhill residential subdivision was built prior to 1990 and several dwellings were built within the current FEMA 100-yr regulatory floodplain.

Watershed conditions and modeling results were evaluated to identify the extent of flooding, number of dwellings affected, and the available capacity to drain the Pepperhill area through existing channels, floodplains, and crossings.

Factors contributing to flooding were evaluated to identify areas for drainage infrastructure improvements. Contributing factors include watershed runoff from pervious and impervious areas, capacity of drainage and flood conveyances, crossings obstructing flows, and downstream conditions. Developed areas contribute more runoff than undeveloped lands due to impervious surfaces and drainage networks.

Factors such as cost, wetland impacts, public acceptance, and feasibility were considered for the identification of contributing factors to which potential improvement alternatives could be effectively implemented. Multiple alternatives were evaluated to identify a cost-effective solution with feasible options compared through planning level Opinions of Probable Construction Cost.

Watershed scale measures, conveyance improvements, and protection and mitigation alternatives evaluated include:

- Crossing Improvements
- Conveyance Expansion
- Regional Detention
- Interbasin Transfer
- Green Infrastructure
- Levee
- Raising and Structural Protections

- Property Buy-out

The following sections summarize the evaluation of drainage and flood related issues.

Drainage-Related Findings

Results of the hydrologic and hydraulic modeling indicate that conditions of the base flow channels and local drainage networks do not contribute significantly to flood conveyance during large rain events. During large storms, the channels and drainage ditches quickly become submerged and the

floodplains become the active conveyance pathways and storages. Maintenance of channel and ditch capacity is important for drainage, but plays a minor role in flood conveyance compared with the broader floodplains.

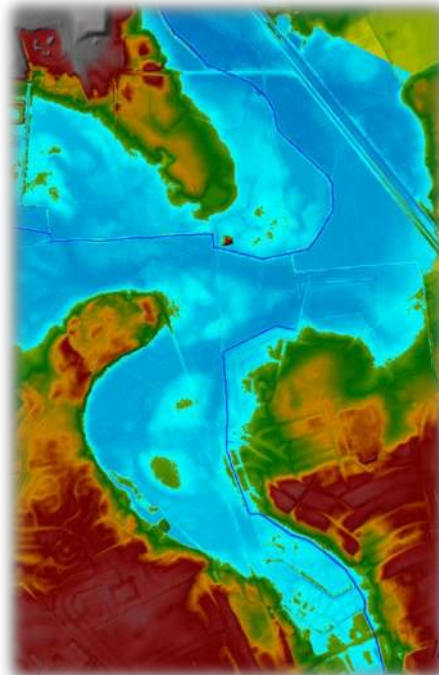
Flood-Related Findings

Flooding of structures along Peppercorn Lane is predicted for flood events as frequent as the 10-year return interval. Flooding for the 100-yr storm is expected to flood approximately 32 dwellings in the Pepperhill neighborhood. Flooding is expected to continue to occur

in this watershed based on the historic rainfall record and recurrence probabilities.

Opportunities for infrastructure improvements to increase flood conveyance and reduce flood stages are limited in the watershed. Multiple crossings contribute to relatively small incremental rises for the larger magnitude floods.

Results of the hydrologic and hydraulic modeling predicted incremental backups at several road crossings with minimal impacts to flood stages in the Pepperhill area. The



results also indicated expected increases in structural flooding under future conditions. Increases in flood stage for the 100-year event were modeled up to 1.1 foot at Pepperhill for projected watershed build-out.

Multiple stream crossings identified with significant backups, more than one foot, were evaluated for potential improvements to reduce upstream flooding including Collins Road, the railroad bridge, Peppermill Parkway, and the crossings on Goose Creek. The Collins Road and Highway 78 crossings are expected to be submerged during the 50-yr recurrence interval event and therefore do not contribute to increased flood stages for the 100-yr event at Pepperhill.

Improvements at none of the crossings were found to provide substantial reductions to the 100-year flood stage. Incremental improvements at multiple crossings have the potential to cumulatively reduce flood stages up to approximately half a foot for the 100-yr design storm. However, each of these roadway improvements carry replacement costs on the order of 1-2 Million dollars each.

Recommended Measures

The recommended stormwater management measures to improve existing and predicted future flooding and drainage conditions for McChune Branch are limited by the watershed characteristics. Infrastructure improvements identified would need to be implemented together to have a significant impact on flooding reduction in the Pepperhill Area. These measures would not be enough to protect the area from flooding in the future. Therefore, the most cost-effective approach to avoid the hazards associated with recurrent flooding in the Pepperhill Area is to purchase the most affected properties and convert the area to a neighborhood park.

Additionally, it is recommended the City continue to perform routine maintenance and protect the floodplain from future development. The City-owned portions of the conveyance system should be cleared and dredged to maintain hydraulic efficiencies assumed in the model and the privately-owned segments of McChune Branch monitored for future significant accumulations of wood and debris.

To mitigate effects of future development, restrictions on impervious areas or runoff control measures are recommended. Predevelopment versus post-development flow matching for the 100-year design return interval would be required to keep additional runoff from increasing flood stages. Protection of the 100-year floodplain limits from development will also contribute to maintaining the available flood storage area and conveyance capacity.

Section 1

Introduction

1.1 Purpose of Study

The development of the McChune Branch Drainage Study (the Drainage Study) has been conducted as part of the City of North Charleston's efforts to address flooding issues in the Pepperhill subdivision. The goal of the Drainage Study is to identify and evaluate existing conditions and impacts of recent development and propose drainage improvements. Hydrologic and Hydraulic models provide tools to quantify flooding and evaluate recommendations for structural and nonstructural improvements that may be implemented in the watershed to reduce existing and projected future stormwater problems related to flooding and drainage in the study area.

1.2 Description of Study Area

The northwestern portion of the Pepperhill subdivision in North Charleston, South Carolina, is located at the drainage divide between McChune Branch and Popperdam Creek as shown in **Figure 1-1**. The study focus area is a limited section of the Pepperhill subdivision, in the northwest end along Peppercorn Lane, which has experienced repeated flooding in the last three years. Numerous homes in this area are in the FEMA mapped 100-yr annual chance flood zone associated with McChune Branch. Since the focus area flooding is associated with watershed scale rainfall runoff events, the study area watersheds include the McChune Branch and Popperdam Creek watersheds.



Figure 1-1. Map of Historic Inland Rice Fields at Pepperhill

The Pepperhill residential subdivision was built well before 1990 off Ashley Phosphate Road and covers an area of about 270 acres. Drainage in the subdivision itself is split with all east side draining towards the east and then south to Popperdam Creek. Drainage on the west side collects in a ditch along Peppercorn Lane connecting McChune Branch and Popperdam Creek.

Much of the watershed is covered by wetlands, as defined by the National Wetland Inventory, and shown in **Figure 1-2**. In fact, the undeveloped areas surrounding the focus area were cultivated as inland rice fields during the 1800's, according to historic markers and signage along Palmetto Commerce Parkway. Waterway bottom elevations in the area are approximately 7 feet above sea level (referenced to NAVD88). Structural flooding occurs at an elevation of 12.25 ft. The FEMA 100-year regulatory floodplain encompasses most of the wetlands and several homes in Pepperhill are in the mapped 100-yr flood zone.

Development of the McChune Branch watershed continues to progress from abandoned agriculture to urban City with residential subdivisions continuing to envelope the watershed and the commercial corridor along Palmetto Commerce Parkway and Ingleside Road central to watershed. Recently, three roadway crossing have been built across the McChune Branch floodplain: Palmetto Commerce Parkway; Weber Boulevard; and Ingleside Road. Each cross over the floodplains with at least one bridge and two of the crossings also have a culvert. As part of the construction of these roadways, fill was placed in the floodplain of McChune Branch which has the potential to inhibit flood flows during large magnitude rainfall runoff events.



Figure 1-2. Study Area Watersheds in North Charleston

Flooding has occurred in Pepperhill three times in the last three years, each time in October and September. While residents in the past have indicated previous flooding, no details of flooding are known before 2015. Since recent flooding followed building of the three connector roadways in the watershed, the impacts of each of these roads on flood stages is evaluated herein.

The Popperdam Creek watershed is currently more densely developed than McChune Branch with commercial and high density residential land uses. The riparian corridor along Popperdam Creek is narrow compared with McChune Branch with a defined trapezoidal natural channel. Known flooding issues associated with the 2015 historical event along Popperdam Creek are limited to the Ashley Townhomes and downstream near the confluence with the Ashley River.

1.3 Scope of Study

CDM Smith worked with the City of North Charleston (City) Department of Public Works to develop the objectives of the study, which include the following:

- Identify and assess existing flooding and drainage problems
- Prioritize existing problems and provide recommended improvements
- Evaluate and determine effects of recent developments on drainage and flooding along Peppercorn Lane

- Evaluate and determine effects of local drainage from the Pepperhill subdivision and surrounding areas on flooding issues along Peppercorn Lane.

The report will include the identification and summary of stormwater drainage issues presently existing in the watershed. Based on the alternatives evaluation performed in Task 5, CDM Smith will compile a list of drainage improvement and/or maintenance projects that may be implemented to resolve or alleviate the identified drainage issues.

The spatial scope of study, includes the main stream channels or Primary Stormwater Management System (PSMS) segments of McChune Branch (MB) and Popperdam Creek (PC), and the Secondary Stormwater Management System (SSMS) in and around the Pepperhill focus area. The study segment of McChune Branch extends from near Coosaw Creek Country Club to Bluehouse Swamp, where MB crosses Interstate 26, as shown on **Figure 1-3**. The entire length of Popperdam Creek is studied from Peppercorn Lane to its discharge at the Ashley River.

The local drainage system, or Secondary Stormwater Management System, serving the Pepperhill area is also studied to assess any impacts of localized runoff on flooding issues.

The area to be included in this analysis will be referred to henceforth as the “Study Area.”

The following is a brief description of the services provided to achieve the objectives listed above.

1.3.1 Data Collection and Evaluation

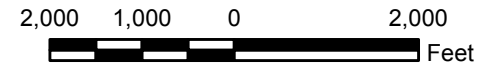
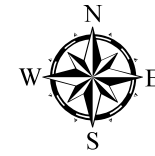
The CDM Smith team collected and reviewed available and provided information pertaining to drainage in the Study Area, including recent flooding data, as-built plans, topographic maps, planimetric maps, soil maps, and aerial photographs, a majority of which was available in GIS format. The CDM Smith team coordinated with City staff to collect flooding information from the Study Area. Based on a review of the data collected, the CDM Smith team performed a watershed characterization to provide a baseline, context, and focus for the analysis and evaluation in subsequent tasks. A discussion of the watershed characterization is provided in Section 2.

Field survey and reconnaissance were conducted to assess watershed conditions and develop an inventory of drainage conditions and roadway crossings along the streams. The CDM Smith team conducted field surveys to collect channel cross sections and modeling-related information at bridges and major culvert crossings. Photographs were taken at all crossings to document conditions and provide input for development of modeling parameters. A detailed discussion of the information collected in this Phase is provided in Section 2.







1.3.2 Hydrologic and Hydraulic Modeling

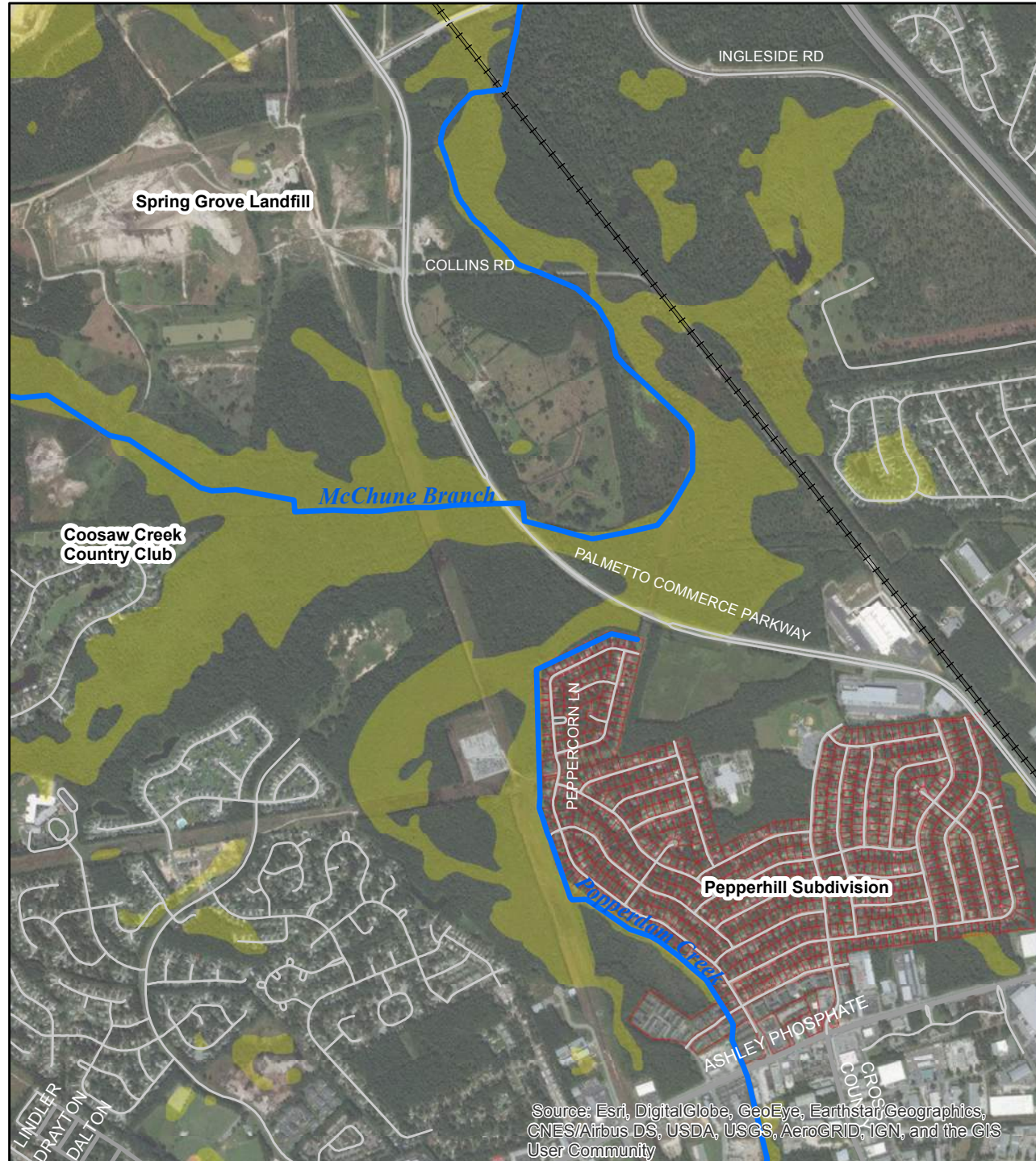
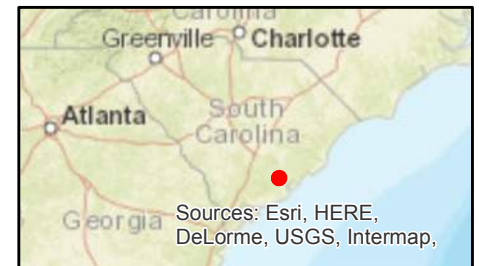
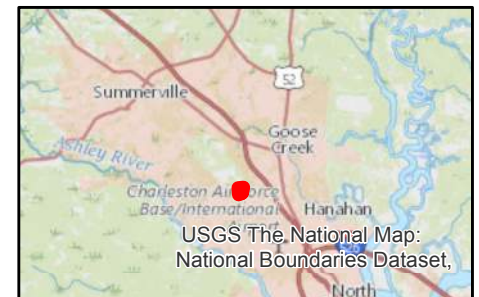
The CDM Smith team developed a hydrologic model of the MB and PC watershed using the U.S. Army Corps of Engineers’ (USACE), Hydrologic Engineering Center, Hydrologic Modeling System (HEC-HMS, Version 4.2.1). The portion of the MB and PC watershed outside the Study Area, north of the City’s municipal limits, was included because it was necessary to consider the full tributary flow when conducting the hydraulic model analysis within the Study Area. The modeling effort

McChune Branch Drainage Study Figure 1-3 Study Area



Legend

-  Primary Stream
-  Roads
-  Railroad
-  Highway
-  Wetlands
-  Pepperhill Parcels



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

included delineating subbasins and assigning parameters to calculate runoff hydrographs for the suite of design rainfall events. A detailed discussion of the model parameter development and model execution is provided in Section 3.

The CDM Smith team developed a hydraulic model of the Study Area using the USACE, HEC, River Analysis System (HEC-RAS, Version 4.1). Cross section data along the modeled streams were developed using the field data collected in the previous tasks and existing Light Detection and Ranging (LiDAR) topographic data. The resulting model was used to evaluate the performance of the primary stormwater management system (PSMS) within the City limits for existing and future land use scenarios. A detailed discussion of the model parameter development and model execution is provided in Section 3.

1.3.3 Stormwater Management Evaluations

Based on the results of the hydrologic and hydraulic model analyses, the CDM Smith team delineated the floodplains for the design rainfall events, which will be used as part of the Phase V submittal. A detailed discussion of the floodplain mapping is provided in Section 4.

In addition, the model results were used in conjunction with the field data collected to identify problem areas related to structural flooding, streambank erosion, road overtoppings, and drainage maintenance issues. Existing infrastructure and flooding issues were identified from the field reconnaissance, public input, and survey photographs, while additional potential problem areas were identified through the modeling. Level of service (LOS) definitions were developed from applicable structural flooding and roadway overtopping regulations and applied to the modeled flood stages to determine potential problem areas under existing and future land use conditions for the range of design rainfall events. Crossings not conveying their design storm without overtopping and structures with finished floor elevations below the modeled 100-year flood elevations are identified as not meeting their LOS. A detailed discussion of the problems assessment is provided in Section 6.

1.3.4 Improvements Evaluations

For the problem areas identified in Task 3.2, CDM Smith performed an evaluation of improvement alternatives to reduce flooding impacts to roads and/or structures for the PSMS and localized drainage at Peppercorn Lane. The evaluation will include, but not be limited to:

- Create larger openings at culverts and bridges to minimize backwater effects
- Increase the capacity of the primary or secondary drainage system
- Provide individual or collective property protection measures
- Transfer floodwater to an adjacent watershed
- Reduce runoff in the watershed with green infrastructure retrofits
- Detention of runoff within the watershed

The target for each improvement alternative will be to achieve the selected LOS for roadway and structural flooding. Modeling of alternatives will provide a measure of flooding reduction achieved for each. CDM Smith will develop up to four conceptual improvement alternatives with

potential to reduce flood risk at Peppercorn Lane. In addition, CDM Smith will develop a conceptual opinion of probable cost for each. A more detailed description of this task is provided below. A cost comparison amongst the alternatives will provide a basis for ranking the alternatives.

CDM Smith will develop conceptual opinions of probable cost for each recommended improvement project. This will include typical costs for construction materials and labor and assumptions for engineering, design, permitting, construction, and contingency funds.

1.3.5 Recommendations

CDM Smith provides recommendations for improvements to implement in the primary and secondary drainage systems to reduce the frequency and magnitude of flooding in the Pepperhill area. Several properties in the Pepperhill area are in the FEMA 1% annual chance floodplain (100-year) and can be expected to flood in the future during large magnitude rainfall runoff events. Measures to mitigate the hazards associated with recurrent flooding are recommended.

Section 2

Drainage Basin Characteristics

2.1 Introduction

The purpose of this section is to describe the drainage basin characteristics based on the data collection and evaluation conducted in support of the drainage study. The following is a description of the data and methods of collection, including: GIS, drainage ditch field reconnaissance; field survey; rainfall data; FEMA studies; As-Builts; and identification of known flooding conditions. The initial data collection effort included the identification and collection of existing information readily available to the City and through local, state, and federal resources pertinent to the project. Additional information including stream and riparian conditions, photographs, elevations, and dimensions were obtained through field reconnaissance and survey. Various sources of elevation data reference the North American Vertical Datum of 1988 (NAVD88), unless otherwise specified with appropriate conversion applied.

2.2 Available Data

Many sources of data are readily available via desktop methods on state and federal government websites. A tabulated summary of the available data collected indicating type of data, data source, and the date collected are presented in **Tables 2-1 and 2-2**. The following describes the sources of data referenced for this study. Additionally, data available to local municipal authorities was collected by the City of N. Charleston. This data included zoning and roadway crossing as-built information.

2.2.1 GIS

LiDAR and other GIS from SC DENR and other sources were collected as available to support the modeling and evaluations.

Orthophotography from 2015 was used to confirm flow paths, land use, and other watershed conditions. Aerials from previous years were used to establish land use and development areas since 1990.

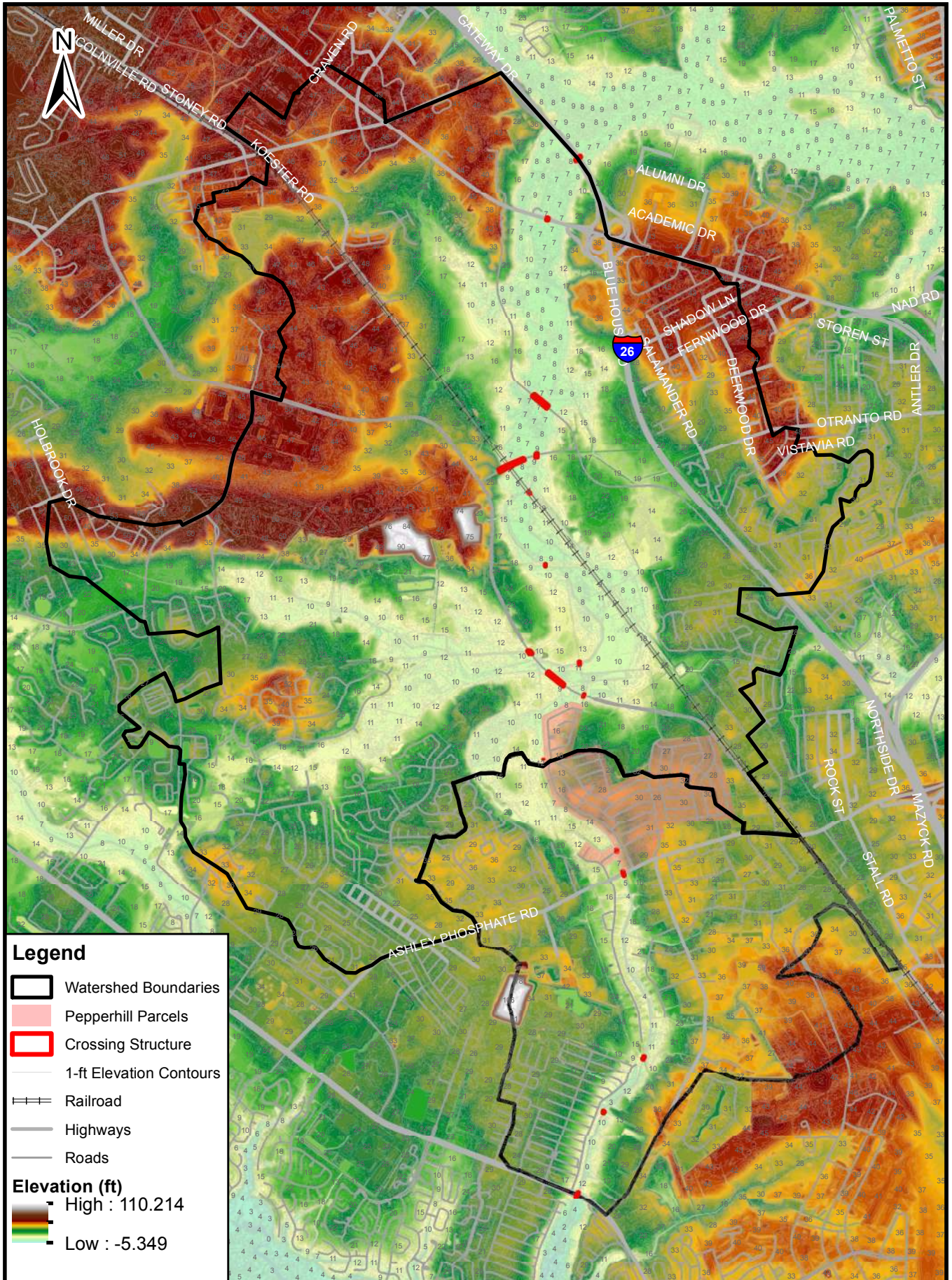
Parcels and zoning GIS data were provided by the City to support land use evaluation and parameterization for the H&H modeling. Since the parcel data did not provide attributed existing land use data, the 2011 National Land Cover Dataset (NLCD) was used to establish a GIS land use coverage applicable for modeling. The NLCD provides a GIS coverage spanning the nation which categorizes land uses based on available spatial data sets such as aerials. This data set assigns each pixel in a raster file a relative density of development or type of undeveloped land use suitable for translation to model parameters. Hydrography including streamlines were used to define the hydrologic network and delineate drainage areas. Wetlands which act as impervious areas are prevalent in the bottomlands along McChune Branch where their widths exceeding 2,000 feet at some points as mapped by the National Wetlands Inventory.

Table 2-1. Summary of GIS Data Collected

Category	Type	Date	Source	Resource Filename or Link
GIS	2 ft Topographic Contours 2009	2009	SC DNR	http://www.dnr.sc.gov/GIS/lidarstatus.html
GIS	2015 Aerial Photography	2015	City GIS	https://ccgisapps.charlestoncounty.org:6443/arcgis/rest/services/IMAGERY/COLOR_2015/ImageServer
GIS	Parcels	2017	City GIS	Kat Brenkert - Parcel_092517.shp
GIS	1992, 1992, 2006 Aerials		SC DNR	http://www.dnr.sc.gov/pls/gisdata/quad.doq?ptilename=LADSO&pcounty=charleston
GIS	National Land Cover Data 2011	2011	NLCD	https://catalog.data.gov/dataset/nlcd-2011-land-cover-2011-edition-amended-2014-by-state-nlcd2011-lc-south-carolina
GIS	FEMA Flood Hazard Areas	2016	NFHL	https://msc.fema.gov/portal FIRMDB_09092016_45019C_PRELIMDB
GIS	Zoning	2017	City GIS	Kat Brenkert - Zoning_092517.shp
GIS	Hydrology (NHD streamlines)		NHD Website	https://services.nationalmap.gov/arcgis/rest/services/nhd/MapServer
GIS	NRCS Soils Survey Coverage		USDA Website	https://datagateway.nrcs.usda.gov/
GIS	Wetlands		NWI Website	https://www.fws.gov/wetlands/Data/State-Downloads.html

Table 2-2. Summary of Data Collected

Category	Type	Source
Rainfall Data	Hourly data 1954-2013: NOAA Climate Data Online	www.ncdc.noaa.gov/cdo-web (station COOP 381544)
	Hourly data 2014-2017: NOAA Quality Controlled Local Climatological Data	www.ncdc.noaa.gov/orders/qclcd (station WBAN 13880)
	Daily data: NOAA Global Historical Climatologic Network data	ftp.ncdc.noaa.gov/pub/data/ghcn/daily/all/USW00013880.dly (Airport station WBAN 13880; 1938-2017) ftp.ncdc.noaa.gov/pub/data/ghcn/daily/all/USW00013782.dly (Downtown station WBAN 13782; 1893-2017)
Rainfall Recurrence Intervals	NOAA Atlas 14 Volume 2, Version 3 Precipitation Intensity-Duration-Frequency	https://hdsc.nws.noaa.gov/hdsc/pfds/
FEMA	FIRM	Preliminary FIRM, September 2016 - 45019C0280K
	FIS	Charleston County Flood Insurance Study Effective, November 2004: https://map1.msc.fema.gov/data/45/S/PDF/45019CV000A.pdf?LOC=cb139944251daa9d880899bb4581afdf
		Charleston County Flood Insurance Study Preliminary, September 2016
	LOMR	08-04-2279P-450042 Map Revision, September 3, 2009



2.2.1.1 Topography

The LiDAR data available through SC DENR is of high resolution and high quality. The data was collected in 2009 with 18.5 cm vertical RMSE to support 2-foot contours and accuracy tested at 95 percent confidence level. This data corresponds very well with observed elevations, particularly related to the areas of known flooding. The level of detail of the flat topography is also very high, as this data shows relatively small ditches, on the order of 3-5 feet in width and 1-2 feet in depth. Based on review of the watershed topographic data as illustrated in **Figure 2-1**, the following observations were gleaned:

1. McChune Branch ceases to be a defined channel downstream of Weber Boulevard where the stream is spread through extensive wetlands down to the headwaters of Goose Creek Reservoir.
2. Topography associated with the ditch along Peppercorn Lane is so flat that drainage above elevation 10 feet could travel to the north towards PC Parkway or south to Popperdam Creek. The drainage divide is not clearly defined in this area and is subject to the influence of low profile features such as roadways and ditches for base drainage and downstream capacities for floods.
3. A series of small ditches north of Peppercorn Lane serve to drain the area towards McChune Branch.

2.2.1.2 Soils

The NRCS Soils survey data available as a GIS coverage indicates that more than 2/3 of the soils in the McChune Branch and Popperdam Creek Watersheds have relatively slow infiltration rates, at least when they become saturated. Since soils can be saturated prior to a large rain event or quickly become saturated where not well drained, this means most of the watershed soils do not naturally infiltrate much rainwater and most of the rainfall becomes runoff. The hydrologic soils group data is factored into the hydrologic modeling described in Section 3.

Table 2-3. Soil Survey Hydrologic Soil Groups

Hydrologic Soils Group	Acres	Percentage
A	926	9%
A/D	2,599	26%
B	990	10%
B/D	858	8%
C	1,080	11%
C/D	3,091	30%
D	604	6%
W	17	0%
Total	10,165	100%

2.2.2 Rainfall

Rainfall data were collected and analyzed for the available period of record. The nearest rain gauge is within a few miles of the study area at the Charleston International Airport. The Charleston Airport hourly data ranges from 1954-present and hourly data for Charleston City from 1948-2004. **Table 2-4**, below lists the five largest storms on record at 1- and 4-day durations. The October 2015 event exceeds all recorded totals since the start of recordkeeping at the airport in 1938 and in downtown Charleston since 1893 for these durations. The estimated 4-day average recurrence interval (ARI) for the October 2015 storm is nearly 1000 years according to NOAA Atlas 14 Volume 2 (2006). However, the atlas is only based on data from 1930 through 2000, and four of the eight largest one-day totals observed at the airport have occurred since 2000. CDM Smith estimates the 4-day ARI to be 100 years based on analysis of the complete data set.

The 1% Annual Chance (100-year) rainfall depth according to Atlas 14 is 10.1 inches in 24-hours and 13.1 for the 0.2% Annual Chance event (500-yr return interval).

Table 2-4. Rainfall Statistics for Largest Magnitude Events in Period of Record

Date	Depth (inches)		ARI (years) ¹		Atlas 14 ARI (years)	
	24 hours	4 days	24 hours	4 days	24 hours	4 days
June 10, 1973	10.10	17.07	40	100	100	860
September 4, 1987	7.61	11.11	10	30	20	50
September 21, 1998	10.52	11.48	50	30	130	60
October 1, 2015	11.85	17.29	80	110	270	950
October 7, 2016	10.47	10.48	50	20	130	40

1. Analysis using CDM Smith NetSTORM software (www.dynsystem.com/netstorm ; [https://doi.org/10.1061/40737\(2004\)395](https://doi.org/10.1061/40737(2004)395))

Additionally, the 8/30/15 storm, which was more extreme than the 2015/2016 October storms on a 1- to 6-hour basis did not cause significant flooding. This indicates that events with greater rainfall intensities for shorter periods of time do not necessarily cause flooding due to the watershed capacity for attenuation in the extensive floodplain wetlands.

The graph below in **Figure 2-2** shows the annual series of maximum daily precipitation for the city gage, as well as maximum daily (since 1938) and 24-hour (since 1954) precipitation for the airport. The data exhibit no obvious trends in extreme precipitation.

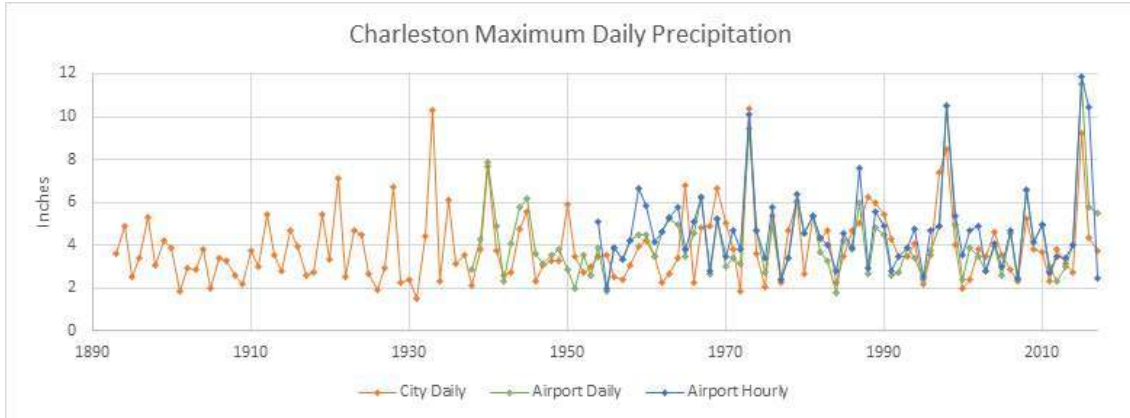


Figure 2-2. Graph of Maximum Daily Precipitation

2.2.3 FEMA

2.2.3.1 FEMA Flood Insurance Rate Maps (FIRMS)

McChune Branch in Charleston County is partially a Detailed Study and partially a Limited Detailed Study which means that certain lengths were developed with detailed information including crossing information and others were based on more limited information. A Preliminary update to the Effective FIRM was released in September of 2016. The Preliminary Flood Insurance Study (FIS) builds on the previous mapping. Flows in the Flood Insurance Study (FIS) were derived by regression equations. The model provided by DNR as the Preliminary Model does not include detailed information for any crossings. A LOMR was issued in 2009 and the mapping was apparently upgraded from Zone A to Zone AE at this time with the mapping from the LOMR incorporated into the Preliminary mapping.

The mapped FEMA 1% annual chance floodplain includes 17 dwellings in the Pepperhill area within the floodplain. Based on the reported extents and depths of flooding for the 2015 and 2016 events, and the LiDAR topography, the FEMA base flood elevation and mapped floodplain does not appear to be entirely accurate in this area.

2.2.3.2 FEMA Flood Insurance Study (FIS)

The Preliminary Flood Insurance Study (FIS) builds on the previous mapping with amendments from a LOMR and updated information as listed in **Table 2-5**. Flows in the Flood Insurance Study (FIS) were derived by regression equations.

Table 2-5. Flood Insurance Rate Maps for McChune Branch

Firm	Status	Date Year	Zone	Status
45019C0280J	Effective	Nov 17, 2004	A	
45019C0280J	LOMR	Sept 3, 2009	AE	Revised
45019C0280K	Preliminary	Sept 9, 2016	AE	Map Revised

2.2.3.3 Downstream Boundary Conditions

Pepperhill is located at the drainage divide between McChune Branch and Popperdam Creek with one flowing north towards the Cooper River and the other south to the Ashley River, respectively.

Downstream of McChune Branch and Bluehouse Swamp is Goose Creek Reservoir. This reservoir is controlled by a spillway before the Cooper River at approximate crest elevation of 7 feet. The spillway is inundated during the 100-yr flood according to the FEMA FIRM (45015C0695E, 2016). The FEMA base flood stage associated with the Goose Creek Reservoir backwater is at an elevation of 10 ft for the 100-yr and does not show the 500-yr flooding recurrence interval. Upstream of Goose Ck Reservoir, the FIRM (45015C0685E, 2016) indicates a base flood of 13ft near Camelot Drive. This does not correspond with the lower BFEs (9 ft) on McChune Branch further upstream at the Hwy 78 crossing (45019C0280K, 2016).

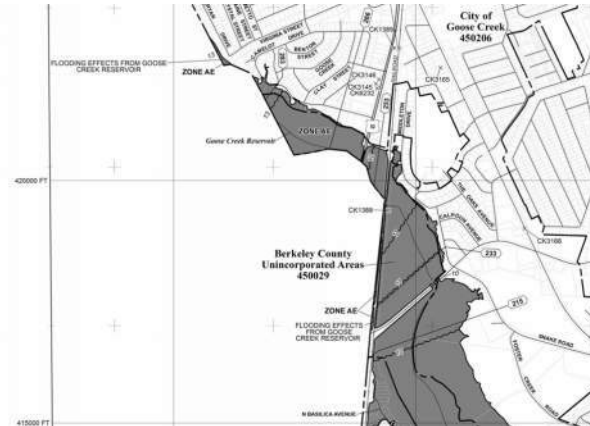


Figure 2-3. Portion of FEMA FIRM at Goose Creek

Downstream of Popperdam Creek, below Dorchester Road is the tidal Ashley River. Normal water surface elevation at the Ashley River is 0 ft as shown in the DTM (shown in Figure 2-1). The FEMA base flood stage associated with the Ashley River is at elevation 9 ft for the 1% Annual Chance flooding recurrence interval (FIRM 45019C0289K, 2016, Zone AE).

2.2.4 Known Flooding Conditions

Three major flooding events have occurred in the McChune Branch watershed in the last three years. Residents on Peppercorn Lane reported flooding for events in October 2015, October 2016 associated with Hurricane Matthew, and to a lesser degree in September 2017 associated with Hurricane Irma. Flooding has been documented with photos, and videos along Peppercorn Lane at the north end as shown in **Figure 2-4** and at the townhomes at Mountainbrook Avenue with highwater depths recorded by City staff.

Photos of the flooding and anecdotal information available on the internet indicate the approximate depth of flooding experienced along Peppercorn Lane during each of the storm events. Flood waters reportedly reached waist deep in the largest storm on record, the October 2015 historic storm event. This rainfall event is estimated to correspond with the 270-year return interval event based on the Atlas 14 data as described in Section 2.2.2. This depth corresponds with a flood elevation of over 16 feet and is estimated to have directly affected over 100 residential properties in the Pepperhill subdivision. Flooding was



Figure 2-4. Peppercorn Lane 2015 Flooding (Source: Google Earth Pro)

less extensive during the 2016 and 2017 events, reaching a flood stage of approximately 14 feet and affecting an estimated 40 properties during the 2016 hurricane.

The anecdotal information corresponds with records collected by City staff which went from door to door gathering information on flood damage following the 2015 and 2016 floods. Dwellings listed in **Table 2-6** below were reported as receiving at least some damage associated with flooding. Depths of flooding were estimated in some dwellings from a few inches to a few feet. The maximum depths of flooding were recorded at 7809 Peppercorn Lane inside the house at 4 ft for the 2015 flood and 2 ft during the 2016 Hurricane. At 7809 Peppercorn Lane, the finished floor elevation was surveyed at 12.25 ft (by CDM Smith). With 4 feet of flooding reported, the estimated maximum flood stage for the 2015 event is 16.25 ft.

Table 2-6. Addresses with Reported Structural Flooding

Storm Event	Address	Reported Flooding Depth Inside Dwelling (ft)
2015 Flood	7754 GINGER LANE	
2015 Flood	7755 GINGER LANE	
2015 Flood	7758 GINGER LANE	
2015 Flood	7759 GINGER LANE	2.0
2015 Flood	7755 PEPPERCORN LANE	
2015 Flood	7763 PEPPERCORN LANE	
2015 Flood	7767 PEPPERCORN LANE	0.5
2015 Flood	7768 PEPPERCORN LANE	0.1
2015 Flood	7771 PEPPERCORN LANE	1.5
2015 Flood	7772 PEPPERCORN LANE	
2015 Flood	7775 PEPPERCORN LANE	
2015 Flood	7779 PEPPERCORN LANE	
2015 Flood	7783 PEPPERCORN LANE	
2015 Flood	7786 PEPPERCORN LANE	
2015 Flood	7787 PEPPERCORN LANE	3.5
2015 Flood	7790 PEPPERCORN LANE	
2015 Flood	7791 PEPPERCORN LANE	
2015 Flood	7794 PEPPERCORN LANE	
2015 Flood	7795 PEPPERCORN LANE	
2015 Flood	7798 PEPPERCORN LANE	
2015 Flood	7799 PEPPERCORN LANE	
2015 Flood	7802 PEPPERCORN LANE	
2015 Flood	7803 PEPPERCORN LANE	

Storm Event	Address	Reported Flooding Depth Inside Dwelling (ft)
2015 Flood	7809 PEPPERCORN LANE	4.0
2015 Flood	7811 PEPPERCORN LANE	4.0
2015 Flood	7812 PEPPERCORN LANE	3.0
2015 Flood	7815 PEPPERCORN LANE	1.7
2015 Flood	7816 PEPPERCORN LANE	2.0
2015 Flood	7819 PEPPERCORN LANE	
2015 Flood	7820 PEPPERCORN LANE	
2015 Flood	7823 PEPPERCORN LANE	
2015 Flood	7824 PEPPERCORN LANE	
2015 Flood	7827 PEPPERCORN LANE	3.5
2015 Flood	7828 PEPPERCORN LANE	
2015 Flood	7831 PEPPERCORN LANE	2.0
2015 Flood	7832 PEPPERCORN LANE	
2015 Flood	7835 PEPPERCORN LANE	2.0
2015 Flood	7836 PEPPERCORN LANE	
2015 Flood	7839 PEPPERCORN LANE	
2015 Flood	7840 PEPPERCORN LANE	
2015 Flood	7843 PEPPERCORN LANE	2.0
2015 Flood	7847 PEPPERCORN LANE	
2015 Flood	7851 PEPPERCORN LANE	
2015 Flood	7855 PEPPERCORN LANE	
2015 Flood	3418 SMOKETREE COURT	0.5
2015 Flood	3422 SMOKETREE COURT	0.5
2015 Flood	3426 SMOKETREE COURT	1.5
2015 Flood	3430 SMOKETREE COURT	
2015 Flood	3434 SMOKETREE COURT	
2016 Hurricane	7771 PEPPERCORN LANE	
2016 Hurricane	7775 PEPPERCORN LANE	
2016 Hurricane	7779 PEPPERCORN LANE	
2016 Hurricane	7783 PEPPERCORN LANE	
2016 Hurricane	7791 PEPPERCORN LANE	
2016 Hurricane	7795 PEPPERCORN LANE	

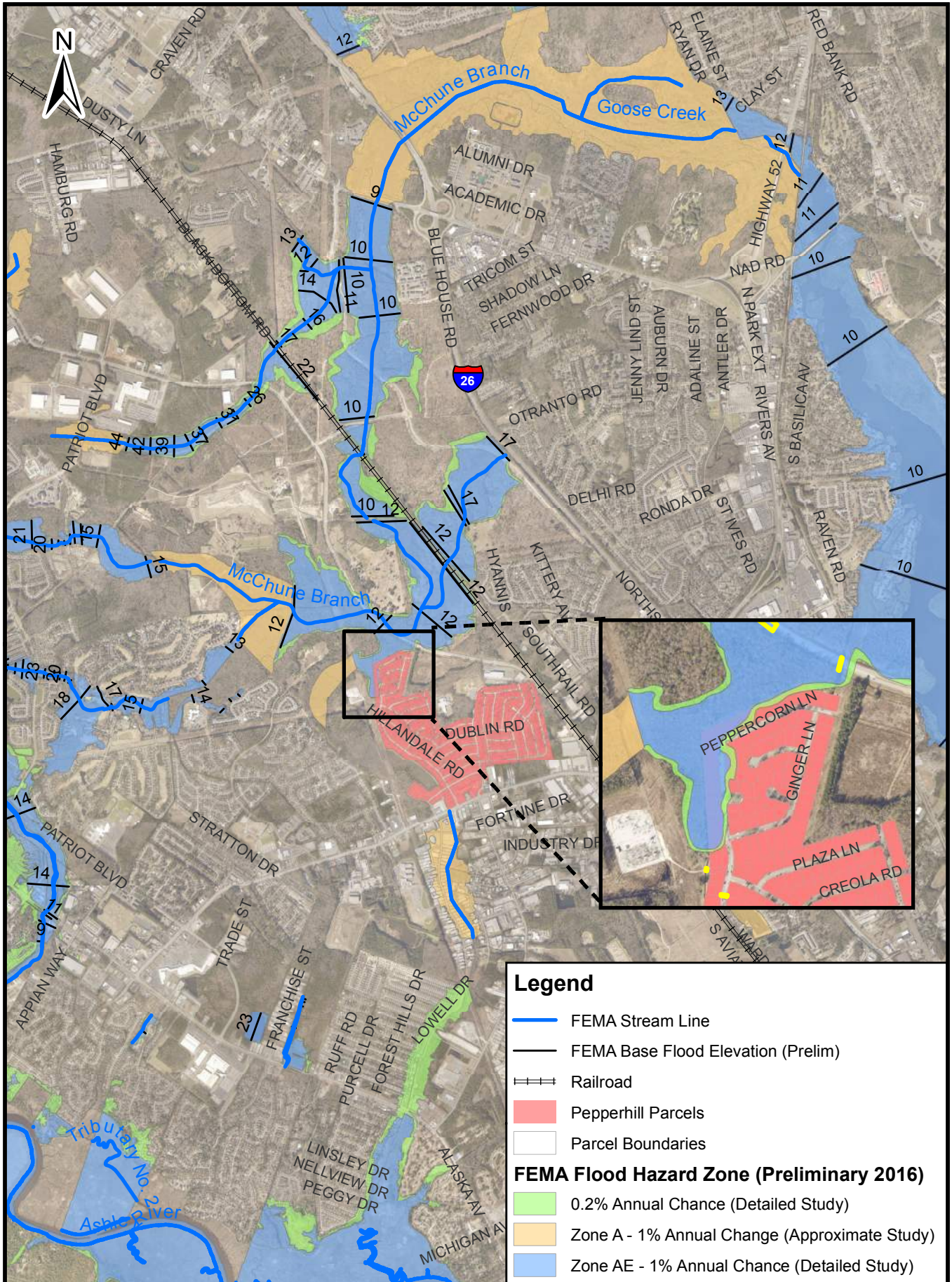
Storm Event	Address	Reported Flooding Depth Inside Dwelling (ft)
2016 Hurricane	7798 PEPPERCORN LANE	
2016 Hurricane	7799 PEPPERCORN LANE	
2016 Hurricane	7802 PEPPERCORN LANE	
2016 Hurricane	7803 PEPPERCORN LANE	
2016 Hurricane	7809 PEPPERCORN LANE	2.0
2016 Hurricane	7811 PEPPERCORN LANE	
2016 Hurricane	7812 PEPPERCORN LANE	
2016 Hurricane	7815 PEPPERCORN LANE	
2016 Hurricane	7816 PEPPERCORN LANE	
2016 Hurricane	7819 PEPPERCORN LANE	
2016 Hurricane	7820 PEPPERCORN LANE	
2016 Hurricane	7823 PEPPERCORN LANE	
2016 Hurricane	7824 PEPPERCORN LANE	
2016 Hurricane	7827 PEPPERCORN LANE	
2016 Hurricane	7831 PEPPERCORN LANE	
2016 Hurricane	7835 PEPPERCORN LANE	
2016 Hurricane	7836 PEPPERCORN LANE	
2016 Hurricane	7839 PEPPERCORN LANE	
2016 Hurricane	7843 PEPPERCORN LANE	
2016 Hurricane	3430 SMOKETREE COURT	
2016 Hurricane	3434 SMOKETREE COURT	
2015 Flood	7604 ALLWOOD (Not in Pepperhill)	1.0
2015 Flood	7603 ALLWOOD (Not in Pepperhill)	0.5
2015 Flood	7603 ALLWOOD AVE (Not in Pepperhill)	0.8
2015 Flood	7536 PLANTATION RD. APT 2	
2015 Flood	3467 MOUNTAIN BROOK AVE APT 2	
2015 Flood	3467 MOUNTAIN BROOK AVE APT 3	
2015 Flood	3467 MOUNTAIN BROOK AVE APT 4	
2015 Flood	7536 PLANTATION ROAD APT 1	
2015 Flood	3470 MOUNTAIN BROOK AVE APT 2	0.3
2015 Flood	3470 MOUNTAIN BROOK AVE APT. 5	0.3
2015 Flood	3476 MOUNTAIN BROOK AVE APT 1	

Storm Event	Address	Reported Flooding Depth Inside Dwelling (ft)
2015 Flood	3476 MOUNTAIN BROOK AVE APT 2	
2015 Flood	3482 MOUNTAIN BROOK AVE APT 5	
2015 Flood	3482 MOUNTAIN BROOK AVE APT 6	
2015 Flood	3473 MOUNTAIN BROOK AVE APT 5	
2015 Flood	3473 MOUNTAIN BROOK AVE APT 6	
2015 Flood	3485 MOUNTAIN BROOK AVE APT 3	
2015 Flood	7538 PLANTATION ROAD APT 6	1.5
2015 Flood	7538 PLANTATION ROAD APT 5	
2015 Flood	7548 PLANTATION ROAD APT 1	1.5
2015 Flood	7548 PLANTATION ROAD APT 2	
2015 Flood	7558 PLANTATION ROAD APT 6	
2015 Flood	7558 MOUNTAIN BROOK AVE APT 5	1.5
2015 Flood	3467 MOUNTAINBROOK AVE APT 1	0.3
2015 Flood	3467 MOUNTAINBROOK AVE APT 5	0.4

At least 50 homes were impacted by flooding inside the dwelling during the 2015 flood event and at least 27 during the 2016 event according to the City records. Many other properties were affected by flooding outside the dwellings which did not reach above the finished floor elevations (inside the house). Of these affected structures, only 17 homes are mapped within the preliminary 1% annual chance floodplain (FIRM Panel) as shown in **Figure 2-5**. Other residences, in Coosaw Creek Country Club, are also in the 1% floodplain, but no known structures downstream along McChune Branch are in the 1% floodplain.

Along Popperdam Creek, structural flooding occurred at Mountainbrook Avenue and near Allwood Avenue during the 2015 flood. Flooding affected the inside of at least 22 structures according to the records collected by City staff at the Ashley Town Homes around Mountainbrook Avenue and Peppercorn Lane. A maximum depth of 1.5 feet was observed and recorded inside three dwellings with the others less than 1 foot. This depth corresponds approximately with a maximum flood stage of 15.5 ft.

At Allwood Ave, just downstream of Dorchester Road, 2 houses along Popperdam Creek were flooded with up to a foot of water, according to the records. These two dwellings and many neighboring structures are mapped within the 1% floodplain (FIRM Panel 45019C0289K) associated with the Ashley River. The FEMA base flood stage for the Ashley River is at a higher base flood elevation (9 ft) than corresponding with the depth reported (7.7 ft) in the 2015 event. This indicates that the Ashley River did not reach its peak stage at the same time as Popperdam Creek during the 2015 flooding event.



2.2.5 As-Built Drawings

As-Built drawings were provided by the City for several crossings in the McChune Branch and Popperdam Creek watersheds. These as-builts included information on the dimensions, inverts, bridge spans, piling spacing, and roadway crest elevations for road crossings along McChune Branch and Popperdam Creek. As-builts for all roadways constructed within the last ten years including Palmetto Commerce Parkway, Weber Boulevard, and Ingleside Road were provided. Crossings without available As-built information were field surveyed to obtain the elevations and dimensions for hydraulic modeling.

2.3 Field Data

2.3.1 Field Reconnaissance

CDM Smith conducted a field reconnaissance of the Study Area to determine parameters needed for hydrologic and hydraulic modeling and gather other data pertinent to the primary and secondary stormwater management system. Also included as part of the field reconnaissance was the identification and documentation of potential problem areas within the PSMS. The observed problems were categorized as maintenance or flooding/potential flooding related.



Photo 2-1. Ditch Full at 7809 Peppercorn Lane

On Friday, August 25, 2017, a CDM Smith Engineer investigated drainage conditions along

Peppercorn Lane and Palmetto Commerce Parkway. Significant rain had occurred within the previous 24 hours as puddling and runoff was still observed. The drainage ditch along Peppercorn Lane was observed to be full at the north end of the neighborhood and flowing slowly south toward Popperdam Creek as shown in **Photo 2-1**. No flow was observed at the box culvert crossing of Palmetto Commerce Parkway near the north end of Peppercorn Lane. Water was backwatered from the north side of Palmetto Commerce Parkway and was not visibly flowing north at all towards McChune Branch. Flow was observed to be moving south towards Popperdam Creek at the utility access road crossing near Picardy Place, slowly at the crossing of Mountainbrook Road, and rapidly at Ashley Phosphate Blvd. The utility crossing and channel downstream of Mountainbrook Road appeared to be constricting flow and holding water in the ditch for an extended period.

On October 27th, 2017, CDM Smith investigated conditions along McChune Branch from Palmetto Commerce Parkway to Weber Blvd. The channel varied in depth from less than half a foot to 5' and was on average 20-30 feet wide. Conditions were found to be generally clear within the channel with some smaller trees and branches overhanging or catching some debris in the channel at a couple points, but not to the extent that flow is blocked in or above the channel. A large tree was down across the channel just upstream of Weber Blvd. The water surface was mostly flat backwater along the reach with shallow flow observable only at one point where a sediment plume from the area near Spring Grove Landfill filled a majority of the channel. A manmade levee was discontinuous along the channel associated with placement of the channel

excavation spoils. This levee is a disconnect between the surrounding wetlands and the channel, but does not appear to significantly affect or restrict inflow or outflow to and from the surrounding wetlands with multiple access points. Aquatic invasive species were observed throughout the channel wherever tree cover does not block the sunlight. Along the cleared powerline easement north of Pepperhill, aquatic vegetation covered the entire channel. This vegetation does not appear to be causing backups in drainage, but will contribute to accumulation of sediment and natural debris in the channels over time.

2.3.2 Field Survey

Field survey of the open and closed primary system was collected in October and November of 2017 to support the hydraulic model analysis, described in Section 3. Open system survey consisted of channel cross section and stream crossing (e.g., bridge and culvert) surveys where as-built information was not available.

Channel cross section surveys, consisting of field measurements of the channel were performed at transitional intervals along the hydraulic study streams. Cross sections were surveyed using the South Carolina State Plane coordinate system (NAD83 HARN) and the North American Vertical Datum of 1988 (NAVD88). Elevation information for the cross sections and hydrologic network development besides the information gathered by survey was obtained from LiDAR, provided by the SC DNR website.

Stream crossing surveys were collected for bridges and culverts along the hydraulic study streams where As-Built information was not available. **Figure 2-6** shows the watershed roadway and railroad crossings. Primary system crossing surveys were collected with full survey-grade techniques and consisted of measurement and location of channel and stream crossing structure features (e.g., inverts, dimensions, and crest elevations) at the upstream and downstream ends, as well as a profile along the top of road. **Table 2-7** lists the stream crossing locations with culvert type, size, length, and invert elevations. Also, as part of the reconnaissance and survey work, photographs were taken of the stream crossings. These photographs are provided in **Appendix B**.

Closed system survey was also performed in the east side of the Pepperhill subdivision, where localized drainage systems discharge directly into the area of focus as shown in **Photo 2-2**. Closed system survey consisted of inventory (e.g., measurement and location of inverts, pipe sizes and materials, manhole rim elevations, etc.) of 24-inch diameter and larger pipes and associated structures (e.g., manholes, catch basins, etc.). All closed system survey was collected with full survey-grade techniques to the extent accessible to establish main flow paths and sizing of the main drainage network.



Photo 2-2. Drain Inlet and Ditch on Peppercorn Lane

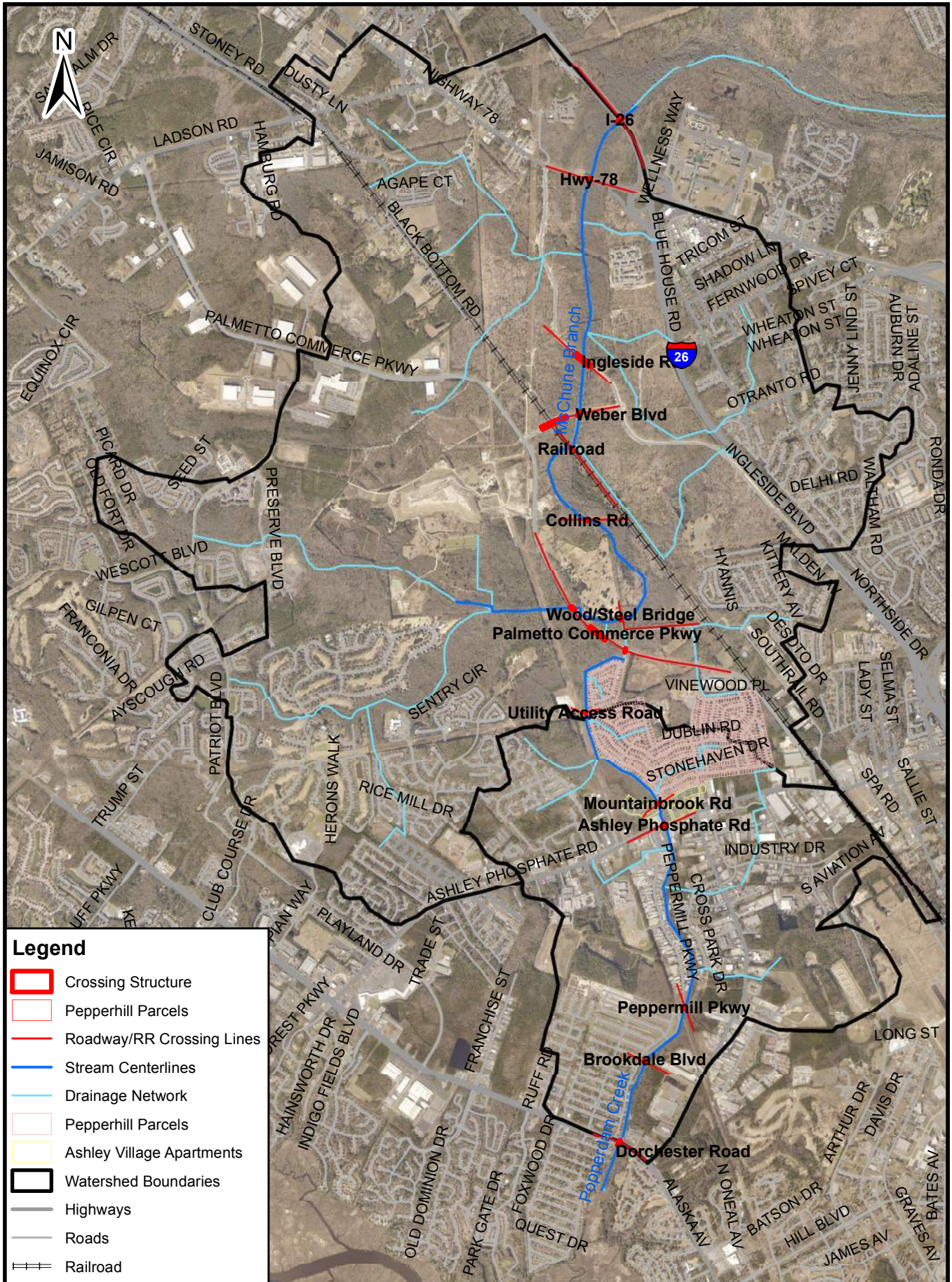


Table 2-7. McChune Branch and Popperdam Creek Stream Crossings

Stream	Roadway/Location	Photo Numbers in Appendix B	Owner	Type	No. Barrels	Length Parallel to Flow (ft)	Rise (ft)	Span (ft)	Invert Elevation (ft NAVD)	Depth of Sediment (ft)	Crest Inline High Point Elevation (ft NAVD)	Information Source
MB	I-26	63, 64	SCDOT	Box Culvert	3	182	10	10	1.05	0.5-1.22	17.8	Survey
MB	Hwy 78	61, 62	SCDOT	Concrete Span Bridge	-	75	7	56.7	2.30	-	12.60	Survey
MB	Ingleside Road	57-60	County	Concrete Span Bridge	-	80	7.21	466	-	-	16-19	As-Built
MB	Weber Blvd	54	County	Concrete Arch Bridge	-	92	6	28	-	-	16	As-Built
MB	Weber Blvd Bridge	53	County	Concrete Span Bridge	-	78	-	730	-	-	33-49	As-Built
MB	Railroad	48,49	Private RR	Steel Beam Bridge	-	20	5.83	55	3.36	-	16.0	Survey
MB	Collins Rd	44	Private	RCP Culverts	2	58	3.5	3.5	5.32	-	12.8	Survey
MB	Dirt Road N of PC Pkwy	39, 40	Private	Steel Frame/Wood Plank	-	10	7	39	-	-	13.8	Survey
MB	PC Pkwy Short Bridge	35, 36	County	Concrete Span Bridge	-	79	18	100	6	-	24	As-Built
MB	PC Pkwy Long Bridge	34	County	Concrete Span Bridge	-	79	16	525	8	-	28	As-Built
Ditch	PC Pkwy Culvert	30-32	County	Box Culvert	2	120	9	12	5.43	1	22	As-Built
Ditch	Powerline Utility Easement	19-24	Private	RCP Culvert	2	12	2.5	2.5	7.16	0.2	11.51	Survey
Ditch	Peppercorn Ln	17, 18	CITY	RCP Culvert	2	54	3	3	10.14	0	14.56	Survey
PC	Mountainbrook Dr	11-16	CITY	RCP Culvert	3	49	4.67	4.67	6.23	0.04-0.2	13.57	Survey
PC	Ashley Phosphate Rd	7-10	SCDOT	Box Culvert	3	125	8	8	5	0	16.4	As-Built
PC	Peppermill Pkwy (Dirt)	5, 6	Private	Bottomless Concrete Arch	1	80	10.5	20	0.55	0.7-2.65	14.72	Survey
PC	Brookdale Blvd	3, 4	Private	Corrugated Metal Arch	1	45	7.6	20 - 35	0.74	0.02-0.1	11.08	Survey
PC	Dorchester Rd SC-642	1, 2	SCDOT	Box Culvert	2	164	8	8	-0.77	0	13.7	Survey

Section 3

Hydrologic and Hydraulic Analyses

The objective of this stormwater study is to evaluate both the primary and secondary stormwater management systems for existing drainage system performance and impacts on flooding associated with recent development in the watershed.

Hydrologic modeling estimates the quantity of runoff entering the drainage system and simulates the surface runoff response of a watershed for a given rainfall event. Hydraulic modeling determines the water surface elevations throughout the system and predicts in-channel flow velocities which can be used to evaluate potential erosion problems in the system. Based on review the topographic information, it was observed that McChune Branch has extensive floodplain storage and flows from the McChune Branch floodplain could spill over toward Popperdam Creek. Therefore, CDM Smith developed a set of hydrologic and hydraulic computer models for both the McChune Branch and Popperdam Creek watersheds to analyze the existing drainage system, to evaluate flooding impacts of development, and to evaluate potential improvement alternative options. The following sections summarize the development of these models.

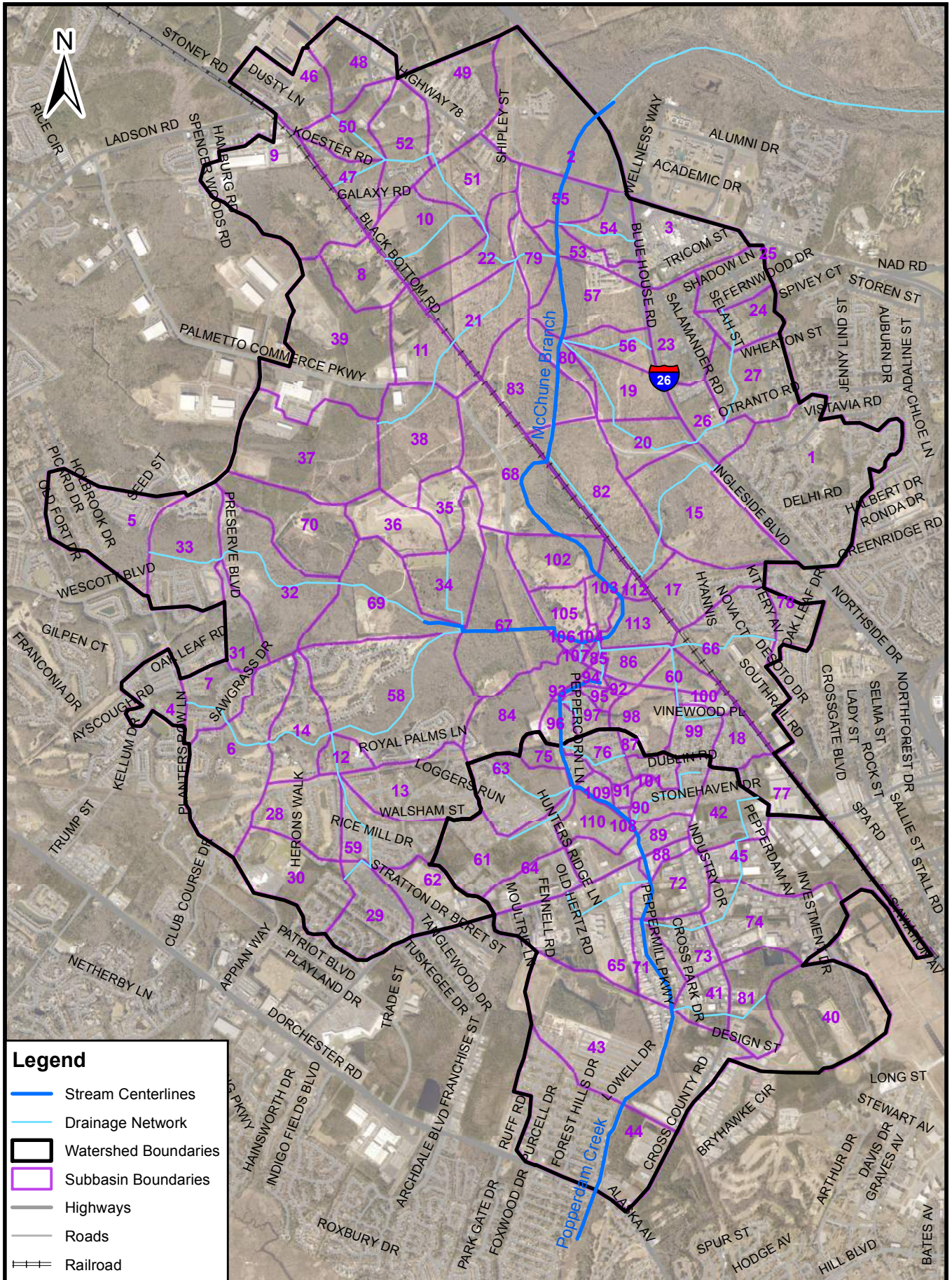
3.1 Hydrologic Analysis

CDM Smith developed a detailed hydrologic model of the McChune Branch and Popperdam Creek watersheds using the U.S. Army Corps of Engineers, Hydrologic Engineering Center, Hydrologic Modeling System (HEC-HMS, Version 4.2.1) to estimate the quantity of runoff entering the drainage system and to simulate the surface runoff response of a watershed for a given rainfall event. To perform the analysis, the watershed is represented as an interconnected system of hydrologic and hydraulic components which include contributing drainage area, land use, basin slope, channel characteristics, and rainfall data. Each of these characteristics was identified for all sub-watersheds in the study area and input into the HEC-HMS model. The development of these characteristics is described in Section 3.1.1.

3.1.1 Hydrologic Model Parameters

The following is a list of assumptions, methods, and necessary hydrologic parameters employed for modeling purposes:

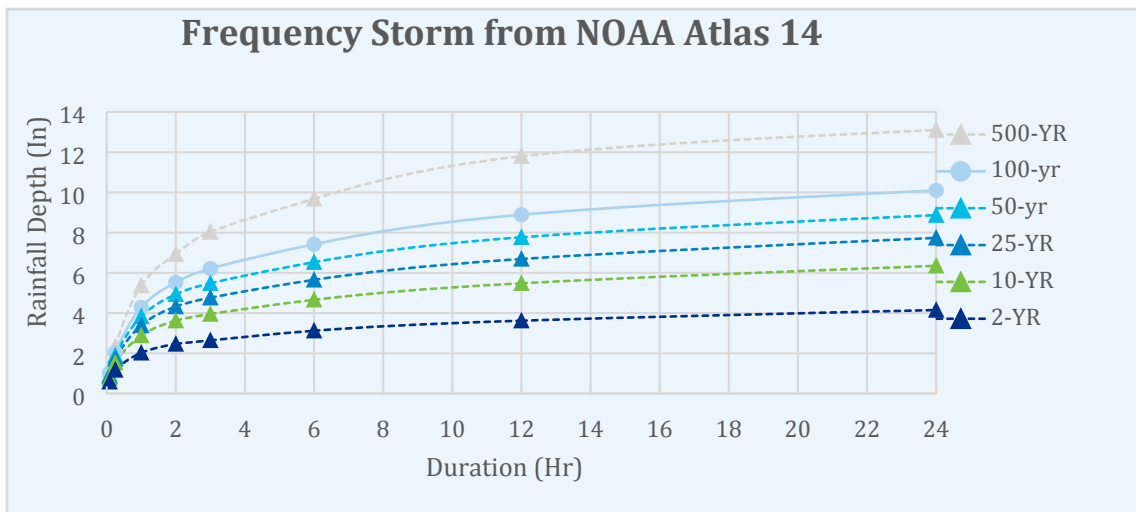
- Using available topographic data, CDM Smith subdivided the McChune Branch and Popperdam Creek watersheds into 111 sub-basins. Subbasins delineations were sufficiently detailed to accurately analyze contributing runoff. Each of the 111 subbasins are represented in the HEC-HMS model as shown in **Figure 3-1**.



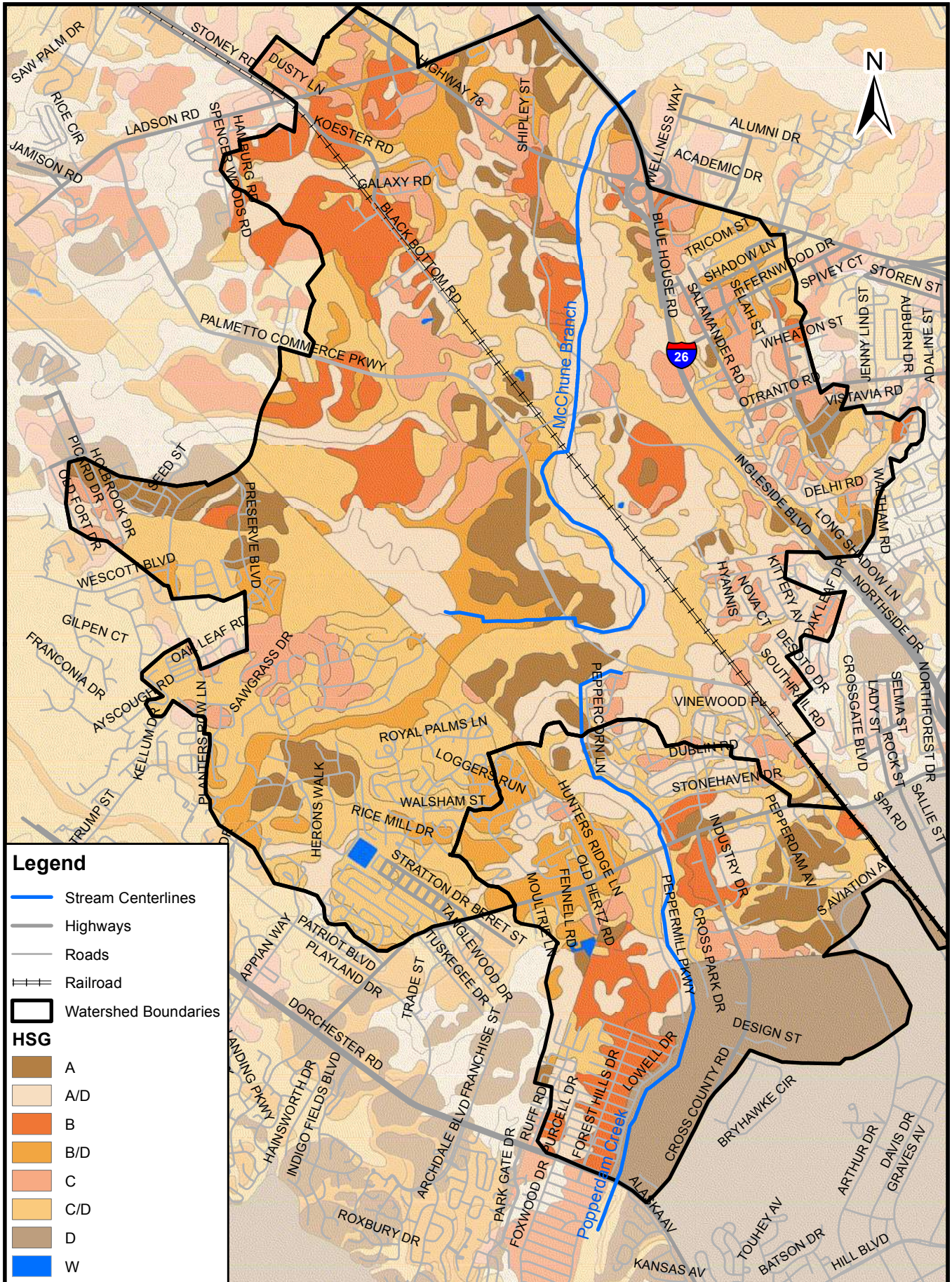
- Six design storm events, 2-, 10-, 25-, 50-, 100-, and 500-years, were chosen for the modeling by CDM Smith and City staff. The events correspond to roadway levels of service and existing/proposed City post-construction stormwater requirements. **Table 3-1** summarizes the design storm and corresponding rainfall totals, as determined from the National Oceanic and Atmospheric Administration (NOAA) Atlas 14.

Table 3-1. Precipitation Frequency Estimates from NOAA Atlas 14

Duration	2-Yr (50%)	10-Yr (10%)	25-Yr (4%)	50-Yr (2%)	100-Yr (1%)	500-Yr (0.2%)
5 Minutes	0.579	0.754	0.850	0.931	1.01	1.18
15 Minutes	1.17	1.53	1.72	1.88	2.03	2.35
1 Hour	2.02	2.88	3.39	3.83	4.28	5.37
2 Hours	2.46	3.62	4.32	4.93	5.52	6.93
3 Hours	2.64	3.95	4.76	5.48	6.21	8.03
6 Hours	3.12	4.66	5.65	6.53	7.42	9.68
12 Hours	3.62	5.48	6.69	7.77	8.89	11.8
1 Day	4.15	6.35	7.74	8.87	10.1	13.1

**Figure 3-2. Total Rainfall Depth for 24-Hour Duration (Inches)**

- The synthetic SCS Unit Hydrograph Method was applied to compute the flow hydrograph and peak runoff from each basin with the peak rate factor of 100 which represents the typical low coastal plain flat wooded regional terrain areas.
- SCS Type III Rainfall Distribution was selected for use in the model.
- Soils data was obtained from the NRCS Web Soil Survey. Hydrologic soils groups for each mapped soil type are shown in **Figure 3-3**.

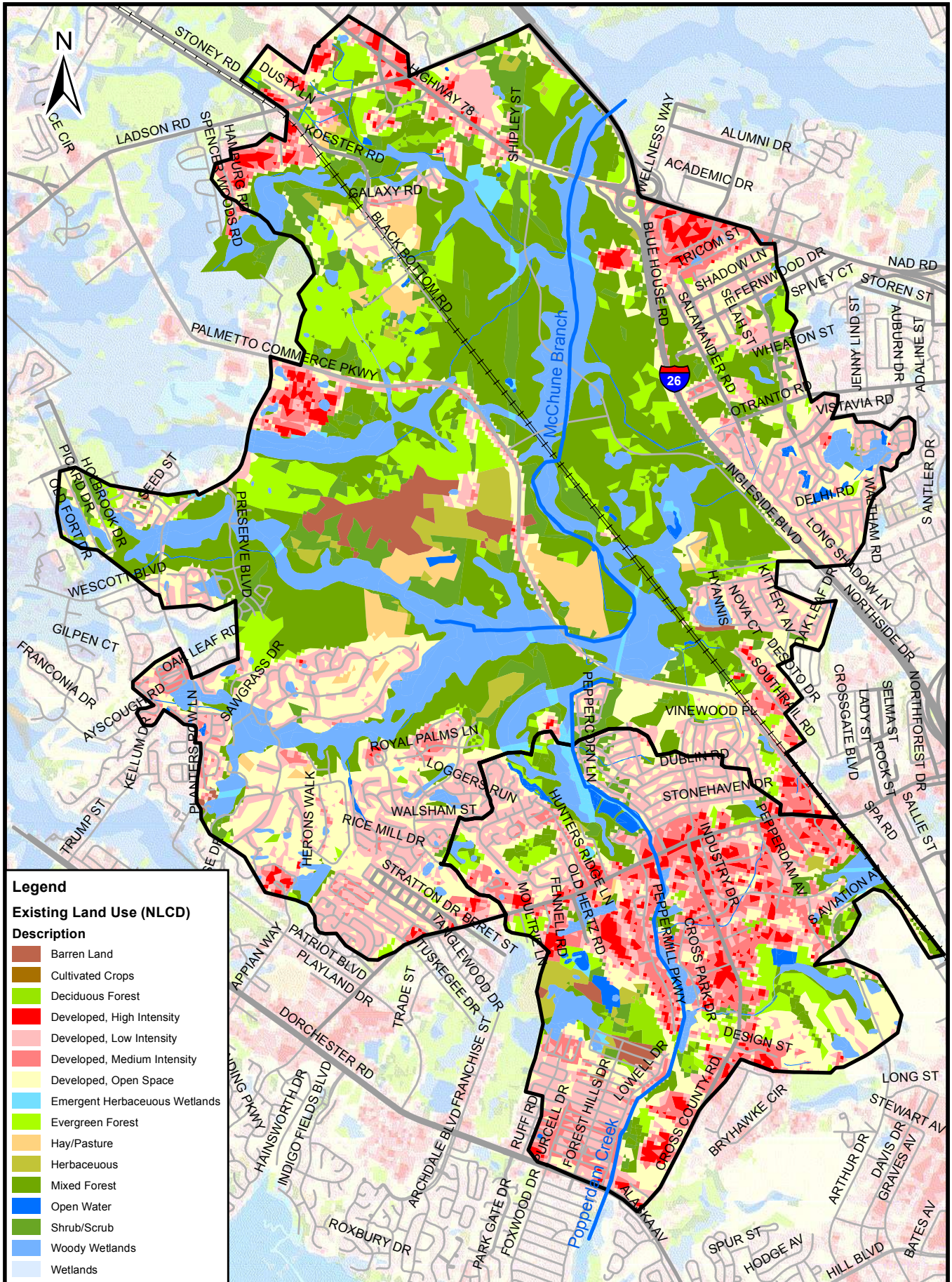


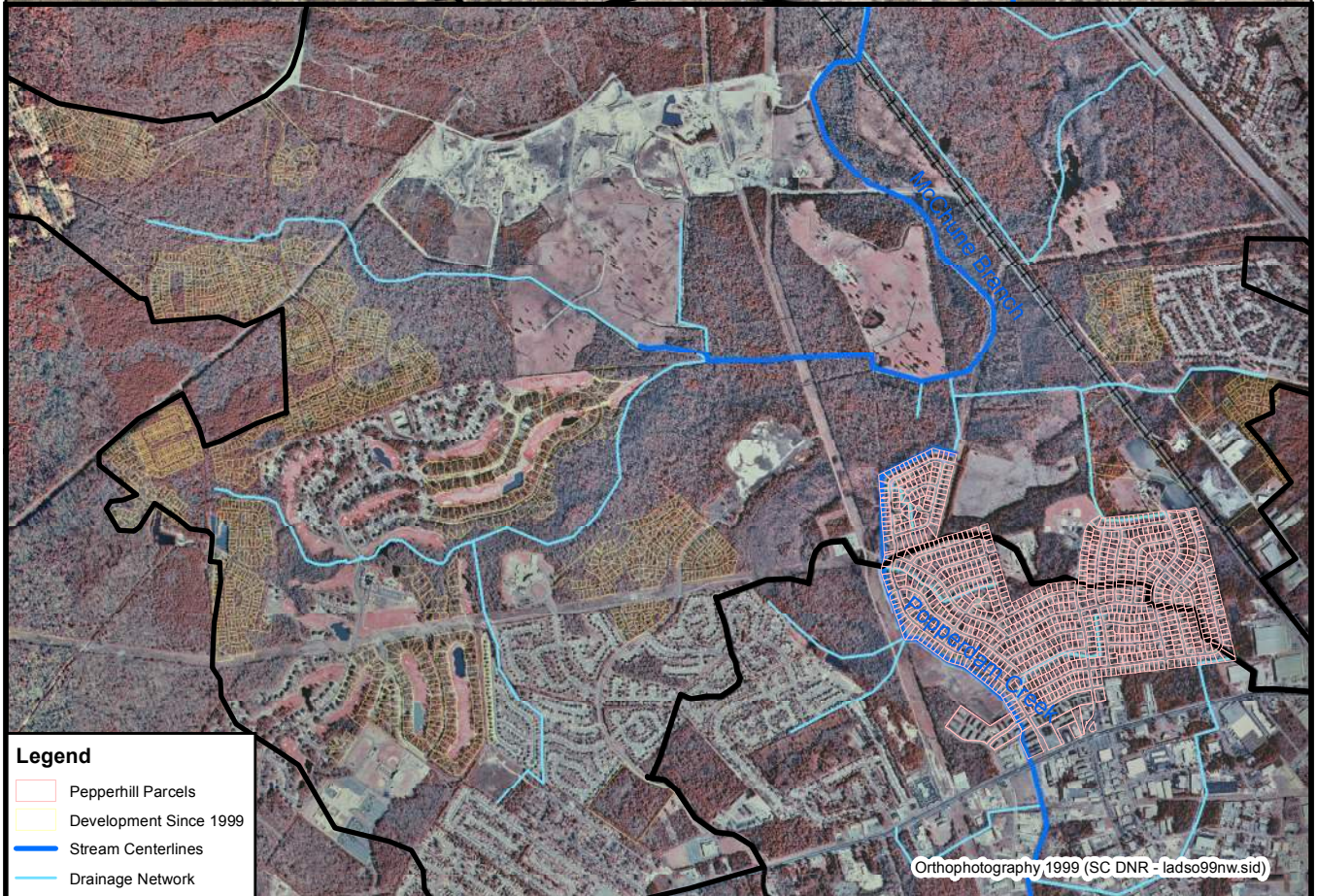
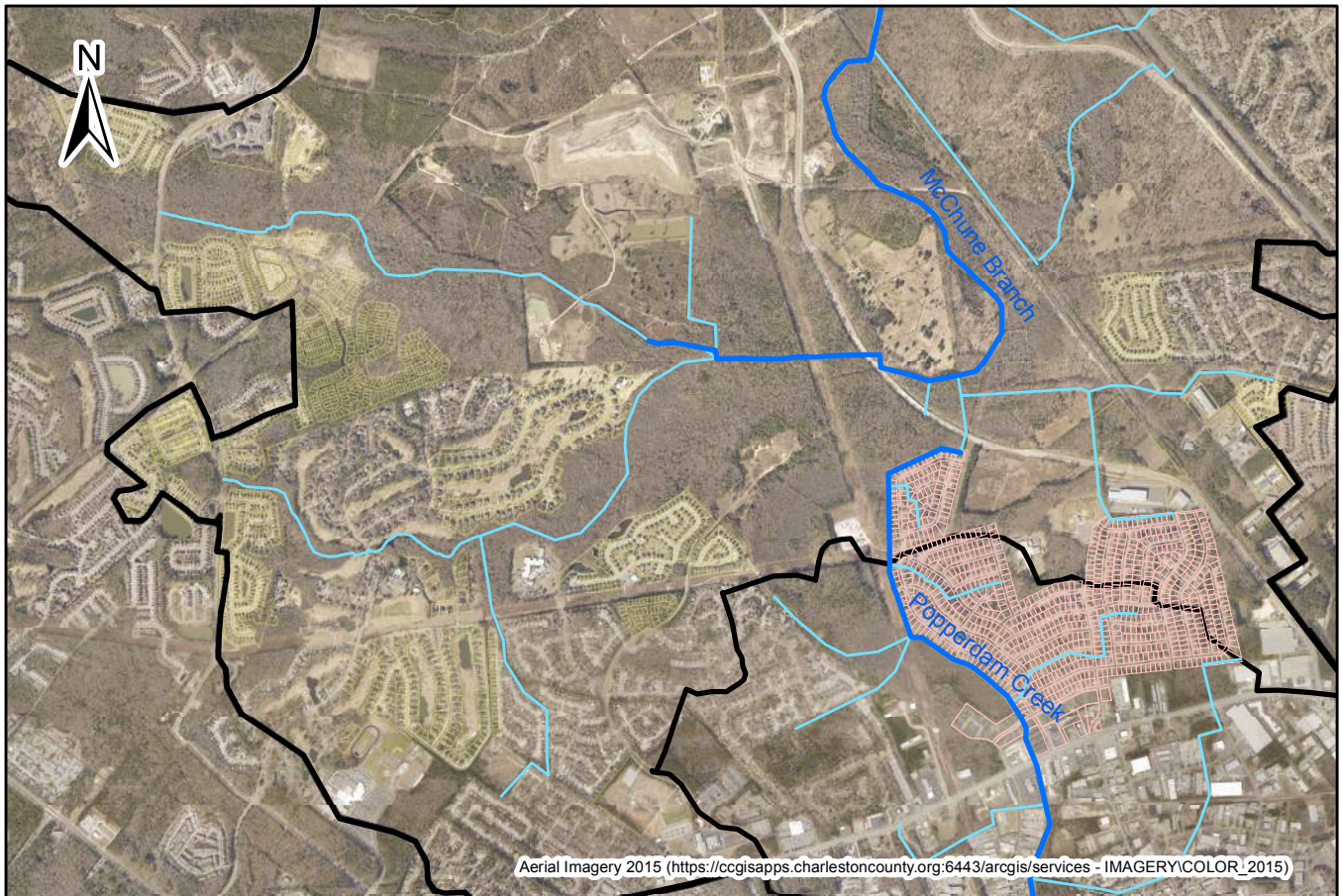
- Antecedent Moisture Condition (AMC) II was assumed for soil conditions.
- SCS Curve Number Method was used for estimating the initial abstraction for existing and future land use conditions. Runoff curve numbers were determined based on the land use information provided by the National Land Cover Database for existing conditions, aeriels, and the zoning information provided by the City. Existing land use is shown on **Figure 3-4**, Prior to 2000 land use on **Figure 3-5**, and zoning based future build-out on **Figure 3-6**.
- Time of Concentration was estimated using the SCS Lag Time Method which is applicable for the mixed urban and rural basin represented by the existing conditions.
- Main reaches of McChune Branch and Popperdam Creek were routed using the Modified Puls method. The tributary reaches were routed using the kinematic wave method.
- An initial HEC-RAS routing model was prepared with a family of discharges for storage-discharge relationship development, and these relationship curves were imported into the HEC-HMS model for the Modified Puls channel routing.
- Modified Puls channel routing was used to route the runoff hydrographs through the channel network from each basin within the HMS model.
- **Table 3-2** summarizes all the hydrologic parameters developed for the McChune Branch and Popperdam Creek watershed model for each delineated basin.

3.1.2 Hydrologic Model Results

Based on the parameters provided above, CDM Smith executed the HEC-HMS model for existing, prior to recent development (1999), and future land use conditions. For each design storm event, flow hydrographs and peak flow rates along the channel were developed for use in the hydraulic model discussed in Section 3.2.

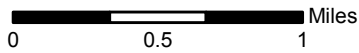
Calibration of HEC-HMS models can typically be performed using flow gaging station records. However, there is no stream flow gaging station within the watershed. The computed flows were cross-checked against the published FEMA FIS flow values, and the existing land use condition peak discharges are slightly different than the FEMA FIS values, within 20 percent, but the computed peak discharges are generally compatible with the FEMA FIS discharges as shown in **Table 3-3**. The difference is because the FEMA FIS peak discharges values are from the USGS Regional Regression Equations, and the modeled discharge values are based on the recently published NOAA rainfall depths and detailed hydrologic and hydraulic parameters.





Legend

- Pepperhill Parcels
- Development Since 1999
- Stream Centerlines
- Drainage Network



McChune Branch Drainage Study
Figure 3-5 Development Since 1999

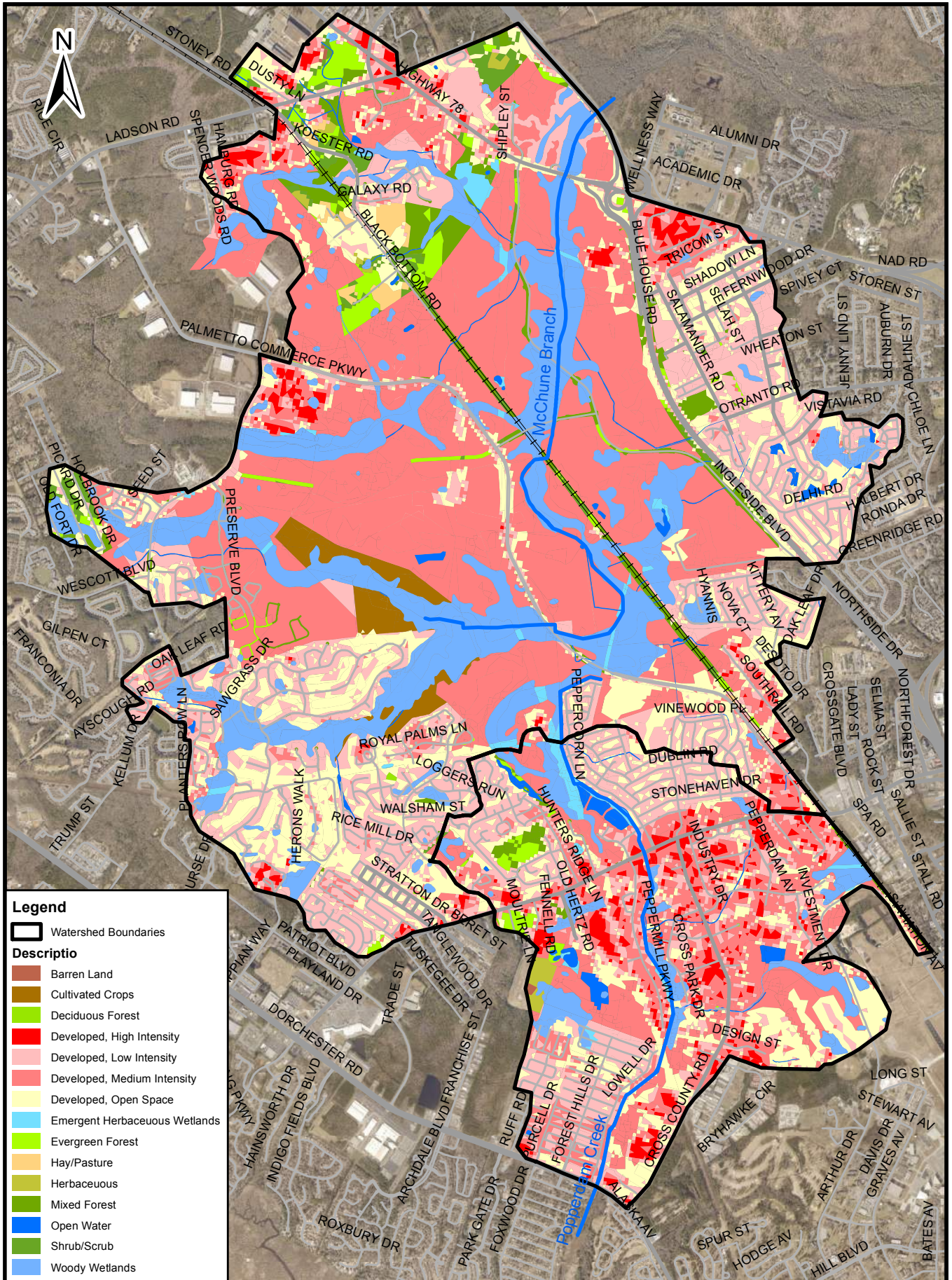


Table 3-2. Hydrologic Parameters for McChune Branch and Popperdam Creek Watersheds

Basin ID	Area (sq. mi)	Area (acres)	Pre-2000 Runoff Curve Number	Existing Runoff Curve Number	Future Runoff Curve Number	Lag Time (min)
S_MB_0100	0.352	225.3	83	83	83	140
S_MB_0200	0.113	72.3	89	89	89	64
S_MB_0300	0.088	56.3	85	85	85	33
S_MB_0350	0.17	108.8	85	85	89	151
S_MB_0400	0.056	35.8	89	89	90	188
S_MB_0500	0.067	42.9	97	97	97	107
S_MB_0510	0.161	103.0	94	94	94	56
S_MB_0520	0.153	97.9	77	77	88	59
S_MB_0530	0.227	145.3	80	80	90	48
S_MB_0535	0.334	213.8	80	85	91	94
S_MB_0540	0.383	245.1	67	73	88	194
S_MB_0550	0.13	83.2	85	85	88	48
S_MB_0555	0.184	117.8	80	80	80	54
S_MB_0560	0.111	71.0	57	57	73	75
S_MB_0570	0.145	92.8	88	88	88	35
S_MB_0575	0.197	126.1	64	64	80	72
S_MB_0580	0.142	90.9	76	81	88	50
S_MB_0585	0.091	58.2	73	76	76	78
S_MB_0587	0.33	211.2	77	77	81	146
S_MB_0590	0.106	67.8	75	75	80	55
S_MB_0595	0.13	83.2	77	77	81	30
S_MB_0597	0.144	92.2	74	74	79	55
S_MB_0600	0.184	117.8	92	92	93	75
S_MB_0700	0.061	39.0	94	94	94	32
S_MB_0800	0.128	81.9	92	92	92	118
S_MB_0810	0.1	64.0	94	94	94	101
S_MB_0820	0.1	64.0	88	88	88	138
S_MB_0825	0.156	99.8	75	75	80	42
S_MB_0830	0.175	112.0	83	83	93	46
S_MB_0840	0.084	53.8	79	79	82	55
S_MB_0850	0.094	60.2	75	75	82	73
S_MB_0900	0.05	32.0	98	98	98	17
S_MB_1000	0.191	122.2	73	73	92	85
S_MB_1010	0.142	90.9	68	68	90	159
S_MB_1020	0.3	192.0	73	73	90	198
S_MB_1030	0.522	334.1	87	87	98	99
S_MB_1100	0.322	206.1	94	94	94	58
S_MB_1200	0.125	80.0	91	91	91	220
S_MB_1300	0.066	42.2	88	88	93	48
S_MB_1400	0.013	8.3	65	65	91	97

Basin ID	Area (sq. mi)	Area (acres)	Pre-2000 Runoff Curve Number	Existing Runoff Curve Number	Future Runoff Curve Number	Lag Time (min)
S_MB_1410	0.138	88.3	63	75	88	120
S_MB_1500	0.084	53.8	69	69	95	167
S_MB_1600	0.006	3.8	91	91	93	55
S_MB_1610	0.006	3.8	98	98	98	10
S_MB_1615	0.009	5.8	50	50	82	8
S_MB_1620	0.05	32.0	68	68	95	48
S_MB_1630	0.275	176.0	88	88	98	51
S_MB_1635	0.064	41.0	91	91	91	36
S_MB_1650	0.053	33.9	80	80	88	45
S_MB_1660	0.094	60.2	50	50	84	52
S_MB_1670	0.027	17.3	83	83	93	18
S_MB_1675	0.064	41.0	68	68	84	51
S_MB_1680	0.063	40.3	59	59	84	42
S_MB_1700	0.008	5.1	69	69	90	27
S_MB_1800	0.006	3.8	68	68	86	112
S_MB_1810	0.173	110.7	49	49	88	130
S_MB_1900	0.073	46.7	68	68	81	65
S_MB_2000	0.27	172.8	59	59	90	43
S_MB_2100	0.466	298.2	59	59	88	182
S_MB_2110	0.045	28.8	88	88	88	48
S_MB_2115	0.195	124.8	77	84	85	100
S_MB_2120	0.148	94.7	52	52	83	54
S_MB_2125	0.155	99.2	87	87	87	48
S_MB_2130	0.133	85.1	86	86	86	43
S_MB_2140	0.147	94.1	88	88	88	40
S_MB_2150	0.195	124.8	77	77	85	47
S_MB_2170	0.139	89.0	78	78	78	39
S_MB_2180	0.314	201.0	65	65	84	205
S_MB_2185	0.106	67.8	77	77	87	331
S_MB_2190	0.092	58.9	72	79	89	92
S_MB_2200	0.247	158.1	75	75	93	109
S_MB_2210	0.156	99.8	77	77	88	46
S_MB_2215	0.072	46.1	71	76	86	39
S_MB_2220	0.116	74.2	81	81	90	38
S_MB_2300	0.208	133.1	84	84	91	233
S_MB_2400	0.266	170.2	75	75	91	81
S_MB_2500	0.078	49.9	66	74	85	26
S_MB_2600	0.219	140.2	73	73	86	122
S_MB_2700	0.247	158.1	75	75	77	34
S_PC_0100	0.011	7.0	72	72	93	23
S_PC_0200	0.017	10.9	83	83	96	18

Basin ID	Area (sq. mi)	Area (acres)	Pre-2000 Runoff Curve Number	Existing Runoff Curve Number	Future Runoff Curve Number	Lag Time (min)
S_PC_0300	0.006	3.8	72	72	93	41
S_PC_0400	0.034	21.8	89	89	89	27
S_PC_0500	0.034	21.8	73	73	86	36
S_PC_0600	0.063	40.3	91	91	91	45
S_PC_0610	0.013	8.3	55	55	84	32
S_PC_0630	0.038	24.3	86	86	86	25
S_PC_0700	0.052	33.3	64	64	87	16
S_PC_0800	0.022	14.1	68	68	88	28
S_PC_0900	0.155	99.2	62	62	89	51
S_PC_1000	0.194	124.2	56	56	85	79
S_PC_1100	0.084	53.8	70	70	92	35
S_PC_1200	0.017	10.9	68	68	84	17
S_PC_1300	0.005	3.2	59	59	94	12
S_PC_1400	0.084	53.8	78	78	82	44
S_PC_1500	0.098	62.7	68	68	87	70
S_PC_1510	0.133	85.1	72	72	87	23
S_PC_1515	0.083	53.1	68	68	85	38
S_PC_1590	0.094	60.2	84	84	86	92
S_PC_1600	0.023	14.7	63	63	91	34
S_PC_1700	0.283	181.1	82	82	85	35
S_PC_1800	0.111	71.0	73	73	86	33
S_PC_1850	0.281	179.8	77	77	83	55
S_PC_1900	0.078	49.9	73	73	88	28
S_PC_1950	0.244	156.2	86	86	86	79
S_PC_2000	0.081	51.8	80	80	92	47
S_PC_2100	0.075	48.0	80	80	91	41
S_PC_2110	0.139	89.0	78	78	90	86
S_PC_2120	0.303	193.9	85	85	87	137
S_PC_2200	0.558	357.1	73	73	85	49
S_PC_2300	0.408	261.1	74	74	83	143
Total/Average:	15.655	10,019	Average: 76	Average: 77	Average: 88	Average: 73

Table 3-3. McChune Branch and Popperdam Creek Existing Conditions Peak Flows

HEC-RAS Section	HEC-HMS ID	DA (sq.mi)	Peak Discharge (cfs) from HEC-HMS						2015 Storm	2016 Storm
			2-YR	10-YR	25-YR	50-YR	100-YR	500-YR		
McChune Branch										
XS-35980	J_MB_2400	1.02	83	177	242	297	358	511	350	283
XS-33887	J_MB_2100	3.74	252	496	670	812	972	1,372	1,040	751
XS-31704	J_MB_2000	4.01	140	278	368	449	560	848	846	320
XS-29279	J_MB_1700	4.99	122	242	319	390	471	788	897	427
XS-27712	J_MB_1500	5.22	118	236	312	382	461	769	902	314
XS-22471	J_MB_1100	6.70	140	249	321	380	445	638	880	424
XS-19191	J_MB_0600	7.84	174	313	405	480	563	768	836	546
XS-17046	J_MB_0500	11.06	400	759	1,006	1,210	1,435	1,994	1,624	1,386
XS-12868	J_MB_0100	11.83	307	592	830	1,018	1,228	1,750	1,670	820
Popperdam Creek										
XS-18086	J_PC_0100	0.03	8	16	21	25	29	40	22	14
XS-17354	J_PC_0300	0.07	15	26	33	40	46	63	34	30
XS-15785	J_PC_0500	0.22	37	66	86	102	119	163	96	85
XS-14702	J_PC_0700	0.62	53	112	156	193	231	307	229	198
XS-12890	J_PC_1300	0.75	68	138	166	194	224	316	222	202
XS-12509	J_PC_1100	0.83	77	155	190	221	259	356	250	229
XS-11850	J_PC_1500	0.93	84	170	211	248	292	401	282	259
XS-10867	J_PC_1600	1.33	147	290	373	440	513	706	451	423
XS-9908	J_PC_2000	2.26	251	514	681	825	985	1,373	827	750
XS-6961	J_PC_2100	3.41	355	721	957	1,157	1,344	1,820	1,203	1,121
XS-4185	J_PC_2200	3.41	350	696	895	1,063	1,233	1,679	1,134	1,059
XS-1569	J_PC_2300	3.82	372	741	953	1,127	1,307	1,778	1,234	1,133

It should be noted that the Stormwater Study peak discharges listed in Table 3-3 are from the HEC-HMS channel routed model results which was obtained via conventional hydrological analysis in conjunction with the steady-state hydraulic analysis. The values listed in Table 3-4 are for comparison purposes to confirm that the study hydrologic modeling is valid and compatible as modeled using the steady-state flow routine. Table 3-3 indicates slight differences as expected since the FEMA FIS peak discharges are from the Regional Regression Equations and used for the Limited Detailed Study streams.

Table 3-4. Peak Discharge Comparison with FEMA FIS

Location	FEMA FIS (Preliminary 2016)				McChune Branch Drainage Study			
	DA (sq.mi)	10-Yr (10%)	100-Yr (1%)	500-Yr (0.2%)	DA (sq.mi)	10-Yr (10%)	100-Yr (1%)	500-Yr (0.2%)
At Hwy 78 (XS14830, J_MB_0200)	11.71	656	1,248	1,808	11.48	689	1,313	1,871

3.2 Hydraulic Analysis

Hydraulic modeling of the primary drainage system and floodplains was performed using the U.S. Army Corps of Engineers, Hydrologic Engineering Center, River Analysis System (HEC-RAS Version 5.0.3) to determine the water surface elevations. **Figure 3-7** shows a model schematic of the streams and cross sections included in the RAS hydraulic model. The results of the hydraulic model are based on the amount of flow predicted by the hydrologic model for various locations and a representation of the size, shape, and length of the open channel system (including the effects of roadway crossings).

To model the downstream boundary conditions based on the FEMA base flood elevations, a normal depth slope of 0.00004 for McChune Branch and 0.0005 for Popperdam Creek were set. These boundary slopes match closely with the FEMA mapped downstream base flood elevations for the 100-yr storm with McChune Branch at 13 ft and Popperdam Creek at 7.7 ft. The downstream Goose Creek preliminary FEMA model was provided by SC DNR and demonstrates that the 100-yr base flood elevation is a result of backup distributed across the Highway 52 roadway crossing, the railroad crossing immediately downstream of Hwy 52, and NAD Road, at the headwaters of the Goose Creek Reservoir. The modeled reaches of McChune Branch and Popperdam Creek share a drainage divide and flood flows spillover depending on stages and conditions. To balance the stages between the two streams in the model which were not hydraulically linked was conducted with manual calculations in a spreadsheet by shifting flows between coinciding reaches at XS-31704 on McChune Branch and XS-17354 on Popperdam Ck via an iterative process until the stages matched within 0.1 ft.

Evaluation of improvements at roadway crossings was done through an iterative process of modifying the RAS hydraulic model to reflect the proposed condition, then transferring the elevation/discharge relationship into the HMS model to update routing, and updating peak flows in the RAS model. This method enables more accurate accounting of floodplain storage in the watershed. Downstream impacts of increasing conveyance were not conducted because there are

no known buildings in or near the McChune Branch floodplain downstream of Palmetto Commerce Parkway.

3.2.1 Conveyance System Conditions

The schematic of the HEC-RAS model of McChune Branch and Popperdam Creek consists of a network of open channels and roadway crossings. Cross-section data that is representative of the channel is required to produce accurate water surface profiles with HEC-RAS. Base model channel cross-sections and roadway crossings were field surveyed by CDM Smith or extracted from as-built information. The remaining cross-sections were interpolated from the base cross-sections and combined with floodplain elevations generated from topographical data from the 2009 LiDAR.

Current conditions of main channel and overbank areas were field assessed where accessible. The main stems of McChune Branch and Popperdam Creek are channelized for most of their lengths, but the downstream portion of McChune Branch has no defined channel beginning downstream

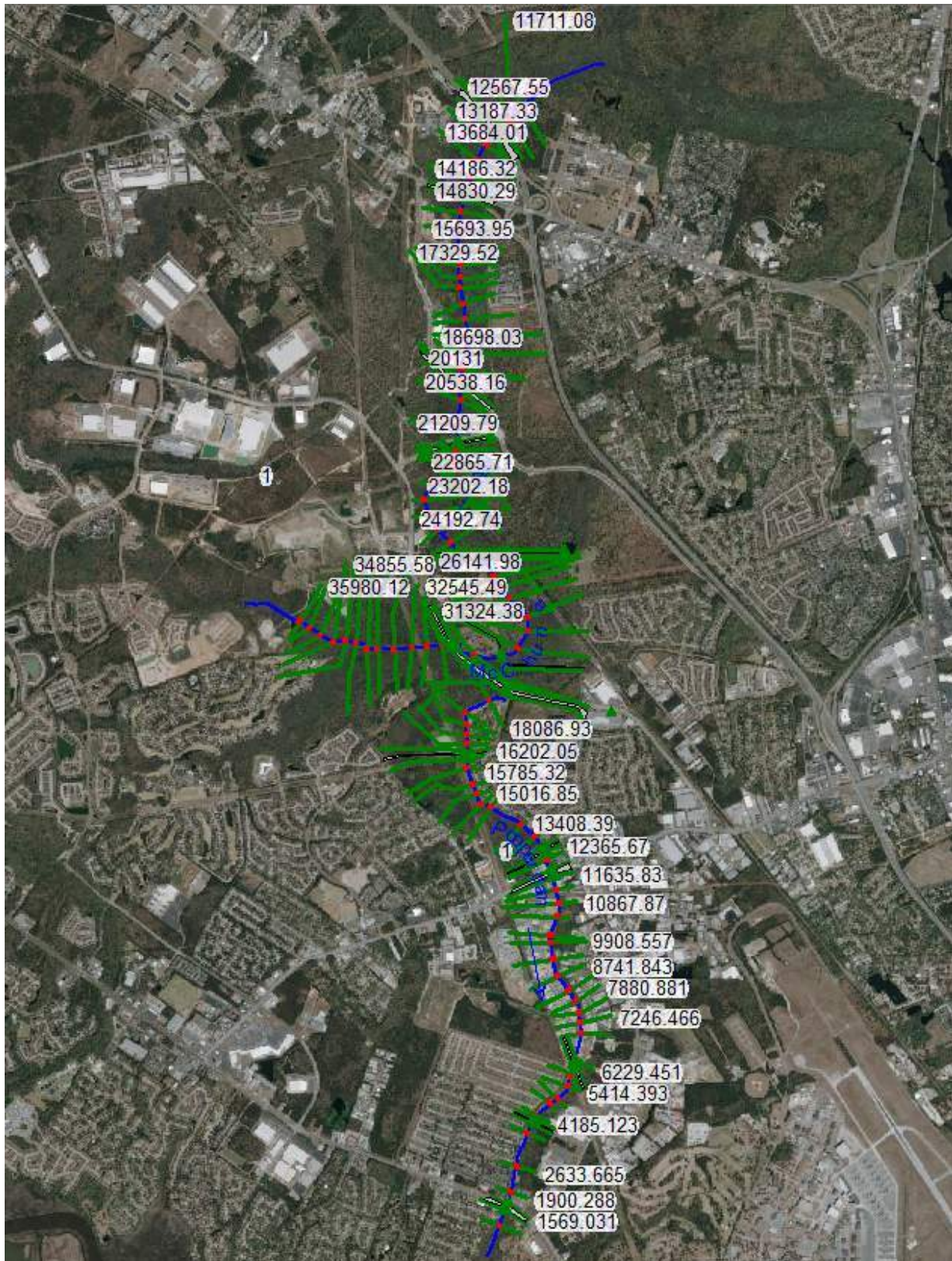


Figure 3-7. RAS Hydraulic Model Schematic of McChune Branch and Popperdam Creek

of Weber Boulevard. Typical current channel and floodplain conditions were observed for the reaches accessible in the field investigation. Photos 1-6 below illustrate the typical conditions.

Each open channel in the model also requires a hydraulic roughness coefficient (Manning's "n") to determine the amount of energy that is lost in the channel due to friction. The roughness coefficient is an experimentally determined value that varies based on the type of channel or floodplain surface conditions. Through field observation, roughness coefficients were determined for both channels and floodplains. The values ranged between 0.08 and 0.12 for channels and between 0.05 and 0.18 for the overbank areas.

3.2.2 Hydraulic Model Results and Validation

CDM Smith applied the peak flow hydrographs from the HEC-HMS model to the HEC-RAS model to determine the water surface elevations and extent of flooding throughout McChune Branch and Popperdam Creek. Validation for the HEC-HMS and HEC-RAS models was conducted using available highwater mark records. No stream flow gaging locations exist within the watershed. The computed elevations were also cross checked against the published FEMA FIS elevations and the results showed significant differences.

Modeled flood stages were verified for the October 2015 rainfall event at two locations and the 2016 hurricane in one location within the Study Area, utilizing high water depths recorded by City staff. The recorded elevations were compared to modeled elevations for the actual rainfall events, with a good correlation between the two observed. Therefore, the hydrologic and hydraulic model results were considered verified. The following is a more detailed description of the verification analyses.

3.2.2.1 Hydraulic Model Results

The results of the model were compared to the existing roadway elevations and structure locations to compare with the existing flooding impacts. **Table 3-5** summarizes the computed water surface elevations for comparison between the 100-yr storm and the 2015 and 2016 flooding events. The 2105 storm compares with the modeled 500-year storm recurrence interval and the 2016 event coincides with the 50-yr storm. This is consistent with the rainfall return intervals identified in Section 2.2.

Table 3-5. Modeled Flood Stages at Pepperhill (feet)

Condition	2-YR	10-YR	25-YR	50-YR	100-YR	500-YR	2015	2016
Before 2000	11.3	13.2	13.6	13.7	14.4	16.1	--	--
Existing	11.5	13.3	13.6	13.8	14.5	16.2	15.4	13.7
Future (Build-Out)	12.0	13.3	14.0	14.6	15.6	16.5	--	--



Photo 1. McChune Branch Upstream of PC Pkwy



Photo 2. McChune Branch at Powerline Easement



Photo 3. McChune Branch Upstream Ingleside Road

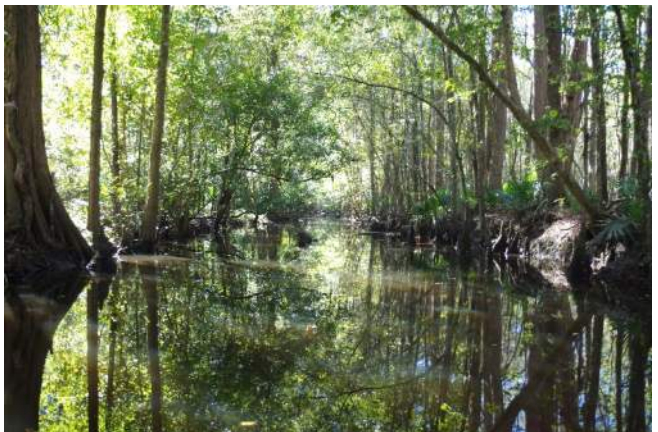


Photo 4 – McChune Branch Downstream Railroad Crossing



Photo 5. Wetlands along McChune Branch



Photo 6. Popperdam Creek Upstream Ashley Phosphate Road

3.2.2.2 Model Validation

Information regarding known flooding at multiple points were used to validate the model. Comparison with the FEMA base flood elevation is not used to validate the model since the floodplain mapping does not agree with flooding stages observed since 2015.

Reported flood depths at three locations were used to validate the model resulting flood stages for the 2015 and 2016 events. Additionally, the mapped floodplains correspond well with the dwellings reportedly flooded during these events.

Model Validation 1

Depth of flooding was recorded following the flooding in 2015 and in 2016 by City staff visiting the dwellings flooded throughout the City as described in Section 2.2.4. As part of the data collection process for this study, the CDM Smith surveyor recorded the foundation elevation relative to the survey datum (NAVD88) for multiple dwellings. The highest high-water mark was reported at a depth of 4' in 2015 and 2' in 2016 at 7809 Peppercorn Lane according to the City records. These flood depths correspond with stages of approximately



Photo 7. Finished Floor above Ground Surface

16.25 feet and 14.25 feet, respectively. With the records of hourly rainfall depths from the nearby rain gages for each of these storms, the model was verified within 1 foot for the 2016 event and 0.5 foot for the 2016 flood conditions. The 2015 stages support the use of the 13-ft stage boundary condition for the 100-yr design storm at the downstream confluence with Goose Creek.

Model Validation 2

Flooding was observed at the Ashley Townhomes on Mountainbrook Road during the 2015 event only. The multi-family dwellings at 7558 Mountainbrook Avenue were recorded to have 1.5 feet of floodwater. This corresponds approximately with a stage of 15.5 ft based on the LiDAR elevations and an approximate floor elevation of 0.5 foot above grade. The model results (15.2 ft) correspond within 0.3 feet at this location for the 2015 storm rainfall.

Model Validation 3

Additionally, a dwelling downstream on Popperdam Creek at 7604 Allwood Dr was flooded with a recorded 1 foot of water in the house. A surveyed point at the grade of the demolished house was at 6.7 ft which corresponds closely with the LiDAR at this location. The depth corresponds with a flood stage reaching 8.2 feet when adding 6 inches for the foundation. This corresponds very closely (within 0.1 ft) with the modeled flood stage at this location for the 2015 storm without any coincidental flooding from the Ashley River. Since the 100-year floodplain for the Ashley River is mapped a few feet higher, this is assumed to be the peak flood stage for Popperdam Creek with normal tidal conditions and flows in the Ashley River, and confirms the downstream boundary condition for the 2015 event.

Model Validation 4

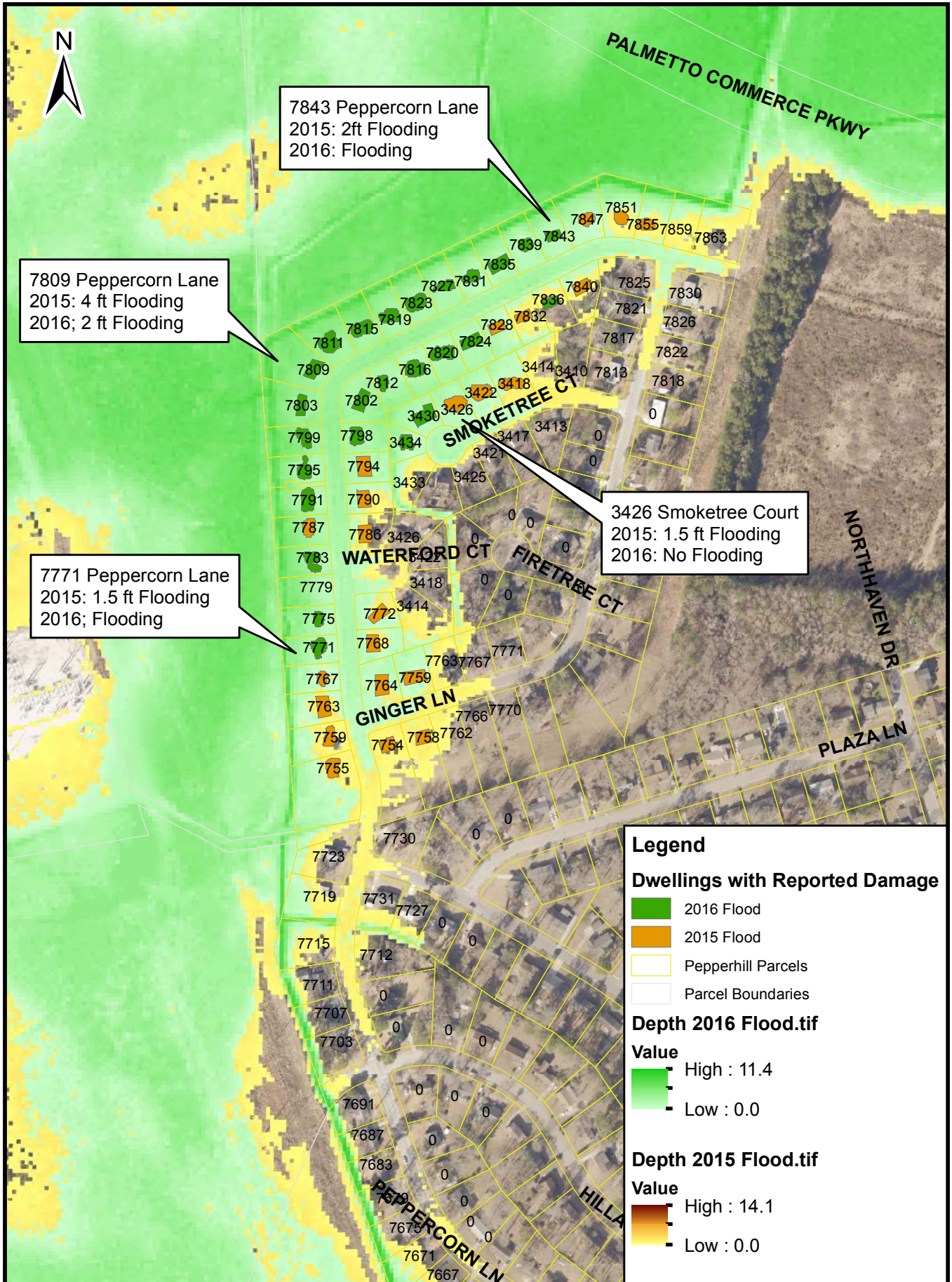
The flooding extents as shown on **Figure 3-8** correspond well with the dwellings reportedly flooded in Pepperhill in 2015 and 2016. Approximately 70 single family dwellings in the north end of Pepperhill and approximately 20 buildings around Mountainbrook Avenue are in the 2015 floodplain. The extent of the 2016 mapped floodplain which closely matches the 25-year recurrence interval encompasses 57 dwellings. Not all of these dwellings experienced damage to the buildings because the slabs are elevated, but this indicates the extent of flooding mapped based on the modeling for the 2015 and 2016 storms is accurate.

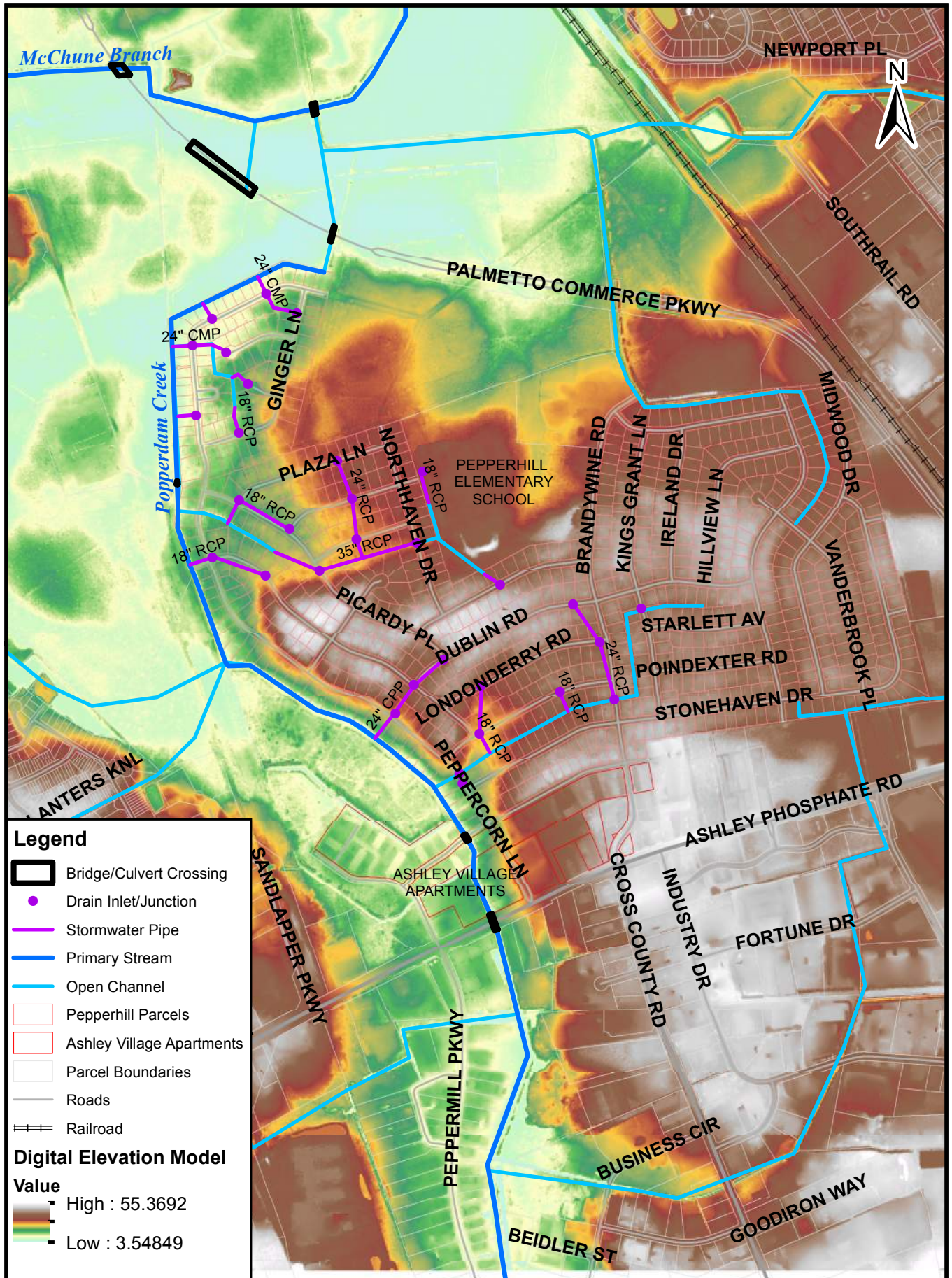
3.2.3 Pepperhill Drainage System

On a smaller scale, SWMM modeling of the Pepperhill Neighborhood secondary drainage system was performed to evaluate the contributions of localized stormwater and drainage system deficiencies on recurrent flooding conditions. This was done in XPSWMM, a proprietary software based on the EPA SWMM platform. The model uses flows developed in the HMS model and applies them to model conduits representing the closed pipes and open channel system drainage identified. Information on the pipe network was obtained by field survey where accessible.

The field survey identified 8 closed/open system drainage networks discharging to the ditch along Peppercorn Lane. The secondary drainage systems in Pepperhill subdivision includes drain inlets, various size and material pipes, and open channels. Four of these drainage systems include an open collector channel between lengths of pipe. In the focus area North of Hillandale Road, one system of pipes and channels collect runoff from Ginger Lane, Firetree Court, and Smoketree Court and discharges just south of 7802 Peppercorn Lane. Another system collects runoff from the elementary school and Stonybook Road and discharges between Hillandale Road and Picardy Place. **Figure 3-9** shows the drainage systems in Pepperhill.

The XPSWMM model indicates that the drainage system is generally able to convey flows for up to the 10-year design storm. Flows greater than the piped system capacity are conveyed overland via the streets and yards. During large events some localized ponding is expected at drain inlets and low areas along the overland flow paths. This localized ponding may be a nuisance, but is not expected to reach significant depths, affect buildings, or cause erosion. Low areas where ponding may occur are on or near Peppercorn Lane where the drainage system begins to flatten out and may encounter backwater from the main ditch. Drainage is expected to be conveyed to the ditch along Peppercorn Lane without significant backups or flows collecting in relative low areas.





Section 4

Stormwater Management Evaluation

4.1 Introduction

This section describes the stormwater management evaluations using the stormwater models and field investigation to identify existing and potential future drainage and flooding problems and factors contributing to flooding in the McChune Branch watershed. Flooding issues in the study area in the Pepperhill subdivision are potentially affected by multiple sources of flooding, including coastal surge, fluvial, and pluvial flooding. Fluvial flooding is when a creek or river overflows its banks. Pluvial flooding is caused when heavy rainfall creates a flood independent of a flowing water body. Flooding experienced recently at Pepperhill beginning in 2015 has been attributed by local residents to recent development in the watershed including conversion of forested land to developed land uses and the construction of multiple roadways across the McChune Branch floodplain. This section evaluates causal factors associated with watershed flooding conditions, changes in conditions prior to recent development (1999) to determine any impacts on flooding, and potential improvement areas.

The major objectives of the drainage study are as follows:

- Identify and assess existing flooding and drainage problems
- Prioritize existing problems and provide recommended improvements
- Evaluate and determine effects of recent developments on drainage and flooding along Peppercorn Lane by comparing existing flood stages to pre-development conditions at:
 - Palmetto Commerce Parkway,
 - Weber Boulevard,
 - Ingleside Roads, and
 - Recent land development.
- Evaluate and determine effects of local drainage from the Pepperhill subdivision and surrounding areas on flooding issues along Peppercorn Lane.

4.2 Stormwater System Performance Evaluations

Performance standards for the conveyance system specify the design flows that can be accommodated without exceeding the system's capacity or causing considerable damage. The standards may be defined in a community's drainage design manual or through accepted engineering practice. The following sections summarize the evaluation of the City's drainage system related to roadway crossings, drainage, and structural flooding.

4.2.1 Watershed

The McChune Branch watershed is defined as the land area that drains to McChune Branch. The characteristics of the watershed determine the hydrologic response to a given rainfall event. The

watershed hydrologic response varies depending on many factors. The infiltration capacity of the soils, the percent directly connected impervious area, the efficiency of the drainage system, and the available channel and floodplain storage determine the timing and quantity of runoff reaching a given point. The watershed hydrologic response results in a peak flow for a given storm event. For this study, peak flows for the 2, 10, 25, 50, 100, and 500-year return interval rainfall events were hydrologically modeled and resulting watershed responses provided as peak flows. In the McChune Branch watershed, extensive wetland floodplains create a large storage area which serves to attenuate runoff flows. The flat floodplains extend for miles at nearly the same elevation causing flood stages to also extend for miles at the same elevations.

The efficiency, storage capacity, and speed of conveyance of overland runoff affects the amount of runoff reaching the drainage system. Where runoff from roofs and driveways are directly connected to streets with curb and gutter and piped drainage systems, more runoff reaches the conveyance system SSMS and the PSMS rather than infiltrating or puddling in place.

The cumulative effects of development are quantified using a land development scenario based on conditions in 1999. Results of this modeled scenario indicate that peak flows were less than the existing peak flows for the modeled storms. However, due to attenuation in the watershed, the increase in development does not translate to a significant increase in peak stages in McChune Branch in the last 20 years.

The McChune Branch watershed encompasses an area of 11.5 square miles at Interstate 26. Upstream of PC Parkway, McChune Branch drains an area of approximately 3.7 square miles including Coosaw Creek Country Club and nearby residential development. Development covers approximately a quarter of the watershed area and wetlands cover approximately 1,300 acres (2 square miles). Runoff storage volume in the watershed plays a significant role in attenuating the peak runoff during large rain events. For example, the runoff entering the tributary area upstream of PC Parkway receives 949 cubic feet per second (cfs) and discharges downstream at a peak of 455 cfs for the 100-year return interval as shown in Table 3-3.

4.2.2 Conveyance

The conveyance system in McChune Branch is comprised of the secondary drainage system and the primary drainage system. The secondary drainage system collects runoff from the uplands and conveys them to the primary system which is McChune Branch and the associated floodplains. During large rainfall runoff events the McChune Branch floodplains become inundated and conveyance becomes slow moving as limited by backwater effects.

4.2.2.1 Secondary Stormwater Management System (SSMS)

Overland flow is collected in manmade pipes and ditches draining areas such as Pepperhill to McChune Branch and Popperdam Creek facilitating removal of rainfall runoff from these areas. The rapid conveyance of runoff is important, because where drainage systems do not remove runoff, it can accumulate causing ponding. While ponding is not usually an issue associated with structural flooding, it can cause roadways to become covered and low-lying areas to retain standing water.

The efficiency, storage capacity, and speed of conveyance of concentrated runoff affects the amount of runoff reaching the PSMS. Where drainage systems efficiently and rapidly deliver

runoff downstream, more runoff reaches the PSMS rather than infiltrating or ponding in place, resulting in higher peak flows and greater flooding downstream.

New development is required to control the peak runoff leaving a site using stormwater control measures such as detention ponds. However, the runoff detained is only for smaller, more frequent design storm and does not attenuate the 100-year design storm peak runoff.

4.2.2.2 Primary Stormwater Management System (PSMS)

The man-made channels and natural floodplains comprising the McChune Branch and Popperdam Creek primary stormwater management systems convey runoff collected from the watershed headwaters via secondary drainage systems to their downstream confluences with Goose Creek and the Ashley River, respectively.

The McChune Branch headwaters begin near the Coosaw Creek Country Club where they immediately take the form of riparian wetlands. With a manmade channel carved through the wetlands for most of the length and broad floodplain wetlands, McChune Branch flows east past Pepperhill and then north merging into Bluehouse Swamp before converging with Goose Creek downstream of I-26. McChune Branch is a wide slow-moving waterway with heavily vegetated floodplains and shallow, backwatered channels at a slope of 0.0002 ft/ft. Several roadway crossings and a railroad crossing transect McChune Branch and its floodplains. Popperdam Creek, in contrast to McChune Branch, is a mostly straight and confined open channel conveyance with a slope of 0.0005 ft/ft from the headwaters along Peppercorn Lane, down to the tidal discharge at the Ashley River. The hydraulic capacity of Popperdam Creek is a function of slope, cross sectional area, roughness, and the constraints associated with multiple roadway crossings. Tidal and storm surge can also be a factor if they happen to coincide with peak storm flows at the discharges of McChune Branch or Popperdam Creek. This does not appear to be the case for the 2015 or 2016 storm events and is not included in the downstream boundary conditions for the modeled events.

Along McChune Branch the primary drainage system was modeled from near the headwaters at Coosaw Creek Country Club to I-26 near where McChune Branch confluences with Goose Creek. As shown in **Figure 4-1**, the McChune Branch water surface profiles are very flat.

The peak flows provided in Table 3-3 show the runoff concentrated along the PSMS from the SSMS. Just upstream of PC Parkway the flood attenuation of the watershed is apparent in the reduction of peak flows as the storage capacity of the floodplain is much higher than the discharge capacity due to limited conveyance capacity across the flat floodplains.

Popperdam Creek water surface profiles are shown in **Figure 4-2**. Popperdam Creek extends from the northern part of the Pepperhill neighborhood to the Ashley River.

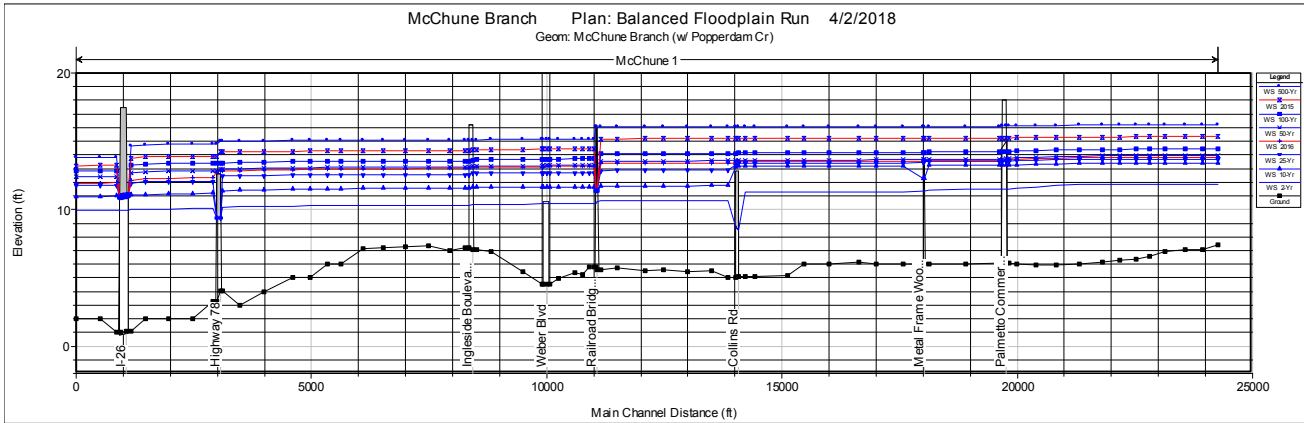


Figure 4-1. McChune Branch Existing Conditions Modeled Stream Profile

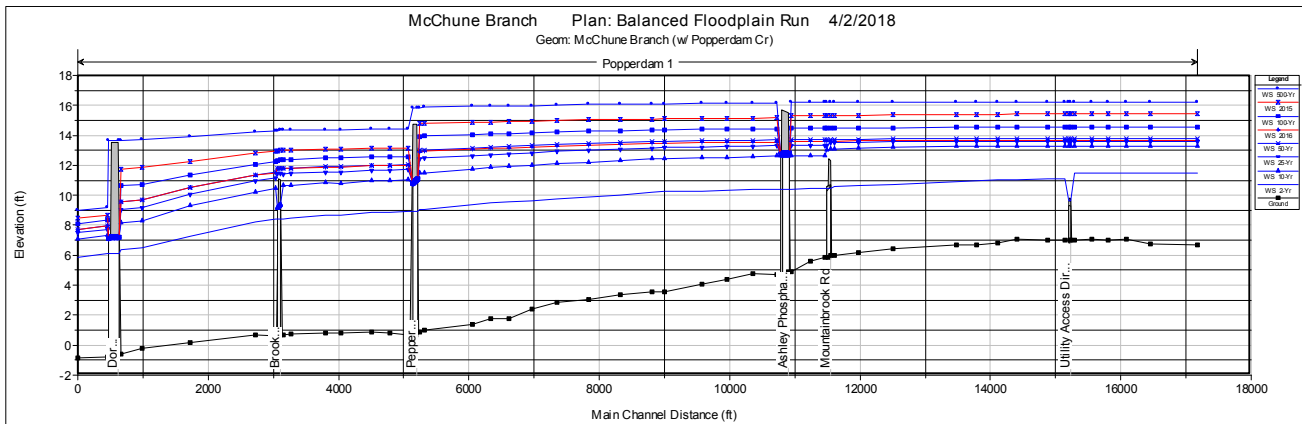


Figure 4-2. Popperdam Creek Existing Conditions Modeled Stream Profile

Pepperhill is located at the drainage divide between McChune Branch and Popperdam Creek. When the McChune Branch capacity to convey flood waters is overwhelmed and the floodplains flood, waters spread over the flat areas to the Pepperhill area and flow towards Popperdam Creek. The McChune Branch conveyance capacity is controlled by floodplain conditions and constrictions at roadways. Conditions inhibiting conveyance along McChune Branch include densely vegetated floodplains and a lack of defined channel for much of McChune Branch downstream of Weber Blvd. Collins Road is shown to have greatest effect on backing up flood waters for all modeled storm events. These backwaters contribute to flooding in the Pepperhill area by raising flood stages for all modeled storms. Runoff from the Pepperhill subdivision itself and the areas to the immediate west also contribute to the accumulation of water in the area.

Runoff from this area also drains down Popperdam Creek via direct connection to the channel along Peppercorn Lane. The conveyance of flow down Popperdam Creek is limited by multiple roadways and is subject to backwater conditions at the discharge at the Ashley River.

Conveyance Channels

The conditions of the primary stormwater management systems, comprising the conveyance system were observed in the field where accessible.

The extended backwatered channel conditions along McChune Branch and the tendency for base flow to drain towards Popperdam Creek when the ditch along Peppercorn Lane is full indicates that base flow drainage along McChune Branch is constrained by more than grade and

downstream conditions. Locations where flow was observed to be obstructed in the channel was at a sediment bar near the landfill and upstream of Weber Blvd where a downed tree was causing minimal blockage of flow. Besides these channel obstructions, aquatic vegetation and some smaller downed trees were observed in the channel with potential to minimally reduce channel flowrates. Natural debris accumulates within the channel due to slow flow velocities, particularly where aquatic vegetation or trees tend to hold and accumulate floating debris from upstream. While this natural accumulation of debris does not appear to be hindering flow, maintenance clearing of the ditches may be required on regular basis to keep the channel flowing. One location where debris is accumulating is downstream of Collins Road. The channel widens and is more open to sunlight providing conditions for aquatic vegetation. This area can be observed on the aerials due to the collection of light green vegetation (duck weed) floating on the surface. Some logs and waste debris have collected in this area. Alligator weed is one of the prevalent exotic invasive species of plants covering the channel where not shaded in the powerline easement to the north of PC Parkway.



Photo 4-1. McChune Branch Minor Debris Blockage

Floodplain Wetlands

The extensive forested riparian wetlands along McChune Branch have a large capacity to hold water. These wetlands cover an estimated 560 acres along McChune Branch. A foot of storage across these wetlands is equivalent to approximately 560 acre-feet or 185 million gallons of water. The dense floodplain wetland trees including Cypress and Tupelo are maturing following historic clearing and recent forestry in some areas as observed on historic aerials. The density and size of trees contributes to hydraulic roughness for flows in the floodplain which tends to hinder flows especially downstream of Weber Boulevard where no defined channel provides a clear path for flows.



Photo 4-2. McChune Branch Floodplain Wetlands

Roadway Crossings

Roadways crossing McChune Branch with limited conveyance capacity have significant backwater effects in the watershed. No major roadways were reported to overtop during the recent large flood events described in Section 2.2.3 besides Highway 78. The tendency for a roadway crossing to block floodplain flows and limit conveyance capacity can be a controlling or contributing factor causing higher flood stages upstream. Crossings in the study watersheds were modeled for effects on the upstream flood stages around Pepperhill. **Tables 4-1 and 4-2** list the roadway crossing locations in the study watersheds with the predicted flooding elevations under existing and proposed land use conditions. Red font indicates a rise of greater than 1 foot across a crossing and bold font indicates overtopping occurring for the modeled design storm. Crossings at Peppermill Parkway and Dorchester are shown to hold more than a foot of head behind them for the 100-year and greater storms, thereby impeding flood flows and potentially exacerbating upstream flooding. Roadways on McChune Branch which constrict flows greater than a tenth of a foot include the railroad crossing and Highway 78.

Table 4-1. Hydraulic Performance for Existing Conditions Roadway Flooding

Location	Minimum Elevation at Top of Road	Calculated Water Surface Elevations (feet NAVD)					
		10-year D/S	10-year U/S	100-year D/S	100-year U/S	500-year D/S	500-year U/S
McChune Branch							
Palmetto Commerce Pkwy	23.00	13.25	13.27	14.21	14.24	16.10	16.11
Metal/Wood Bridge	13.70	13.18	13.25	14.15	14.20	16.09	16.09
Collins Road	12.84	11.75	13.17	14.13	14.14	16.08	16.08
Railroad Crossing	16.02	11.67	11.72	13.71	14.11	15.16	16.06
Weber Boulevard	17.00	11.64	11.66	13.66	13.70	15.13	15.16
Ingleside Road	16.20	11.55	11.63	13.56	13.64	15.10	15.11
Highway 78	12.67	11.20	11.38	13.41	13.43	14.81	15.00
Interstate 26	17.50	10.99	11.05	12.86	13.25	13.84	14.64
Other Crossings							
Utility Dirt Road	9.66	13.26	13.26	14.53	14.53	16.23	16.23
Mountainbrook Road	12.44	12.66	13.10	14.49	14.50	16.22	16.22
Ashley Phosphate Road	15.72	12.60	12.62	14.45	14.48	16.13	16.21
Peppermill Parkway	14.72	11.01	11.46	12.58	13.92	14.42	15.86
Brookdale Boulevard	11.07	10.45	10.65	12.23	12.39	14.29	14.33
Dorchester Road	13.52	7.30	8.16	8.34	10.63	9.15	13.68

Note: Red font indicates greater than 1 foot drop across crossing.

Bold font indicates overtopping occurring at crossing.

Table 4-2. Hydraulic Performance for Proposed Conditions Roadway Flooding

Location	Minimum Elevation at Top of Road	Calculated Water Surface Elevations (feet NAVD)					
		10-year D/S	10-year U/S	100-year D/S	100-year U/S	500-year D/S	500-year U/S
McChune Branch							
Palmetto Commerce Pkwy	23.00	12.53	12.57	14.33	14.36	16.21	16.23
Metal/Wood Bridge	13.70	12.34	12.43	14.28	14.33	16.20	16.21
Collins Road	12.84	12.14	12.30	14.26	14.26	16.19	16.19
Railroad Crossing	16.02	11.95	12.09	13.67	14.23	15.23	16.16
Weber Boulevard	17.00	11.92	11.95	13.62	13.66	15.27	15.31
Ingleside Road	16.20	11.82	11.90	13.52	13.59	15.23	15.24
Highway 78	12.67	11.43	11.65	13.36	13.38	14.95	15.12
Interstate 26	17.50	11.20	11.28	12.82	13.20	13.93	14.78
Utility Dirt Road	9.66	12.70	12.70	14.82	14.82	16.70	16.70
Mountainbrook Road	12.44	12.33	12.59	14.78	14.79	16.16	16.16
Ashley Phosphate Road	15.72	12.30	12.31	14.72	14.77	16.08	16.15
Peppermill Parkway	14.72	10.76	11.15	12.79	14.24	14.24	15.79
Brookdale Boulevard	11.07	10.22	10.38	12.49	12.61	14.10	14.14
Dorchester Road	13.52	7.17	7.90	8.46	11.02	9.08	13.40

Note: Red font indicates greater than 1 foot drop across crossing.

Bold font indicates overtopping occurring at crossing.

Backwater from Collins Road is shown to extend to upstream of Palmetto Commerce Parkway where the Pepperhill neighborhood is to Coosaw Creek Country Club. With just two 42-inch diameter culverts beneath Collins Road there is an increase in flood water surface elevations for smaller storms. However, the 100 and 500-yr events are shown to overtop the roadway. No other crossings on McChune Branch show significant backwater effects.

The smaller crossings of Mountainbrook Avenue and Brookdale Avenue overtop beginning with the 10-year return interval. No storm event is shown to overtop the roadways at Ashley Phosphate Road and Dorchester Road. Peppermill Parkway and Dorchester Roads show the only significant backwater effects (greater than 1 foot).

Roadway crossings that have a significant rise in water surface elevation across them are listed and described below:

- Collins Road was built by a private land owner prior to much of the other development in the McChune Branch watershed. The currently inactive roadway is elevated more than 5 feet above the surrounding wetland floodplain and is not known to have overtopped during either the 2015 or 2016 floods. A pair of 42" RCP culverts beneath the roadway has served to drain the entire upstream watershed and is attributed to a more than 2-foot rise in base flood elevation for the 100-year storm according to the FEMA preliminary FIRM and CDM

Smith's model. The roadway appears to have a second former culverted crossing to the east. Evidence of a potential former pipe beneath the road is observable on the DTM and beneath the overgrown brush about 600 feet east of the existing culvert crossing. This second crossing may have provided additional conveyance until recent years.

- The railroad crosses McChune Branch between Collins Road and Weber Boulevard with a steel bridge. The beams are elevated only a few feet above the channel and the channel is narrowest at the railroad. A row of piers support girders on each side of the channel. Rock covered abutments on each side beneath the bridge provide a space of approximately 2-feet for water to flow through. The steel beams show evidence of recent and prolonged wetting with rust coloring.
- This railroad bridge may have been replaced within the last twenty years altering the cross-sectional area for flow through. The tops of the old piers remain exposed over the abutments. A layer of rock may have been added on the abutment reducing the effective channel width.
- Peppermill Parkway, a crossing along Popperdam Creek, is a relatively low-profile bridge/culvert which is shown to overtop during relatively high frequency storm events starting with the 10-yr. This crossing produces a rise of approximately 1.5 feet upstream according to the hydraulic model.

The floodplain cross sections upstream and downstream of these crossing indicate that a large portion of the floodplain conveyance has been obstructed by the fill associated with these roadways. However, comparison of the flood profile upstream and downstream indicates no backups at Palmetto Commerce Parkway, Weber Boulevard, or Ingleside Roads associated with reduced floodplain conveyance capacity.

4.2.3 Flooding

Flooding in McChune Branch occurs regularly with any storm event causing overtopping of the channel banks. Flooding which affects developed infrastructure occurs less frequently with larger rain events. Flooding does not cause overtopping of active roadways except for extreme events. During the 100-yr and greater events, Highway 78 is shown to overtop due to its low profile. Along McChune Branch, with exception of Coosaw Creek Country Club, Pepperhill is the only residential neighborhood partially built within the 100-yr floodplain. Certain roadways and properties in Pepperhill are shown to flood for storms with return intervals 10-yr and greater. Flooding in this area is a result of backwater effects from McChune Branch and Popperdam Creek combined and the water that floods the neighborhood is not flowing.

The Federal Emergency Management Agency (FEMA) aims to protect homes from flooding up to the 1% annual chance rainfall event. Therefore, CDM Smith assumed the same standard for the evaluation of structural flooding in the Pepperhill study area. Structural flooding upstream of Pepperhill on McChune Branch and downstream of Ashley Phosphate Boulevard was not evaluated as part of this study.

CDM Smith first examined multiple sources of information to determine the impacts, if any, to structures under existing and future flow conditions. First, CDM Smith evaluated the presence of structures within the mapped regulatory floodplain and identified 17 residential dwellings along

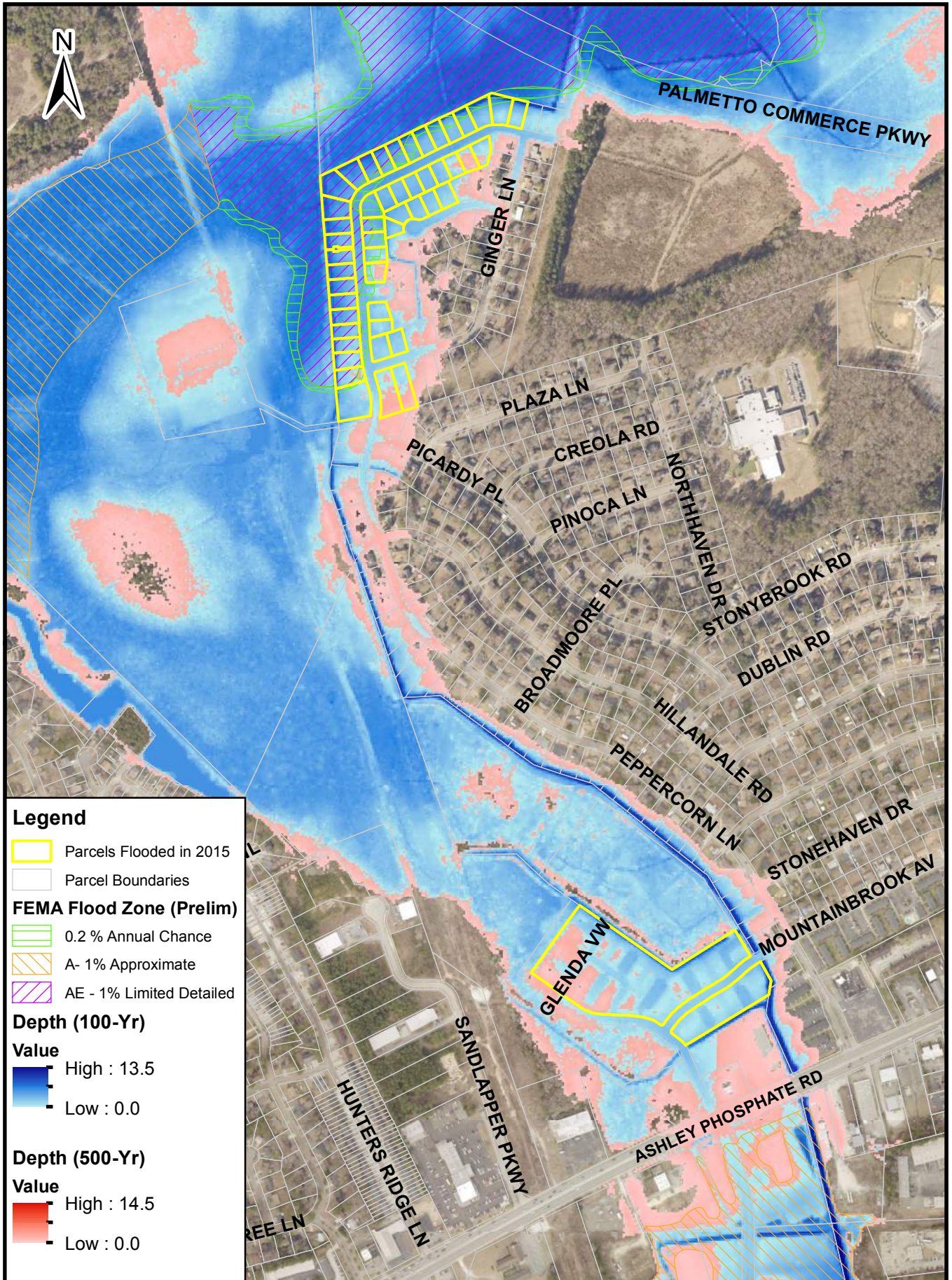
Peppercorn Lane within the FEMA 100-year annual chance event flood zone. Many residential parcels in Coosaw Creek Country Club also have building footprints in the 100-year, but these structures are generally elevated slightly with finished floor elevations above the 100-year flood stage. Therefore, these residences are only reported to experience flooding in their yards and driveways and not damaging structural flooding.

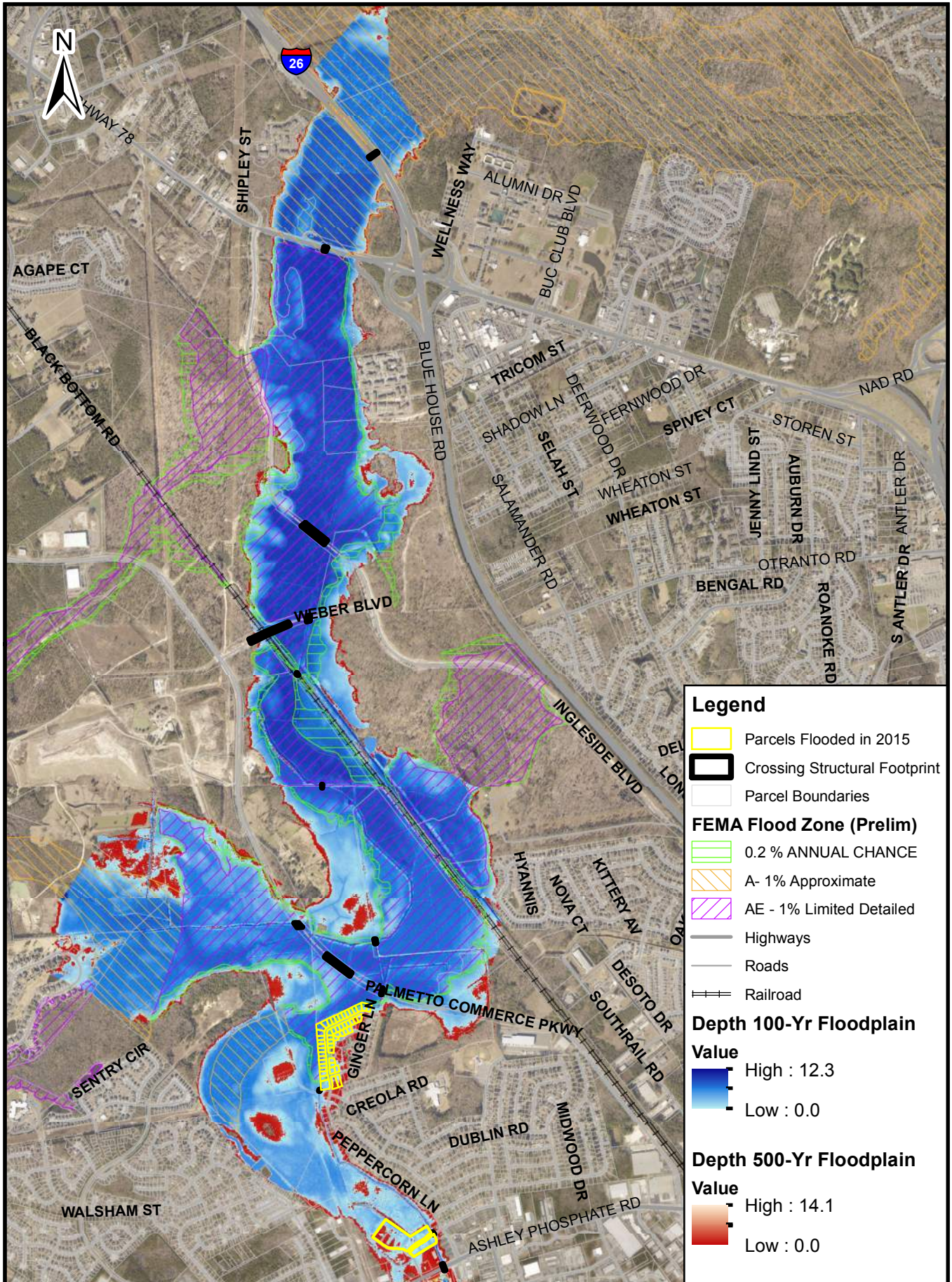
Second, CDM Smith requested available records from the City of N. Charleston regarding structures flooded in recent storm events. The City provided records of dwelling flooding for the 2015 and 2016 flooding events. Third, CDM Smith used results from the HEC-RAS modeling effort to define the predicted 100-year annual chance floodplain under existing and future conditions to determine how many existing structures would potentially be impacted. City records indicate upwards of 28 homes flooded on the inside during Hurricane Mathew in 2016 and more than 50 during the 2015 historic rainfall event (exact count is not confirmed). **Figure 4-3** shows the parcels reported to have experienced flooding. High water depths of 4 feet in 2015 and 2 feet in 2016 reported inside 7809 Peppercorn Lane combined with surveyed base floor elevation of 12.25 ft provides flood stages of 16.25 and 14.25 for the 2015 and 2016 storms. The extent of flooding and recorded elevations were generally confirmed by the model and review of the modeled flood stages reaching 14 and 16 feet, respectively for the two storms. Based on a review of the GIS, there are 18 structures in the FEMA mapped preliminary 100-year annual chance event flood zone which correspond with the 40 identified.

CDM Smith evaluated the 100-year (1%) flood stages for existing and future conditions to identify other areas of flood risk in the watershed. **Table 4-3** lists the modeled flood stages at Pepperhill. The predicted flood stages were projected onto available the digital terrain model using GIS and compared against the location of existing structures on the 2015 aerial photos to identify potential structural flooding problems. **Figures 4-4** and **4-5** show the modeled floodplains overlaid on the watershed map with aerial photography.

Table 4-3. Modeled Flood Stages at Pepperhill

		2-YR	10-YR	25-YR	50-YR	100-YR	500-YR	2015	2016
Existing Conditions									
McChune Branch	XS-31704	11.5	13.3	13.6	13.8	14.5	16.2	15.4	13.7
Proposed Condition with Only Collins Road Improvements									
McChune Branch	XS-31704	11.4	12.7	13.6	13.8	14.4	16.2	-	-
Proposed Condition with Improvements at Collins Road, Peppermill Parkway, and Mountainbrook Road									
McChune Branch	XS-31704	11.3	12.6	13.1	13.7	14.0	15.0	-	-
Future Condition (with Collins Road Improvements)									
McChune Branch	XS-31704	12.0	13.3	14.0	14.6	15.6	16.5	-	-
Future Condition (with Collins Road Improvements) and Proposed Improvement at Railroad									
McChune Branch	XS-31704	12.0	13.3	13.8	14.6	15.2	16.3		





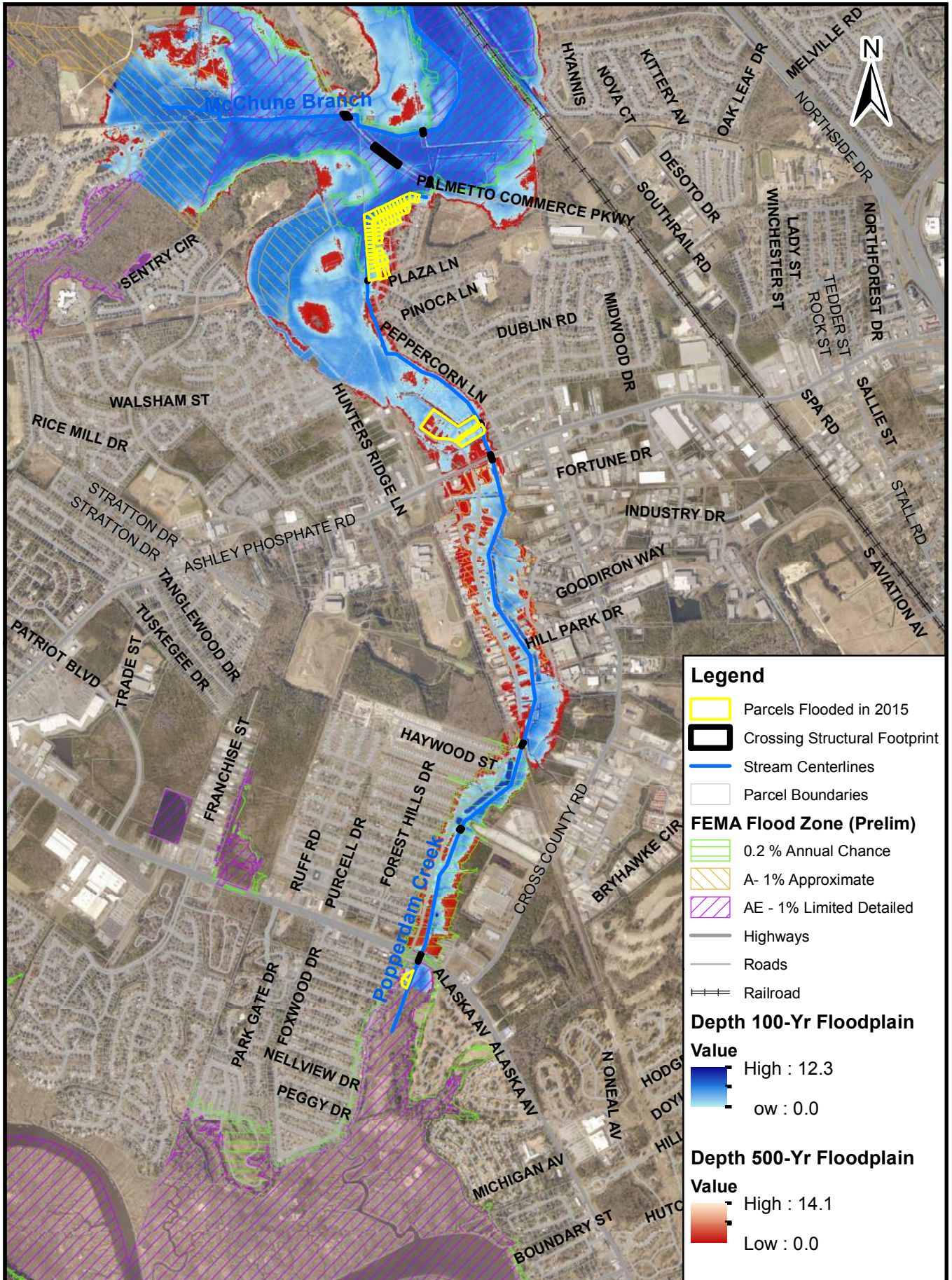


Table 4-4. Properties with Dwellings in Modeled Floodplain

Count	Address	Approximate Slab Elevation (ft)	Return Interval Floodplain (yr)
1	7799 Peppercorn Lane	12.0	10
2	7803 Peppercorn Lane	12.2 (12.3)	10
3	7811 Peppercorn Lane	12.5	10
4	7815 Peppercorn Lane	12.8	10
5	7809 Peppercorn Lane	12.7	10
6	7787 Peppercorn Lane	12.8	10
7	7783 Peppercorn Lane	12.8	10
8	7795 Peppercorn Lane	12.8	10
9	7819 Peppercorn Lane	12.8	10
10	7791 Peppercorn Lane	12.8	10
11	7823 Peppercorn Lane	12.8	10
12	7812 Peppercorn Lane	12.8	10
13	7798 Peppercorn Lane	12.8	10
14	7827 Peppercorn Lane	12.8	10
15	7820 Peppercorn Lane	12.8	10
16	7816 Peppercorn Lane	12.8	10
17	7831 Peppercorn Lane	12.8	10
18	7775 Peppercorn Lane	12.8	10
19	7835 Peppercorn Lane	12.8	10
20	7802 Peppercorn Lane	12.8	10
21	7839 Peppercorn Lane	12.8	10
22	7843 Peppercorn Lane	12.9 (13.4)	10
23	7794 Peppercorn Lane	13.2	10
24	7779 Peppercorn Lane	13.1	10
25	7824 Peppercorn Lane	13.6	25
26	7771 Peppercorn Lane	14.1 (14.0)	50
27	3430 Smoketree Court	13.6	25
28	3434 Smoketree Court	13.9	100
29	3426 Smoketree Court	13.7	50
30	7847 Peppercorn Lane	14.1	100
31	3422 Smoketree Court	14.2	100
32	7836 Peppercorn Lane	15.6	50
33	7828 Peppercorn Lane	14.4	100
34	7790 Peppercorn Lane	14.8	500
35	7768 Peppercorn Lane	14.8	500
36	7772 Peppercorn Lane	14.8	500
37	3418 Smoketree Court	14.8	500

Count	Address	Approximate Slab Elevation (ft)	Return Interval Floodplain (yr)
38	7767 Peppercorn Lane	14.8	500
39	7755 Peppercorn Lane	14.8	500
40	7855 Peppercorn Lane	14.8	500
41	7859 Peppercorn Lane	14.8	500
42	7851 Peppercorn Lane	14.8	500
43	7763 Peppercorn Lane	14.8	500
44	7719 Peppercorn Lane	14.8	500
45	7863 Peppercorn Lane	14.8	500
46	7723 Peppercorn Lane	14.8	500
47	7759 Peppercorn Lane	14.8	500
48	7754 Ginger Lane	14.8	500
49	7759 Ginger Lane	14.8	500
50	7832 Peppercorn Lane	14.8	500
51	7763 Ginger Lane	14.8	500
52	7764 Peppercorn Lane	14.8	500
53	7758 Ginger Lane	14.8	500
54	7840 Peppercorn Lane	14.8	500
55	3414 Smoketree Court	15.1	500
56	7715 Peppercorn Lane	15.2	500
57	7786 Peppercorn Lane	15.3	500
58	3433 Smoketree Court	15.4	500
59	3414 Waterford Court	15.9	500
60	7762 Ginger Lane	16.0	500
61	7730 Picardy Place	16.1	500

Notes: Approximate slab elevation estimated to be 0.75 feet above ground level which is derived from GIS LiDAR data.

Finished Floor elevations surveyed for dwellings at 7803, 7843, and 7771 Peppercorn Lane as indicated in parentheses.

4.2.4 Impacts of Recent Development

Although significant rainfall events occurred prior to 2015, the only known reports of flooding in the Pepperhill area prior to October 2015 do not provide specific details about extents of damage or depths. As a result, the effects of recent development in the watershed have been questioned for their role in causing flooding. Recent development includes development in several new subdivisions, both commercial and residential, and roadways transecting the McChune Branch floodplain. Watershed conditions are evaluated as of 1999, which is after the 1997 large rain event and before much of the recent development including the three roadways built after 2007. These developments had the effects of increasing runoff, reducing floodplain storage, and potentially obstructing floodplain conveyance capacity. CDM Smith modeled a Pre-development scenario with land use conditions reflecting forests where there is now development and without the three roadways recently constructed across McChune Branch.

Recent development in the McChune Branch headwaters includes multiple residential subdivisions to the west, a commercial area to the northwest, and roadways within the floodplains. Development can impact flooding by contributing more runoff, reducing floodplain storage, and altering conveyance hydraulics.

Recent roadway development in the McChune Branch floodplain includes:

- Palmetto Commerce Parkway – 4 lane connector/thoroughfare
- Weber Boulevard – 2 lane connector
- Ingleside Boulevard – 2 lane arterial

The most recently constructed roadway crossings along McChune Branch were evaluated for impacts to flood stages upstream and for drainage of base flows. None of the recently constructed roadways were shown to have a significant effect (greater than a tenth of a foot) on the base flood elevations for the 1% annual chance event.

- Palmetto Commerce Parkway was constructed in 2009 by Charleston County and has 2 bridges and 1 culvert along its length spanning McChune Branch and its floodplain. One bridge (100 ft in length) spans the McChune Branch channel and the second (525 ft) spans a portion of the floodplain. A 12'x9' box culvert provides drainage connecting the ditch along Peppercorn Lane to McChune Branch. A series of smaller interconnecting ditches also provided drainage from the area northwest of Peppercorn Lane towards McChune Branch before construction of PC Parkway. One of these ditches remains active through an 18-inch RCP pipe installed on the east end of the long bridge, through the embankment. One or more ditches were cut off by embankment fill associated with PC Parkway, but to be redundant and their removal is not contributing to drainage backups.
- Weber Boulevard was built in 2013 with a low-profile concrete single span bridge over the McChune Branch channel and a long span elevated bridge over the railroad and portion of the McChune Branch floodplain. The lowest point is the channel under the low profile bridge, and there is a secondary lowpoint in the floodplain wetlands beneath the high bridge adjacent to the railroad track. Remains of a former logging road parallels Weber Boulevard to the north and appears to be impeding base flow through the lowest point in the floodplain besides the channel. In combination with the embankment of Weber Boulevard, this roadway is blocking a portion of the floodplain conveyance and may be increasing the normal water surface elevation upstream.
- Ingleside Road was built in 2013 with a length of bridge spanning 466 ft over the McChune Branch floodplain wetlands. A well-defined deepened channel for McChune Branch is not present at the Ingleside Road crossing or downstream until beyond I-26. The defined channel ends in the wetlands between Weber Boulevard and Ingleside Road and throughout Bluehouse Swamp flow remains spread across the wetlands without a defined channel, except at the highway crossings. A small remnant channel through the cypress trees was observed on the east end of the Ingleside Road Bridge. This channel may have contributed to base flow drainage through the wetland, but is not large enough to affect flood conveyance.

Each of these roadways, built by the County of Charleston, were constructed between 2007 and 2015 and altered the McChune Branch floodplain by placing fill and potentially altering base flow and floodplain flow dynamics. The cross-sectional areas for floodwaters to travel down McChune Branch were reduced and storage volume within the floodplain was lost. At Palmetto Commerce Parkway, an estimated 57-acre feet of storage volume within the 100-yr floodplain was lost due to the footprint of this roadway alone.

Based on the modeling, the reduction in conveyance cross sectional area resulted in minimal, if not negligible, effects on flood stages upstream of each roadway under existing conditions.

4.2.5 Impacts of Future Development

Development of the McChune Branch watershed is ongoing and densities may approach build-out conditions in the near future. Commercial land uses along Palmetto Commerce Parkway and residential subdivisions throughout the watershed will increase impervious surface areas and increase runoff to McChune Branch. Due to the broad storage capacity of the McChune Branch floodplains, the added runoff received by the stream system will be attenuated and result in limited increase in flood stages. The effect of future development will be slightly increased flood stages for the range of return intervals. Modeling indicates the effects of future development on flood stages will be an estimated increase of 1.1 foot for the 1% Annual Chance return interval. This increase is expected to expand the area of flooding such that the 1% Annual Chance floodplain approaches the 0.2% Annual Chance Floodplain. In the Pepperhill neighborhood, this is expected to significantly increase the number of dwellings in the 1% Annual Chance floodplain by approximately 26 structures with finished floor elevations near elevation 15 feet.

Mitigation of the additional future development stormwater runoff projected to increase flood stages, consisting of development management measures, could serve to limit the adverse effects of development. Potential development runoff reduction methods include impervious area limits, peak runoff flow rate controls, and runoff total volume controls. Limits on site development, for example, 24% built upon area could serve to reduce effects of build-out where sprawling impervious areas without greater proportions of open space are provided. These types of controls are site dependent based on the infiltration capacity of the area soils and the capacity to capture and detain runoff. For the 1% Annual Chance return interval, capture and/or infiltration for storms of this magnitude can occupy a very large portion of a development property, especially in coastal conditions with shallow groundwater. Feasibility for runoff reduction methods for flood control during large magnitude storm events is limited.

4.3 Evaluation Summary

Flooding in the McChune Branch study area is a result of stormwater runoff entering the McChune Branch channel and floodplain overwhelming the capacity of the primary stormwater management system to discharge water downstream. The flat waterway rapidly exceeds channel capacity during any significant rainfall event and floods the overbank floodplain wetlands which provide storage for the runoff while the system then drains slowly out to Goose Creek. When the volume of stormwater fills the floodplain storage area above a certain elevation, flooding into the developed areas occurs. The depth of flooding is a function of the quantity of stormwater entering the area, conveyance capacity of the primary system, and the storage capacity of the floodplain area.

Flooding occurring in October of 2015 and 2016, and September 2017 was associated with infrequent, large magnitude storm events inundating the watershed beyond the capacity to convey and store the rainfall runoff without staging up to flood developed areas. The return frequency of rainfall associated with the 2015 and 2016 flooding events are estimated at the 270 and 130-year events, respectively. The circumstance that these storms have occurred in back-to-back years is a matter of climate probabilities.

Although flooding has not been reported recently in the Pepperhill area prior to 2015, other similar magnitude events to the 2016 storm have occurred in 1973, 1987, and 1998 as described in Section 2. Since the turn of the century, the cumulative effects of additional development in the watershed contribute additional runoff to the waterways and multiple roadways have been built across the McChune Branch floodplain. However, these impacts of recent development in the watershed are shown by the modeling to have negligible effects on flood stages. The modeling indicates that high flood stages are controlled by the cumulative effects of natural watershed conditions and previously existing roadway and railroad crossings on floodplain conveyance of rainfall runoff and that flooding is a natural and regular occurrence within the floodplain.

Conveyance improvements at roadway crossings in McChune Branch have minimal potential to reduce flood stages at Pepperhill. Besides Collins Road, the roadways across McChune Branch which have an appreciable effect on the 100-year storm event include the railroad crossing and I-26. Improvements at Collins Road will be able to reduce the flood stages at Pepperhill for events close to the 4% annual chance frequency, but larger events are shown to overtop Collins Road.

Section 5

Stormwater Management Alternatives

5.1 Introduction

This section describes the stormwater management alternatives that were developed and evaluated with the stormwater models to address existing and potential future flooding and drainage issues in the McChune Branch watershed. Alternatives are grouped by scale including watershed, conveyance (PSMS and SSMS), and property protection measures.

5.2 Summary of Hydrologic and Hydraulic Analyses

Several engineering analyses have been performed as part of this study to assist in the development of stormwater improvements. In addition to field reconnaissance to identify existing stormwater system deficiencies, two computer-modeling tools have been employed to assist in these analyses. First, a hydrologic model (HEC-HMS) was used to predict the quantities of stormwater runoff that resulted from various rainfall events over the drainage basin. Stormwater flows predicted with the hydrologic model were used as input to a hydraulic model (HEC-RAS) of the conveyance system, which predicts resulting water surface elevations, floodplain limits, and channel velocities. This information is used to predict where flooding and erosion will occur in the watersheds.

By applying the predicted modeling results to identified flooding issues for the City of N. Charleston, CDM Smith identified improvement alternatives related to structural flooding and drainage issues within McChune Branch. The following sections summarize the improvement analyses.

5.3 Improvement Analysis

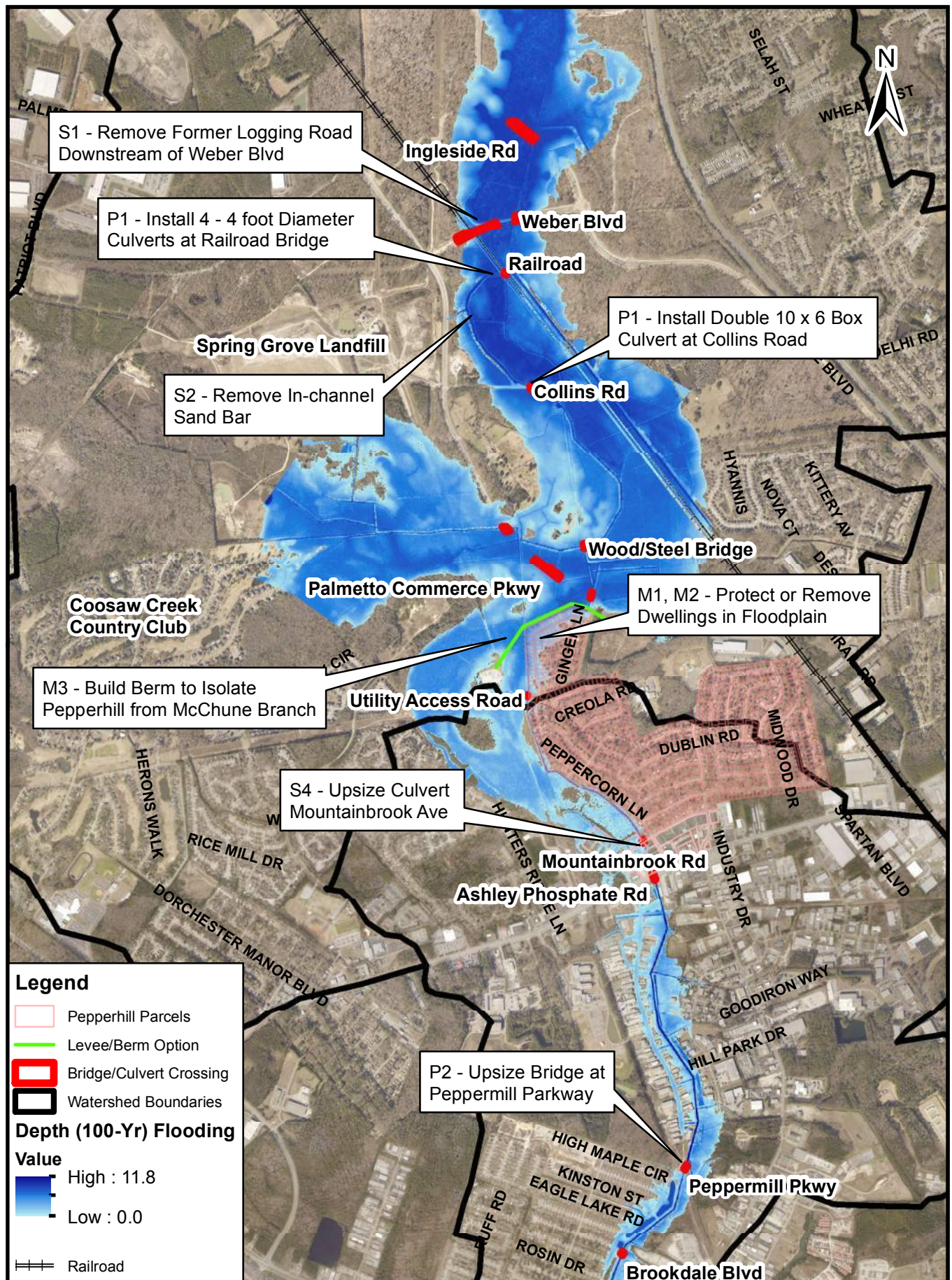
For the problem areas identified in Section 4, CDM Smith performed an evaluation of improvement alternatives to mitigate flooding impacts to structures associated with the PSMS and SSMS (localized drainage) affecting Pepperhill. The evaluation included investigation and evaluation into the feasibility and cost effectiveness of the alternatives listed in **Table 5-1** and shown in **Figure 5-1**. Improvement alternatives are categorized as conveyance (C), watershed (W), or mitigation (M). The target for each improvement alternative is to reduce the number of dwellings experiencing flooding for the 100-year design storm without unacceptable impacts to natural resources or costs exceeding the value of the damage to the flooding dwellings. The initial compilation of possible alternatives in Table 5-1 was screened based on feasibility and cost effectiveness to eliminate options not suitable for further evaluation.

Table 5-1. Improvement Alternatives

Alternative	Type	Name	Description	Benefits
1	C	Collins Road Culverts	Install Large Box Culverts	Reduce Backwater
2	C	Popperdam Creek Roadway Crossing Improvements	Upsize existing Crossings	Improve Conveyance
3	C	McChune Branch Conveyance	Widen and Deepen Channel	Improve Conveyance
4	C	Popperdam Creek Conveyance	Widen and Deepen Channel	Improve Conveyance
5	W	New Channel for Inter-Basin Transfer	Create New Channel to Coosaw Creek	Improve Conveyance
6	W	Regional Detention	Create Large Storage	Reduce Volume
7	W	Green Infrastructure	Retrofit GI Throughout Watershed	Reduce Runoff
8	M	Levee	Create berm/levee to isolate area	Isolation Barrier
9	M	Property Protection Measures	Floodproof or Raise Dwellings	Protect Dwellings
10	M	Buy-out	Purchase Properties and Remove Dwellings	Remove Hazard

Multiple alternatives which may be physically possible, if implemented, would have unallowable impacts to natural resources in addition to the costs associated with construction. Widening and deepening of the McChune Branch channel would have direct impacts to existing natural Cypress wetlands and affect the hydroperiod of the connected wetlands and is therefore not permissible based on Section 404 of the Clean Water Act. Construction of a berm/levee would have similar impacts on wetlands around Pepperhill and may not be permissible.

Multiple alternatives which could be implemented to increase conveyance out of the flooding area of Pepperhill would require impacts to existing infrastructure and private property which exceed the impacts to the flooding properties in cost and effort. Deepening and widening of Popperdam Creek has the potential to reduce flood stages at Pepperhill by conveying flood flows away faster. To achieve increased conveyance capacity, channel widening would be required with impacts along the entire 2-mile length of Popperdam Creek from Ashley Phosphate Road to Dorchester Road. Property acquisition and removal of existing infrastructure costs alone would be likely to exceed the value of the residential properties experiencing flood damage.



For the above reasons, Alternatives 3 through 7 are considered not feasible and are not evaluated further. Remaining alternatives are considered further with modeling where applicable. Modeling of alternatives provides a measure of flooding reduction achieved for each. In addition, CDM Smith developed a conceptual opinion of probable cost for each evaluated alternative. A cost comparison amongst the alternatives provides a basis for ranking the alternatives.

5.3.1 Conveyance Improvements

5.3.1.1 Road Embankment/Stream Crossings

This section discusses the development of recommended improvements for road embankments and stream crossings that are predicted to hold water behind them and increase the predicted flood stages for the evaluated storm events. The implementation of the recommended improvements is not predicted to affect flooding to downstream structures or road crossings when compared to existing conditions identified in the modeling.

The recommended stormwater management plan for the McChune Branch watershed includes measures to improve the existing and future condition flooding problems. The performance standards identified in prior sections specify the design flow that can be accommodated by the drainage system without exceeding the capacity of the infrastructure, causing significant damage, or creating a public safety hazard. Existing design flows were used to evaluate the required improvements since those flows represent current conditions. **Table 5-2** shows a comparison of the flood stages under existing and proposed conditions with limited improvement. **Table 5-3** lists the evaluated roadway conveyance improvements.

Table 5-2. Improved Flood Stage Comparisons

	2-YR	10-YR	25-YR	50-YR	100-YR	500-YR
Existing	11.5	13.3	13.6	13.8	14.5	16.2
Goose Creek Crossings Removed	11.5	13.3	13.6	13.8	14.1	15.6
Proposed Collins Road	11.4	12.7	13.6	13.8	14.5	16.2
Proposed Collins Road and Railroad	11.3	12.7	13.5	13.8	14.5	16.2
Proposed Collins Road, Railroad, Goose Creek, and Peppermill Pkwy	11.3	12.6	13.1	13.7	14.0	15.0

Table 5-3. Evaluated Roadway Conveyance Improvements

Stream	Location	Existing Barrels-Length-Size-Type	Proposed Barrels-Length-Size-Type
McChune Branch	Collins Road	2 - 60' long 3.5' Diameter RCBC	2 - 60' long 6' x 10' RCBC
McChune Branch	Railroad	Steel Span Bridge	4 - 60' long 4' Diam RCP Culverts (In addition to existing bridge)
Popperdam Ck	Mountainbrook Road	3 - 58' long 4.5' Diameter CMP	3 - 60' long 6' x 6' RCBC

Popperdam Ck	Peppermill Parkway	1 - 80' long 20' x 10.55' Arch	3- 80' long 10' x 11' RCBC
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The evaluated improvements for the watershed with planning level opinions of probable construction cost (OPCC) are listed in **Table 5-4**, in 2018 dollars. The potential improvement at the railroad is intended to improve flooding conditions mostly under future conditions where this crossing was shown to have a significant effect on flood stages.

Table 5-4. Potential Roadway Improvements

Stream	Location	Owner	OPCC (2017 Dollars)
McChune Branch	Collins Road	Private	\$755,000
McChune Branch	Railroad (upstream of Collins Rd)	Private RR	\$400,000
Goose Creek	Highway 52, Railroad, and Goose Creek Rd	Others	>\$5,000,000
Popperdam Creek	Mountainbrook Road	N. Charleston	\$500,000
Popperdam Creek	Peppermill Parkway	N. Charleston	\$2,200,000

Section 5 • Stormwater Management Alternatives

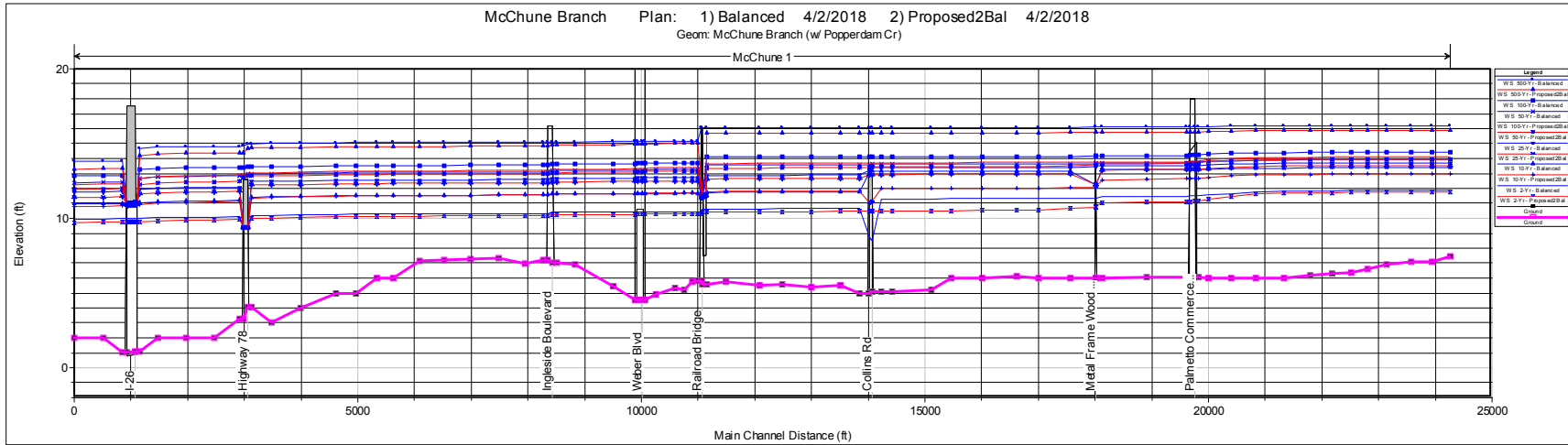


Figure 5-2. Water Surface Profile Comparison between Existing and Improved Conditions McChune Branch

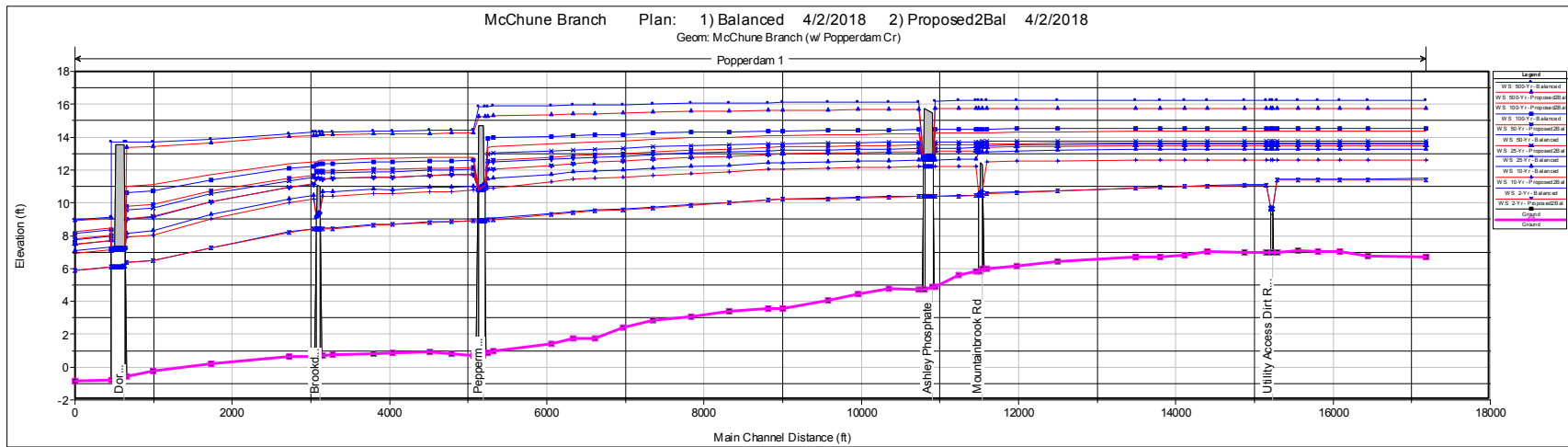


Figure 5-3. Water Surface Profile Comparison between Existing and Improved Conditions Popperdam Creek

5.3.1.2 Channel/Floodplain Improvements

In addition to the road crossing analysis, the CDM Smith team also evaluated potential improvement alternatives within the drainage/conveyance system. Maintenance of the drainage systems is important in low lying areas where a foot or less of blockage can contribute to significant water backup across the flat floodplain.

Water retention for low flows contributes to large event flooding in the McChune Branch watershed due to the volume of storage available preceding a storm event. Removal of standing surface water remaining from one rain event can provide some storage volume for subsequent events and reduce the maximum flood stage. However, the volume of storage available depends on variable microtopography over the wetland floodplain and is small relative to the flood volumes. Localized and minor drainage pathways were evaluated for maintenance or improvement, but the effects of localized drainage during large flood events are minimal when flood flows expand out onto the broad floodplain areas.

Natural and manmade debris buildup during large events and over time has the potential to block culverts and ditches. The slow flowing ditches in McChune Branch do not suspend and carry much sediment or large woody debris, but this will tend to accumulate over time. Since the slow flowing ditches in McChune Branch carry minimal sediment, sediment accumulation is not a significant concern in the watershed. However, near the landfill, a large accumulation of sediment in the channel is recommended for removal and implementation of measures to reduce the sediment discharge from the landfill area. Trees, large wood, and natural debris are also not being carried downstream in significant amounts threatening to block culverts due to the low velocities, narrow channels, and densely forested floodplains. Currently, ditch blockage is just a drainage issue, with minimal potential effect on flooding conditions. However, over time, and as the wetland forests mature following clearing in the last two centuries, contributions of organic debris including small and large woody debris, leaves, and aquatic vegetation, can accumulate filling the shallow, slow flowing ditches and potentially blocking culverts.

Ditch clearing of larger trees and cleaning of accumulated sediment, vegetation, and debris is required to maintain long term drainage in low lying areas. This presents a unique challenge in McChune Branch where almost all the ditches are on privately owned land. Private land owners are required to maintain clear these ditches, but may not be aware of what this entails or the consequences of not maintaining them. Private owners associations should be informed that maintenance of shallow ditches are their responsibility and require regular attention before ditches become blocked and flooding stages are increased locally because the drainage system lacks conveyance.

Surface water is held at the utility crossing immediately west of Peppercorn Lane. Removing the constriction at this crossing has the potential to lower the dry-weather water surface in the ditch to the north by 1-2 feet. Additionally, improving channel conveyance in the reach between Mountainbrook Road and Ashley Phosphate Road has the potential to improve base drainage conditions along Peppercorn Lane.

Alteration of the runoff flows converging on the Peppercorn Lane ditch was also evaluated. The ditch receives flow from a portion of the Pepperhill subdivision and surrounding areas to the

north and west. These areas do not contribute enough runoff to flood the area without backwater effects from McChune Branch.

5.3.2 Watershed Management Alternatives

On the watershed scale, movement of water between basins, regional detention, and green infrastructure alternatives were evaluated for feasibility to achieve flooding reduction at Pepperhill.

5.3.2.1 Interbasin Transfer

Interbasin transfer is effectively occurring during flood events and increasing conveyance along Popperdam Creek could facilitate further drainage out of the McChune Branch watershed. Upsizing the culvert at Peppermill Drive could serve to increase flows discharging to the Ashley River and reduce flows draining towards McChune Branch. Since this transfer would only occur during large rainfall runoff events, it would not need to be permitted as a base flow transfer. However, this improvement provides minimal benefit at high cost. The cost to replace the existing bridge with a larger bridge would exceed a million dollars. The benefit is lowering the 100-year floodplain by approximately two tenths of a foot. This margin will serve to reduce the flood stage removing an estimated 2 or 3 dwellings from experiencing damaging flooding.

5.3.2.2 Regional Detention

The feasibility and cost effectiveness of regional detention in McChune Branch to reduce flooding at Pepperhill was evaluated. The volume of water collected in McChune Branch is on the order of 2,300 acre feet over 650 acres of floodplain wetlands. The floodplain is a nearly flat expanse of water during floods and the quantity required to reduce the flood stage over this area is expansive. To store this amount of stormwater with a detention pond at a depth of 5 feet would require an area of over 130 acres. An area this size is not available outside of the existing wetlands in a place that could serve to collect runoff. To build a single or multiple detention basins capable of containing 1 foot of the flood volume (650 acre feet = 1.05 Million cubic yards) would cost a minimum of 10 Million dollars just to excavate the storage basins. This estimated cost does not include land value, construction of collection systems to direct stormwater to the basin(s), or any of the surrounding/peripheral infrastructure.

5.3.2.3 Green Infrastructure

In addition to the regional detention option, the CDM Smith team also considered implementation of green infrastructure practices throughout the watershed. Green infrastructure practices are structural features built into the developed landscape that mimic natural hydrology. These practices can be effective for water quality treatment and runoff reduction for small storms, but are generally not effective for control of flood magnitude runoff. Retrofit of these practices on existing developed lands would cost more than the regional detention option and not be capable of storing a fraction of the flood volume.

5.3.2.4 Planned Development

Further development in the watershed is expected to increase flood stages marginally by contributing more runoff to McChune Branch. The current stormwater controls required for control of peak runoff and water quality treatment will serve to reduce runoff reaching McChune Branch for smaller, more frequent storms. These measures perform minimally to attenuate large

flood magnitude storm events. Development planning is recommended to manage the effects of increased runoff on the watershed including higher flood stages and water quality impacts. Open space requirements and limits on density of development can serve to limit impacts of development.

5.3.3 Flood Mitigation Measures

Options for protecting existing homes subject to recurrent flooding includes building levees and structure floodproofing/raising. When these options are deemed infeasible or cost prohibitive, property buyout becomes a viable option with FEMA assistance.

5.3.3.1 Berm or Levee Option

Construction of a berm to protect Pepperhill properties from flooding associated with McChune Branch could isolate the area from flood flows. This would entail more than a half mile (2,640 linear foot) berm along the entire west side of the ditch along Peppercorn Lane. This berm would need to be approximately 6 feet tall and 30 feet wide with 2:1 horizontal to vertical side slopes and 6-foot top width. The berm footprint would cover an area of approximately 2 acres. Since the berm footprint would mostly be within Clean Water Act, Section 404 jurisdictional wetlands, wetland impact mitigation credits would need to be purchased. At the going rate for coastal wetland of \$176,000 per acre (NC) at a minimum mitigation ratio of 2:1, the cost for wetlands mitigation alone would be at least \$704,000, if permissible at all. Construction costs to build a berm would include access, tree removal, excavation and fill, among others. Purchase or easement value of the property is another large cost since the properties are currently under private ownership. Another consideration is that this berm would need to cutoff flows to McChune Branch via the ditch under Palmetto Commerce Parkway sending all runoff to Popperdam Creek. This berm could potentially be certified by FEMA if it met all the requirements of a levee and through an extensive regulatory process. If feasible and permissible, such a berm/levee would be expected to cost upwards of \$2.8 Million dollars.

5.3.3.2 Structural Flood Protection

Flood protection measures such as floodproofing and raising buildings can be cost effective in some cases. In the Pepperhill neighborhood, the dwellings are mostly one-story, less than 1,500 square feet, over 30 years old, and built with slab-on-grade foundations. The technique for raising slab-on-grade homes involves lifting the entire slab and constructing a new foundation beneath it. To provide one foot of freeboard above the 100-year flood stage would require raising most of the homes about four feet. Raising these types of homes could be performed only by a highly skilled contractor with experience in lifting slab-on-grade houses. For each dwelling, the water, sewer, and electric utilities need to be reconnected separately and ground surface may need to be regraded.

Making the structure watertight requires sealing the walls with waterproof coatings, impermeable membranes, or a supplemental layer of masonry or concrete. This option may be suitable and cost effective on a case by case basis, but requires maintenance and may not be aesthetically pleasing to everyone. The structural conditions of the dwellings in Pepperhill may make them unsuitable candidates for elevating, but flood proofing could be a cost-effective solution for some homes providing protection since flood waters are only expected to reach a limited depth and do not have any associated flow velocities to compensate for. Without benefit

of a structural evaluation, an estimated planning level cost per structural dwelling retrofit is \$40,000 per structure to raise or protect each structure. Further evaluation of these options as applies to the homes in Pepperhill in the advisory floodplain is recommended to determine feasibility, acceptability, and total cost per home.

5.3.3.3 Buy Out Option

As defined by FEMA, hazard mitigation measures are any sustainable action taken to reduce or eliminate long-term risk to people and property from future disasters. To mitigate future damage from natural flooding expected to occur despite watershed improvement measures, the City may participate in the FEMA Voluntary Flood Buyouts (Hazard Mitigation Grant Program). Under this program, properties subject to repeated flooding can apply for Acquisition and Structure Demolition/Relocation wherein the community purchases and permanently removes, with FEMA funding, a flood-prone property from the individual.

There are 33 dwellings in the Pepperhill subdivision that are in the mapped FEMA 1% annual chance flood zone which have been repeatedly affected by flooding. The properties are estimated to cost up to \$150,000 based on recent sales reported on the tax records at the Charleston County website. Given an average cost of \$150,000, buyout of all 33 dwellings would total approximately \$4,950,000 for property acquisition alone. These properties are listed in **Table 5-5** with the estimated flood return interval (RI) for existing and proposed conditions. The cost to the City would be \$1,240,000 after 75% reimbursement by FEMA through the FEMA Voluntary Flood Buyouts (Hazard Mitigation Grant Program). Additional costs for assessments, grant processing, and demolition are expected to raise the cost to the City by another \$1 Million including a 25% contingency for peripheral costs.

This option does not provide any protection for larger, more infrequent events, such as the 500-yr return interval, to remaining surrounding homes, but would remove people and property from a known hazard that cannot be otherwise reasonably mitigated.

Table 5-5. Properties with Dwellings in Modeled Floodplain

Count	Address Number	Street	Ground Elev (ft)	Approx Slab Elev (ft)	2016 Flood	2015 Flood	Flooding Return Interval Existing (year)	Flood Return Interval Proposed (year)
1	7799	Peppercorn Lane	11.2	12.0	YES	YES	10	10
2	7803	Peppercorn Lane	11.5	12.2	YES	YES	10	10
3	7811	Peppercorn Lane	11.7	12.5	YES	YES	10	10
4	7815	Peppercorn Lane	12.0	12.8	YES	YES	10	10
5	7809	Peppercorn Lane	12.0	12.7	YES	YES	10	10
6	7787	Peppercorn Lane	12.0	12.8	NO	YES	10	25
7	7783	Peppercorn Lane	12.0	12.8	YES	YES	10	25
8	7795	Peppercorn Lane	12.0	12.8	YES	YES	10	25
9	7819	Peppercorn Lane	12.0	12.8	YES	YES	10	25
10	7791	Peppercorn Lane	12.0	12.8	YES	YES	10	25
11	7823	Peppercorn Lane	12.0	12.8	YES	YES	10	25

Count	Address Number	Street	Ground Elev (ft)	Approx Slab Elev (ft)	2016 Flood	2015 Flood	Flooding Return Interval Existing (year)	Flood Return Interval Proposed (year)
12	7812	Peppercorn Lane	12.0	12.8	YES	YES	10	25
13	7798	Peppercorn Lane	12.0	12.8	YES	YES	10	25
14	7827	Peppercorn Lane	12.0	12.8	YES	YES	10	25
15	7820	Peppercorn Lane	12.0	12.8	YES	YES	10	25
16	7816	Peppercorn Lane	12.0	12.8	YES	YES	10	25
17	7831	Peppercorn Lane	12.0	12.8	YES	YES	10	25
18	7775	Peppercorn Lane	12.0	12.8	YES	YES	10	25
19	7835	Peppercorn Lane	12.0	12.8	YES	YES	10	25
20	7802	Peppercorn Lane	12.0	12.8	YES	YES	10	25
21	7839	Peppercorn Lane	12.0	12.8	YES	YES	10	25
22	7843	Peppercorn Lane	12.1	12.9	YES	YES	10	25
23	7794	Peppercorn Lane	12.4	13.2	NO	YES	10	25
24	7779	Peppercorn Lane	12.4	13.1	NO	NO	10	25
25	7824	Peppercorn Lane	12.8	13.6	YES	YES	25	25
26	7771	Peppercorn Lane	13.4	14.1	YES	YES	100	100
27	3430	Smoketree Court	12.8	13.6	YES	YES	25	25
28	3434	Smoketree Court	13.2	13.9	YES	YES	100	100
29	3426	Smoketree Court	12.9	13.7	NO	YES	50	50
30	7847	Peppercorn Lane	13.3	14.1	NO	YES	100	100
31	3422	Smoketree Court	13.5	14.2	NO	YES	100	100
32	7836	Peppercorn Lane	14.9	15.6	YES	YES	100	100
33	7828	Peppercorn Lane	13.7	14.4	NO	YES	500	500
34	7790	Peppercorn Lane	14.0	14.8	NO	YES	500	500
35	7768	Peppercorn Lane	14.0	14.8	NO	YES	500	500
36	7772	Peppercorn Lane	14.0	14.8	NO	YES	500	500
37	3418	Smoketree Court	14.0	14.8	NO	YES	500	500
38	7767	Peppercorn Lane	14.0	14.8	NO	YES	500	500
39	7755	Peppercorn Lane	14.0	14.8	NO	YES	500	500
40	7855	Peppercorn Lane	14.0	14.8	NO	YES	500	500
41	7859	Peppercorn Lane	14.0	14.8	NO	NO	500	500
42	7851	Peppercorn Lane	14.0	14.8	NO	YES	500	500
43	7763	Peppercorn Lane	14.0	14.8	NO	YES	500	500
44	7719	Peppercorn Lane	14.0	14.8	NO	NO	500	500
45	7863	Peppercorn Lane	14.0	14.8	NO	NO	500	500
46	7723	Peppercorn Lane	14.0	14.8	NO	NO	500	500
47	7759	Peppercorn Lane	14.0	14.8	NO	YES	500	500
48	7754	Ginger Lane	14.0	14.8	NO	YES	500	500
49	7759	Ginger Lane	14.0	14.8	NO	YES	500	500
50	7832	Peppercorn Lane	14.0	14.8	NO	YES	500	500

Count	Address Number	Street	Ground Elev (ft)	Approx Slab Elev (ft)	2016 Flood	2015 Flood	Flooding Return Interval Existing (year)	Flood Return Interval Proposed (year)
51	7763	Ginger Lane	14.0	14.8	NO	NO	500	500
52	7764	Peppercorn Lane	14.0	14.8	NO	YES	500	500
53	7758	Ginger Lane	14.0	14.8	NO	YES	500	500
54	7840	Peppercorn Lane	14.0	14.8	NO	YES	500	500
55	3414	Smoketree Court	14.4	15.1	NO	NO	500	500
56	7715	Peppercorn Lane	14.5	15.2	NO	NO	500	500
57	7786	Peppercorn Lane	14.6	15.3	NO	YES	500	500
58	3433	Smoketree Court	14.7	15.4	NO	NO	500	500
59	3414	Waterford Court	15.1	15.9	NO	NO	500	500
60	7762	Ginger Lane	15.3	16.0	NO	NO	500	500
61	7730	Picardy Place	15.4	16.1	NO	NO	>500	>500

5.4 Conclusions

Following screening and review of the available alternatives considered, 4 alternatives remain for further evaluation and comparison. Alternatives 3-8 are screened from further evaluation due to unacceptable impacts to natural resources or existing infrastructure or very high relative cost. The remaining alternatives include conveyance improvement at Collins Road, other roadway crossing conveyance improvements, property protection measures, and property purchase and dwelling removal by the City with FEMA grant assistance. A reason for screening from further evaluation or an Opinion of Probable Construction Cost (OPCC) for the remaining alternatives are listed in **Table 5-6**.

Table 5-6. Alternatives Evaluation

Alternative	Type	Name	Screening Reason	Relative Cost	OPCC
1	Primary Conveyance System	Collins Road Culverts		Low	\$755,000
2		Roadway Improvements		Medium	\$2,710,000
3		McChune Branch	Wetland Impacts	High	
4		Popperdam Creek Conveyance	Infrastructure Impacts	High	
5		New Channel	Infrastructure Impacts	High	
6	Watershed	Regional Detention	Volume Required	High	
7	Watershed	Green Infrastructure	Volume Required	High	
8	Mitigation	Levee	Wetland Impacts	High	
9	Mitigation	Property Protection		Low	\$1,320,000
10	Mitigation	Property Buy-out		Medium	\$2,750,000

Section 6

Improvement Recommendations

6.1 Objectives

The stormwater management improvements presented in this report have been developed to identify and improve upon watershed conditions related to flooding and drainage within the McChune Branch watershed, specifically at the Pepperhill subdivision.

6.2 Conclusions from the Engineering Analysis

A review of the stormwater modeling results, data collection, and field reconnaissance and survey identified flooding and drainage issues affecting the study area at Pepperhill. The main problem observed in the basin is recurrent flooding and the potential for future structural flooding in the Pepperhill area. An estimated 32 dwelling structures are in an active 1% Annual Chance floodplain and improvements to existing roadway crossings have limited effects on reducing these flood stages. Potential watershed, primary and secondary conveyance, and mitigation improvements were evaluated based on feasibility, cost/benefit ratio, and effectiveness.

Results of the hydrologic and hydraulic modeling predict flooding throughout the McChune Branch watershed occurring at several road crossings and impacting residences. Results of hydrologic and hydraulic modeling showed minimal reductions in structural flooding possible with cost-effective improvements to watershed infrastructure. Under future conditions, with further development occurring in the watershed, flood stages are expected to increase. Crossings causing backups under the designated design storms have been identified, improvement projects developed, and costs estimated for improvements to those crossings. Improvements to roadway crossings would individually provide very minimal reduction in flood stages. To reduce flood stages significantly with infrastructure improvements would require improvements at multiple large crossings, each costing over a Million dollars, and would not entirely eliminate flooding at Pepperhill.

6.3 Feasibility

To begin and continue to address the identified stormwater issues, improvements must be feasible from a permitting perspective and cost effective. Impacts to natural resources and existing infrastructure make some alternatives infeasible based on extensive impacts to wetlands or disturbance of established public or private development. Also, implementing improvements that cost more than the damage prevented does not make sense. Based on the analyses conducted by CDM Smith as described in Section 5 and discussions with City staff, Alternatives 3 through 8 are not recommended due to extensive impacts and/or high costs.

6.4 Recommendations

Given the recent flooding and expected continued recurrence, the first priority is removing dwellings from the recurrent floodplain. Based on the model analyses and evaluations conducted

by CDM Smith and discussions with City stormwater staff, the following recommended improvements are proposed in prioritized order:

- First Floodplain Improvement – Buy-out twelve (8) properties built in 10% Annual Chance advisory flood zone and convert area into neighborhood park (\$1,200,000);
- Second Floodplain Improvement – Structurally raise or protect remaining twenty (24) dwellings built in 1% Annual Chance advisory flood zone (\$960,000);
- Primary Drainage Maintenance – Continue routine clearing and sediment removal maintenance throughout conveyance system;
- Secondary Drainage Maintenance – Remove sediment from McChune Branch channel near Spring Grove landfill;
- Secondary Drainage Improvement – Remove logging road downstream of Weber Blvd;
- Future Floodplain Improvement – Add multiple culverts at railroad bridge to reduce backup under future build-out conditions (\$400,000); and
- Floodplain Management – Enforcement of wetland buffers and restrictions on development within the 100-year floodplain.

These improvements are associated with no reduction of the 100-year base flood elevation in the focus area, but are shown to reduce the frequency of flooding for some of the dwellings for the smaller, more frequent storms. This will not remove the dwellings from the hazards of flooding during the 100-yr or less frequent, larger return interval rainfall runoff events.

Secondary drainage level improvements to reduce backwater under base flow conditions are also recommended at Weber Boulevard and sediment removal in the McChune Branch channel near the landfill. At Weber Boulevard, removal of the former logging road downstream of the roadway is recommended to eliminate the apparent impediment to low flows caused by the combined profiles of the former logging road and Weber Boulevard embankment.

In addition to the constructed improvements identified, non-structural management strategies in this developing watershed should also be considered as other priority protection opportunities. The following is a description of the recommended controls:

- Perform routine maintenance on the City-owned portions of the conveyance system to maintain hydraulic efficiencies assumed in the model. Culverts were modeled in HEC-RAS assuming their entire cross-section was sediment-free and available for flow. Culverts in the watershed were not observed to be filled with sediment, potentially restricting flows, except partially for the culvert at Mountainbrook Road at the time of this study. City staff should continue to visit the culverts on a scheduled basis (once per year) and after significant storm events to schedule maintenance and debris/sediment removal when appropriate.

Private owner associations need to be aware of their responsibilities for maintaining drainage ditches which are sensitive to build-up of sediment and vegetative debris given

very flat grades. In flat areas the effects of unmaintained drainage can cause flooding on adjacent properties.

- Implementation and enforcement of Riparian Buffers and Restrictions on development within the 100-year floodplain. The City currently requires protective undisturbed vegetated buffers along all perennial and intermittent stream channels and wetlands. As such, the City allows no impervious or partially pervious surface in the buffer without mitigation. These development restrictions are also appropriate for application within the 100-year floodplain as well as restriction and mitigation for filling. Most of the floodplain is already protected as wetlands. These measures will help future drainage and flood damage concerns while also providing a benefit to overall stream health and water quality.

CDM Smith also recommends the City consider pursuing revisions to the FEMA Flood Insurance Rate Map through the Letter of Map Revision process since the current preliminary/effective floodplain study was based on a limited detailed study, is based on lower downstream boundary conditions than the corresponding downstream mapping and does not include all recently constructed roadways.

Section 7

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Appenix A

McChune Branch and Popperdam Creek Photos



Photo 1. Dorchester Road Downstream



Photo 2. Dorchester Road Upstream



Photo 3. Brookdale Blvd Downstream



Photo 4. Brookdale Blvd Upstream



Photo 5. Peppermill Pkwy Downstream



Photo 6. Peppermill Pkwy Upstream



Photo 7. Ashley Phosphate Rd Downstream 8/25/17



Photo 8. Ashley Phosphate Road Downstream



Photo 9. Ashley Phosphate Road Upstream



Photo 10. Ashley Phosphate Road Upstream



Photo 11. Mountainbrook Ave Downstream



Photo 12. Mountainbrook Ave Downstream



Photo 13. Mountainbrook Road Downstream 11/2017



Photo 14. Mountainbrook Road Upstream 11/2017



Photo 15. Mountainbrook Road Upstream 8/25/17



Photo 16. Mountainbrook Road Upstream 8/25/17



Photo 17. Peppercorn Lane Downstream



Photo 18. Peppercorn Lane Upstream



Photo 19. Downstream Utility Road Crossing 8/25/17



Photo 20. Downstream Utility Road Crossing 8/25/17



Photo 21. Downstream Utility Road Crossing 8/25/17



Photo 22. Upstream Utility Road Crossing 8/25/17



Photo 23. Utility Road Crossing Downstream 11/2017



Photo 24. Upstream Utility Road Crossing 11/2017



Photo 25. Ditch Full at 7803 Peppercorn Lane 8/25/2017



Photo 26. Ditch Full at 7803 Peppercorn Lane



Photo 27. Ditch Full and Overgrown 8/25/17



Photo 28. Ditch at North End of Peppercorn Lane



Photo 29. Ditch Facing PC Pkwy 8/25/2017



Photo 30. Ditch and Box Culvert Facing PC Pkwy



Photo 31. Culvert PC Pkwy Upstream



Photo 32. Culvert PC Pkwy Downstream



Photo 33. Ditch Downstream PC Pkwy Box Culvert



Photo 34. Palmetto Commerce Pkwy Long Bridge



Photo 35. McChune Branch Downstream PC Pkwy



Photo 36. PC Pkwy Bridge over McChune Branch



Photo 37. McChune Branch Downstream PC Pkwy



Photo 38. McChune Branch Upstream Metal Bridge



Photo 39. McChune Branch Wood/Metal Bridge



Photo 40. McChune Branch Wood/Metal Bridge



Photo 41. McChune Branch Through Powerline Easement



Photo 42. McChune Branch Wetlands Upstream Collins Rd



Photo 43. McChune Branch Upstream Collins Rd



Photo 44. McChune Branch Downstream Collins Rd



Photo 45. McChune Branch Downstream Collins Rd



Photo 46. McChune Branch Downstream Collins Rd



Photo 47. McChune Branch Downstream Collins Road



Photo 48. McChune Branch Upstream Railroad Bridge



Photo 49. McChune Branch Downstream Railroad Bridge



Photo 50. McChune Branch Downstream Railroad



Photo 51. McChune Branch Downstream Railroad



Photo 52. McChune Branch Floodplain Wetlands Downstream Railroad



Photo 53. Wetlands Upstream Weber Blvd



Photo 54. McChune Branch Upstream Weber Blvd



Photo 55. McChune Branch Downstream Weber Blvd



Photo 56. McChune Branch Upstream Ingleside Rd



Photo 57. McChune Branch Upstream Ingleside Rd



Photo 58. McChune Branch Downstream Ingleside Rd



Photo 59. McChune Branch Downstream Ingleside Rd



Photo 60. McChune Branch Downstream Ingleside Rd



Photo 61. Hwy 78 Bridge Upstream



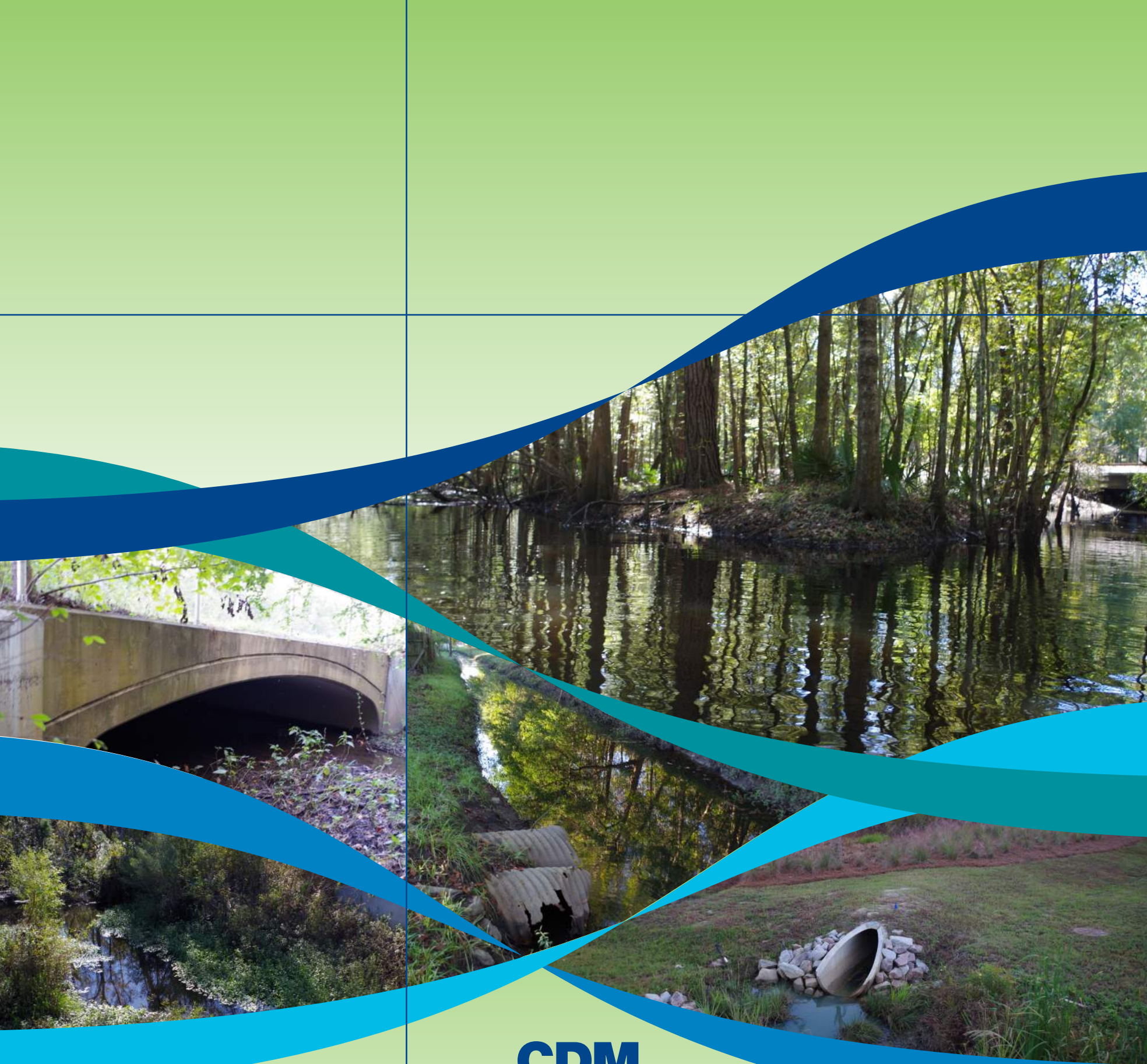
Photo 62. Hwy 78 Bridge Downstream



Photo 63. I-26 Upstream



Photo 64. I-26 Downstream



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