

Greenville County Multi-Jurisdictional Hazard Mitigation Plan

Including: Greenville County and Cities of Fountain Inn, Greenville, Greer, Mauldin, Simpsonville, and Travelers Rest

February 2020



Greenville County Floodplain Management

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List of Abbreviations

- CDC – Centers for Disease Control and Prevention
- CRS – Community Rating System
- DMC – Disaster Mitigation Committee
- EMD – Emergency Management Division
- FEMA – Federal Emergency Management Agency
- FIRM – Flood Insurance Rate Map
- FIS – Flood Insurance Study
- HMP – Hazard Mitigation Plan
- LOS – Level of Service
- NFIP – National Flood Insurance Program
- NOAA – National Oceanic and Atmospheric Administration
- NRCS – Natural Resources Conservation Service
- NWS – National Weather Service
- PMR – Physical Map Revision
- SCDHEC / DHEC – South Carolina Department of Health and Environmental Control
- SCDNR – South Carolina Department of Natural Resources
- SCDOT – South Carolina Department of Transportation
- SCDRO – South Carolina Disaster Recovery Office
- SCEMD / EMD – South Carolina Emergency Management Division
- SCFC – South Carolina Forestry Commission
- SFHA – Special Flood Hazard Area
- USACE – United State Army Corps of Engineers

Executive Summary

Greenville County created its initial Hazard Mitigation Plan (HMP) in January 2005 using Mitigation 20/20 software. The 2005 HMP was created to comply with the Disaster Mitigation Act of 2000 to obtain credits under the Community Rating System (CRS), and it followed the ten (10) step Federal Emergency Management Agency (FEMA) planning process. A process for updating the status of mitigation initiatives annually and updating the entire plan every five (5) years was included in the 2005 Plan and subsequent revisions.

Major revisions to the 2005 HMP were prepared in 2010 and 2015. The 2010 HMP converted the original plan to a multi-jurisdictional, multi-hazard plan and included the Cities of Greenville, Travelers Rest, Mauldin, Simpsonville, and Fountain Inn in the planning process. These communities also participated in the 2015 HMP and are participants in the 2020 HMP as well. Specific hazard mitigation initiatives developed for each of these jurisdictions are included as appendices to this plan.

While this plan is being prepared in accordance with the requirements stated above, its real intent is to reduce the impact of multiple natural hazards to infrastructure and people across Greenville County. The County is threatened by a number of natural hazards that endanger the health and safety of the population and jeopardize its infrastructure and economic vitality. This plan addresses the following hazards:

- Floods
- Winter Storms
- High Winds / Tornadoes
- Wildfires
- Earthquakes
- Drought
- Landslides
- Sinkholes
- Hail
- Climate Change

During the planning process, mitigation initiatives associated with each natural hazard were discussed and included as appropriate. Since flooding is the hazard having the most frequent and largest impact on the County, the majority of mitigation initiatives are associated with this hazard. The Pinnacle Mountain wildfire disaster of 2016 reinforced the significance of potential wildfire events at the urban-forest interface in Greenville County and brought wildfire to the forefront of the planning process as well.

Since Greenville County has applied for a mitigation grant to prepare a comprehensive Paris Mountain Wildfire Mitigation Plan, wildfire was given just a cursory review in creating this plan. It is the intent of the County to add the comprehensive Paris Mountain Wildfire Mitigation Plan to the HMP as an appendix upon its completion, and it is noted as one of the mitigation initiatives in this plan.

Climate change is a relatively new concern and has a greater potential impact on coastal communities than inland communities (e.g., sea level rise, increased intensity of coastal storms and hurricanes). However, Greenville County has seen more extremes in climate events over recent years such as a decrease in annual precipitation and an increase in average annual temperature. Therefore, Greenville County also included consideration of climate change in this plan.

Since 2005, Greenville County and the associated jurisdictions have implemented many of the mitigation initiatives contained in previous plans. While it is difficult to quantify the amount of damage avoided by the implementation of mitigation initiatives, it appears that the program has been very successful in mitigating the impact of natural disasters. One example is the County's structure acquisition program which has acquired over 200 homes and permanently removed them from the floodplain.

Due to the diligence of the County in implementing mitigation measures over the last fifteen (15) years and its resolve to not create new problems, the number of mitigation initiatives in this plan are fewer and more targeted than in previous plans.

Greenville County Council and the governing bodies of each jurisdiction represented in the HMP fully support the development and implementation of the 2020 HMP. Resolutions supporting the 2020 HMP are contained in Appendix G. The implementation, monitoring, and maintenance of the 2020 HMP rests with the Disaster Mitigation Committee (DMC) (Section 3), which is coordinated by the Greenville County Floodplain Administrator. The policies and procedures of the DMC are addressed fully in Section 3 and Section 4.

1 Introduction

The intent of this plan is to document the process and results of the mitigation planning effort for multiple natural hazards that impact Greenville County, South Carolina. To assist in development of the plan, Greenville County retained Woolpert Inc. to facilitate plan development and formed a Disaster Mitigation Committee (DMC) to review hazards impacting the County and to determine potential initiatives to mitigate loss of life and damage to infrastructure.

The DMC consisted of representatives from each of the participating communities, various state and federal agencies, and members of the general public. Each participating community has its own flood damage prevention ordinance and floodplain administrator. However, Greenville County and the City of Greenville, by virtue of their population and tax revenue, have more resources than the other participants. In the past, both the cities of Greenville and Simpsonville have created their own hazard mitigation plans independent of this effort.

The participating communities, their current NFIP status, and Community Rating System (CRS) Rating are listed in Table 1-1, below. A complete listing of the DMC membership can be found in Table 3-1, Disaster Mitigation Committee Membership Roster in Section 3.1 below.

Table 1-1: Participating Communities in the HMP

Participating Community	Population*	CID	NFIP Reg-Emer Date	CRS Class
Greenville County	514,213	450089C	12/02/80	8
City of Fountain Inn	10,019	450209#	06/17/86	N/A
City of Greenville	68,563	450091C	02/01/80	5
City of Greer	32,102	450200#	09/28/79	N/A
City of Mauldin	25,193	450198#	09/29/78	N/A
City of Simpsonville	23,037	450092#	09/29/78	N/A
City of Travelers Rest	5,253	450264#	04/03/97	N/A

* July 1, 2018 population estimates by United States Census

The “2020 Greenville County Multi-Jurisdictional Hazard Mitigation Plan” (2020 HMP) will expire in five (5) years from the date of approval.

While this plan is intended to serve multiple jurisdictions and the planning process included multiple jurisdictions within the County, it is the responsibility of each participant to prepare and present an analysis of its own unique hazards and associated risks. Mitigation activities identified in this plan impact all communities within the planning area, but the plan does not contain activities specific to each individual jurisdiction. All jurisdictions have been afforded the opportunity to include their hazard and risk analysis as well as location specific mitigation activities in the HMP appendices. Several municipalities within the County have developed independent hazard mitigation plans, and they can be found in Appendix F. Additionally, each jurisdiction within this plan relies on its own policies, programs, and authorities for implementation of hazard mitigation activities. Where appropriate, all communities coordinate and share implementation responsibilities.

2 Purpose

The “2020 Greenville County Multi-Jurisdictional Hazard Mitigation Plan” represents an update to previous planning efforts. As such, it closely follows the format and content of the previous plans while updating critical information and data and providing a more succinct narrative. This plan provides the following.

1. A Methodical, Substantive Approach to Mitigation Planning

The approach utilized by the DMC relies on a methodical process to identify vulnerabilities to future disasters and to propose the mitigation initiatives necessary to avoid or minimize those vulnerabilities. This process includes interviews, research, data collection, plan development, community involvement, work sessions, and implementation. Each step in the process builds upon the previous step, so that there is a high level of assurance that the mitigation initiatives proposed by the participants have a valid basis for both their justification and priority for implementation. One key purpose of this plan is to document that process and to present its results to the community.

2. Enhance Public Awareness and Understanding

The DMC is interested in finding ways to make the community as a whole more aware of the natural hazards that threaten public health and safety, the economic vitality of businesses, and the operational capability of important facilities and institutions. The plan identifies the hazards threatening Greenville County as a whole, providing an assessment of the relative level of risk they pose. The plan also includes a number of proposed ways to avoid or minimize those vulnerabilities. This information will be very helpful to individuals desiring to understand how the community could become safer from the impacts of future disasters.

The DMC and its member organizations will continue to conduct community outreach and public information programs. The purpose of these programs is to engage the community as a whole in the multi-jurisdictional mitigation planning process. The planning process includes shaping the goals, priorities, and content of the plan, as well as to provide information and education to the public regarding ways to be more protected from the impacts of future disasters.

3. Create a Decision Tool for Management

The 2020 HMP provides information needed by the managers and leaders of local government, business and industry, community associations, and other key institutions and organizations to take actions to address vulnerabilities to future disasters. It also provides proposals for specific projects and programs that are needed to eliminate or minimize the risks to specific hazards. The plan is based on the best available data, which although limited in many regards, provides a solid foundation for hazard planning and future improvements.

These proposals, called “mitigation initiatives” in the plan, have been justified on the basis of their economic benefits using a uniform technical analysis. These initiatives have also been prioritized. This approach is intended to provide a decision tool for the management of participating organizations and agencies regarding why the proposed mitigation initiatives should be implemented, which should be implemented first, and the economic and public welfare benefits of doing so.

4. Promote Compliance with State and Federal Program Requirements

There are a number of state and federal grant programs, policies, and regulations that encourage or even mandate local government to develop and maintain a comprehensive hazard mitigation plan. This plan is specifically intended to assist the participating local governments to comply with these requirements, and to enable them to more fully and quickly respond to state and federal funding opportunities for mitigation-related projects. Because the plan defines, justifies, and prioritizes mitigation initiatives that have been formulated through a technically valid hazard analysis and vulnerability assessment process, the participating organizations are better prepared to more quickly and easily develop the necessary grant application materials for seeking state and federal funding.

5. Enhance Local Policies for Hazard Mitigation Capability

A component of the hazard mitigation planning process conducted by the Greenville County DMC is the analysis of the existing policy, program, and regulatory basis for control of growth and development, as well as the functioning of key facilities and systems. This process involves cataloging the current mitigation-related policies of local government so that they can be compared against the hazards that threaten the jurisdiction and the relative risks these hazards pose to the community. When the risks posed to the community by a specific hazard are not adequately addressed in the community's policy or regulatory framework, the potential impacts of future disasters can be even more severe. Therefore, the planning process utilized by the DMC supports evaluation of the adequacy of the community's policies and programs in light of the level of risk posed by specific hazards.

6. Integrate HMP Requirements into Other County Plans

The Greenville County HMP is supported by other County planning mechanisms and programs including the following:

- a. County Comprehensive Plan
- b. Capital Improvement Program
- c. Emergency Operations Plan
- d. Stormwater Management Plan
- e. Land Development Regulations
- f. Flood Damage Prevention Ordinance

Section 5.2 provides information on the types of support provided by these plans and programs to the Greenville County HMP.

The following sections of the HMP present the detailed information to support these purposes. Section 3 describes the current DMC organization and its approach to managing the planning process. The plan provides a description of the mitigation-related characteristics of Greenville County, such as its land uses and population growth trends; the mitigation-related policies already in-place; identified critical facilities present in the community; and, repetitively damaged properties. The plan then summarizes the results of the hazard identification and vulnerability assessment process and addresses the adequacy of the current policy basis for hazard management by Greenville County and participating organizations. The plan also documents the structural and non-structural mitigation initiatives to address the identified vulnerabilities. The plan further addresses the mitigation goals and objectives established by the DMC and the actions to be taken to maintain, expand and refine the HMP and the planning process. Finally, the past and planned efforts of the DMC to engage the entire community in the mitigation planning process are documented.

3 Disaster Mitigation Committee

3.1 Organizational Structure

Greenville County created the DMC to provide for thorough representation of the public, business and industry stakeholders, and utility providers, as well as to provide hazard mitigation expertise from various local, state, and federal agencies and academics. Multiple departments of Greenville County were also represented on the DMC.

Table 3-1 below contains the full membership of the DMC. Individual committee representatives may change during the planning cycle; however, it is anticipated that all the listed agencies, departments, and jurisdictions will maintain at least one representative on the committee throughout the five (5) year planning process.

Table 3-1: Disaster Mitigation Committee Membership Roster

Organization / Agency	Participating Member	Member's Title	Contact Information
Greenville County	Brian Bishop	Floodplain Administrator	jbishop@greenvillecounty.org
	Patty Wright	Principal Engineering Technician	pwright@greenvillecounty.org
	Don Shuman	Parks Director	dshuman@greenvillecounty.org
	Hunter Crumley	Civil Engineer	hcrumley@greenvillecounty.org
	Tyler Stone	Planning Manager	astone@greenvillecounty.org
	Bob Mihalic	Governmental Affairs Coordinator	bmihalic@greenvillecounty.org
	Wade Shealy	Director of School Safety and Emergency Preparedness	wshealy@greenville.k12.sc.us
	Jessica Stumpf	Deputy Director of Emergency Management	jstumpf@greenvillecounty.org
	Jay Maret	Director of Emergency Management	jmaret@greenvillecounty.org
City of Greenville	Paul Dow	Assistant City Engineer	pdow@greenvillesc.gov
City of Greer	Dorian Flowers	Fire Chief	dflowers@cityofgreer.org
City of Travelers Rest	Eric Vinson	City Administrator	eric@travelersrestsc.com
City of Simpsonville	Dianna Gracely	City Administrator	dianna@simpsonville.com
City of Fountain Inn	Shawn Bell	City Administrator	shawn.bell@fountaininn.org
City of Mauldin	Bill Stewart	Fire Chief	bthornton@mauldincitysc.com
	Bryan Thornton	Streets Supervisor	bstewart@mauldinfire.com
NOAA	Brian Campbell	Regional Maintenance Specialist	Brian.Campbell@noaa.gov
USDA	Lynne Newton	Supervisory District Conservationist	Lynne.Newton@sc.usda.gov

Organization / Agency	Participating Member	Member's Title	Contact Information
Furman University	Geoffrey Habron	Professor of Sustainability Sciences	Geoffrey.Habron@furman.edu
ReWa	Gabrielle Soled		gabrielles@re-wa.org
	Glen McManus	Director of Business Continuity Services	glenm@re-wa.org
Greenville County Redevelopment Authority	Briney Bischof	Associate Community Development Planner	bbischof@gcra-sc.org
Upstate Forever	Drew Brittain	Land Conservation Specialist	dbrittain@upstateforever.org
Home Builders Association	Michael Dey	Chief Executive Officer	mdey@hbaofgreenville.com
Prisma Health	Jordan Bradway	Senior Program Manager	Jordan.Bradway@prismahealth.org
Greengate Community Initiative	Meg Coffey		megcoffey@yahoo.com
Colonial Pipeline Company	Brandon Grooms	Senior Right-of-Way Inspector	
Woolpert, Inc.	Hal Clarkson	Program Director	Hal.Clarkson@woolpert.com

Sign-in sheets for all three DMC meetings can be found in Appendix A.

The DMC is intended to represent a partnership between the public and private sectors of the community, working together to create a disaster resistant community. The proposed mitigation initiatives developed by the DMC and listed in this plan, when implemented, are intended to make the entire community safer from the impacts of future disasters for the benefit of every individual, neighborhood, business, and institution.

For all previous planning efforts, including the 2020 HMP, the DMC has encouraged participation by all interested agencies, organizations, and individuals. In fact, the DMC has maintained full participation through all planning efforts, and it is anticipated that full participation will continue through this planning period. The result of an active membership is well thought out and meaningful mitigation initiatives.

The DMC is charged with meeting, at a minimum, on an annual basis to review mitigation initiatives that have been implemented, review lessons learned from disaster events that may have occurred since the last meeting of the DMC, and revise the HMP as appropriate. Mitigation initiatives proposed for future implementation may also be reevaluated for consistency with the goals of the Plan and to incorporate lessons learned from ongoing or implemented initiatives.

Previous DMC meetings have resulted in holding those responsible for implementation of the plan accountable as well as adjusting initiatives to meet the changing needs of the community.

Any proposed changes to the 2020 HMP will be considered by the DMC and, if agreed upon, will be incorporated into the Plan. These changes will be presented to Greenville County Council for review as part of the annual report to Council. In addition, the DMC will promote public involvement in the planning process by posting the annual report on the County website and soliciting public comment to be shared with DMC members. It is also a function of the DMC to coordinate and exchange information with agencies and departments represented by individual committee members.

3.2 Operating Procedures

The DMC was organized as the guiding body for the creation of the 2020 HMP with Woolpert assisting through data gathering and analysis, meeting facilitation, and plan preparation. This planning cycle included three (3) meetings of the DMC during the plan development process as follows (full agendas and meeting minutes are contained in Appendix A).

DMC meeting #1 (August 15, 2019): The initial meeting of the DMC served primarily as the introductory meeting for the project and DMC members. A project overview including a review of the existing HMP was provided. The DMC also reviewed the following:

- HMP goals
- Hazards covered by the HMP
- Previous planning efforts including the existing HMP
- Project schedule

DMC meeting #2 (November 8, 2019): The second meeting was held primarily to formulate potential mitigation projects. The meeting began with a discussion of the hazards impacting Greenville County, followed by a review of past mitigation initiatives, and then a brainstorming session of potential mitigation initiatives. DMC meeting #3 (December 13, 2019): The third meeting of the DMC was held to review, add to, and prioritize the list of individual mitigation initiatives.

Once a draft plan was prepared and reviewed by County staff, the draft HMP was provided to the participating communities for further review and comment. Comments from the DMC are contained in Appendix A with comment status (e.g., incorporated into section x).

As stated above, the DMC is tasked with providing annual review of the HMP along with meeting to perform post-disaster reviews. The County Floodplain Manager will notify the DMC members approximately two weeks prior to the meeting dates for annual and post-disaster reviews.

During the annual review process, the DMC will be informed of the status of on-going mitigation initiatives as well as new proposed initiatives. Each initiative will be discussed to ensure it is still appropriate, to review potential funding sources, and to validate the current priority ranking. Any new mitigation ideas from the DMC and others will be evaluated, scored, and added to the mitigation initiative list, as appropriate.

Post-disaster review meetings are currently facilitated by EMD to discuss the successes and failures of actions taken during the disaster. As appropriate, priorities may be adjusted and new mitigation initiatives added to the list based on the items discussed during these meetings. A review of prioritized mitigation initiatives that may be eligible for funding due to a disaster declaration should also be identified and a plan of action created for seeking funding for eligible projects.

4 Mitigation Goals

4.1 Introduction

The DMC has retained the eight (8) goals established in the 2015 HMP update and has added one new goal to reflect the County's concern for protecting life: "The County will protect public safety and reduce loss of life and injury". The previous goals included educating the public and government officials, improving communications and response initiatives, and protecting structures. Specific objectives were established for each goal, and initiatives were approved to meet the required objectives.

4.2 Mitigation Plan Goals and Objectives

The DMC affirmed previously stated goals and objectives and added one new goal (goal # 9 below) to guide its work in the development of the HMP. The goals and objectives helped to focus the efforts of the group in the mitigation planning effort to achieve an end result that matches the unique needs, capabilities and desires of Greenville County.

The goals and objectives affirmed by the DMC for the planning process are listed below.

1. County government will have the capability to develop, maintain, and utilize hazard information
 - a. Data and information needed for defining hazards, risk areas, and vulnerabilities in the community will be obtained
 - b. The capability to effectively utilize available data and information related to mitigation planning and program development will be available
 - c. The effectiveness of mitigation initiatives implemented in the community will be reviewed and documented
 - d. There will be a program to derive mitigation "lessons learned" from significant disaster events occurring in or near the community
2. The County will have the capability to initiate and sustain emergency response operations during and after a disaster
 - a. Communications systems supporting emergency services operations will be available to provide for effective communication during times of disaster
 - b. Designated evacuation shelters will be capable of operating during and after disaster events
 - c. Emergency services organizations will have the capability to detect emergency situations and promptly initiate emergency response operations
 - d. Local emergency services facilities will be assessed, and County-owned service facilities will be capable of operating during a disaster event
 - e. Response capabilities will be available to protect visitors, special needs individuals, and the homeless from a disaster's health and safety impacts
3. The continuity of County government operations will not be significantly disrupted by disasters
 - a. Measures will be implemented to alert County personnel of impending disasters and corresponding action plans
 - b. County employees will be trained in disaster response and operations
4. The policies and regulations of County government will support effective hazard mitigation programming throughout the County

- a. County government will establish and enforce building and land development codes that are effective in addressing the hazards threatening the community
 - b. County government will protect high hazard natural areas from new or continuing development
 - c. Land use policies, plans and regulations will discourage or prohibit inappropriate location of structures or infrastructure components in areas of higher risk
 - d. Reconstruction and rehabilitation of structures and utilities in the County will incorporate appropriate hazard mitigation techniques
 - e. Regulations will be established and enforced to ensure that public and private property maintenance is consistent with minimizing vulnerabilities to disaster
 - f. The County will continue participation in the National Flood Insurance Program and the associated Community Rating System
5. Residents of the County will have homes, institutions, and places of employment that are less vulnerable to disasters
- a. Programs for removal, relocation or retrofitting of vulnerable utilities in high hazard areas will be established
 - b. The vulnerability to disasters of schools, libraries, museums, and other institutions important to the daily lives of the community will be minimized
6. The economic vitality of the County will not be significantly threatened by a disaster
- a. County government emergency response and disaster recovery plans will appropriately consider the needs of key employers in the community
 - b. County government will encourage community businesses and industries to make their facilities and operations disaster resistant
 - c. County government will implement appropriate communications initiatives to address public concerns of community condition and functioning in the aftermath of a disaster
7. The availability and functioning of the County's infrastructure will not be significantly disrupted by a disaster
- a. County government will encourage hazard mitigation programming by private sector organizations owning or operating key community utilities
 - b. Routine maintenance of the community's infrastructure will be done to minimize the potential for system failure due to a disaster
 - c. Transportation facilities and systems serving the County will be constructed and/or retrofitted to minimize the potential for disruption during a disaster
8. Key County employees will be trained to recognize hazards threatening local areas and the techniques to minimize vulnerability to those hazards. Information on hazard mitigation will be disseminated to the public.
- a. Interested individuals will be encouraged to participate in hazard mitigation planning and training activities
 - b. Education programs in risk communication and hazard mitigation will be established and implemented
 - c. Managers of public facilities will be knowledgeable in hazard mitigation techniques and the components of the County's mitigation plan
 - d. Technical training in mitigation planning and programming will be given to appropriate local government employees
 - e. The public will have facilitated access to information needed to understand their vulnerability to disasters and effective mitigation techniques

9. The County will protect public safety and prevent reduce of life and injury

- a. Mitigation initiatives will be prioritized with emphasis on the number of citizens impacted by the initiative
- b. Hazards with the highest potential to cause injury or risk to life will be given priority in the planning process
- c. This plan will support the efforts of those responsible for emergency response during and immediately following a natural disaster

These goals selected by the DMC are related to the broad mitigation needs and capabilities of the communities involved, although some of the initiatives are focused on a specific hazard type or category. In general, the Greenville County mitigation goals and objectives are “multi-hazard” and multi-jurisdictional in scope and can be described as statements of the desired “mitigation-related capabilities” that will be present in the future as the goals are achieved.

Guidance to meet the goals of this mitigation plan will be provided by the State of South Carolina Emergency Management Division, pursuant to the State Mitigation Plan. The state does not provide a specific set of goals; however, guidance and coordination of hazard preparations and mitigation is available.

4.3 Goal Based Planning Process

The goals established by the Greenville County DMC are considered to be broad, general guidance that defines the long-term direction of the 2020 HMP. As indicated in the list of goals and objectives above, each goal statement has one or more objectives that provide a more specific framework for actions to be taken by the DMC and its participants. The objectives define actions or results that can be placed into measurable terms by the DMC and translated into specific assignments for implementation by the participants in the DMC and associated agencies and organizations.

The objectives selected by the DMC are intended to create a specific framework for guiding the development of proposed mitigation initiatives for incorporation into the plan. Whenever feasible, the planning participants have attempted to associate each proposed mitigation initiative with the objective statement the initiative is intended to achieve. By associating a mitigation initiative with a specific objective, the proposed initiative is also intended to help achieve the broader goal statement to which the objective corresponds. Proposing mitigation initiatives that are consistent with the selected objectives is a principal mechanism for the DMC participants to achieve the stated goals of the mitigation planning program.

To illustrate this point, Table 4-1 shows a list of the mitigation initiatives contained in the 2020 HMP and the objective statements which they are intended to help achieve (In the table, goals are identified by numbers and goals by lower case letters). New initiatives added during the 2020 planning cycle are indicated in “**bold**” type. For a more detailed description of each mitigation initiative, see Section 10.2. This format allows the DMC to identify which of the established objectives is to be addressed by the proposed initiative, if any. The DMC is able to consider achievement of a specific objective under an established goal as it reviews a proposed initiative for incorporation into the plan; or, as it assigns the initiative a priority or schedule for implementation. This approach creates a framework for “goal-based” planning by the DMC, focusing the group’s efforts on proposing and implementing mitigation initiatives intended to achieve the established mitigation goals.

As the HMP is reviewed and updated by the DMC, the goals and supporting objective statements are also reviewed to ensure they are still applicable to meeting the unique needs, interests and desires of the community.

Table 4-1: Planning Goals and Objectives

Initiative Description		Planning Goal(s) Targeted	Planning Objective Satisfied
A. Prevention			
	Bridge/Culvert Analysis (on-going)	1, 5	1a, 5b
	Proactive Maintenance of Stormwater Infrastructure	5, 7	5a, 7b
	Underground Electricity Plan	5	5a
	Paris Mountain Wildfire Mitigation Plan	1, 3, 5, 9	1a, 3a, 5b, 9
	Repetitive Loss Area Plan	1, 4, 9	1a, 1c, 4, 9
	Update Existing Watershed Studies	1, 5	1a, 5b
	Enoree River Basin Study	1, 5	1a, 5b
	Travelers Rest and Marietta Area Watershed Study	1, 5	1a, 5b
B. Public Education & Awareness			
	Enhanced GIS Database (on-going)	1, 8	1a-b, 8c, 8e
	Realtor Flood Hazard Education (on-going)	8	8a-e
	Pre-Prepared Hazard Info Ads (on-going)	2, 8	2c, 8c, 8e
	Flood Signs (on-going)	5, 8	5b, 8e
	Enhance Hazards Education	3, 8	3b, 8a-e
	Early Warning System Evaluation	3, 6, 9	3a, 6c, 9
	Social Media Public Communication	3, 6, 9	3a, 6c
	Emergency Public Communication	3	3a
	Protection Education	8	8a-e
C. Natural Resources Protection			
	Stream Crossing Debris Removal	5, 7	5, 7b-c
	Riparian Area Management Plans	4	4a-e
	Runoff Reduction	4	4a-e
D. Emergency Services			
	Early Warning System Enhancement (on-going)	2, 3	2a, 2c, 2e, 3a
	Continue Improvements to Radio Communications (on-going)	2	2a, 2c, 2e
	Communications Protocol (on-going)	2	2a, 2c, 2d, 2e
	Post-Disaster Review Meetings (on-going)	1, 2, 3, 6, 7, 8	1d, 2e, 3b, 6a-b, 7a, 8a
	Evaluation of Emergency Routes (on-going)	2	2c
	Comprehensive Training (on-going)	3	3b
	Coordinated Bridge De-icing	7	7c
	Heating and Cooling	2, 5, 9	2e, 5b, 9
	Backup Power	5, 9	5b, 9
E. Property Protection			
	Elevation Grant Program (on-going)	5	5a
	Flood Mitigation Acquisition Program (on-going)	5	5a
	Identify / Mitigate Infrastructure	4, 7	4d, 7b
F. Structural Projects			
	Critical Facility Retrofits / Relocations	2	2d

5 Previous Planning and Implementation Efforts

5.1 Introduction

This plan is the fourth issuance of the Greenville County Hazard Mitigation Plan and constitutes a comprehensive update to the previous plans. In general, the previous plans built off the last five-year plan update. This planning process included a comprehensive review of the hazards affecting the County and the potential impacts of those hazards.

The goals of the previous plan were reviewed and updated as appropriate. For this planning cycle, consideration of the impact of hazards on human life was given renewed emphasis and is reflected in the addition of goal number 9 (See Section 4.2). Previous mitigation measures were also considered and incorporated into this plan. Just as the first plan focused on public education, this plan does as well.

Greenville County has been aggressive in addressing existing flooding issues over the last fifteen (15) years, having purchased over 200 structures in the floodplain. Further, to help ensure that new problems are not being created, the County has incorporated several “higher standards” such as a four (4) foot freeboard requirement into their ordinance and has conducted five (5) watershed studies to identify structures at risk and appropriate solutions. In fact, the County has only issued nine (9) permits for new buildings in Special Flood Hazard Areas since 2015.

The County experienced an extreme rain event in August of 2014 in the Rocky Creek watershed. Due to the implementation of identified flood solutions from the 2001 Rocky Creek Watershed Study, damage to homes was limited. Two damaged homes, not previously identified for acquisition, were purchased and removed to prevent future damage. Due to the comprehensive nature of the County’s floodplain management program and the success of this plan, this planning cycle is again focused on educating the public on ways they can partner with the County to protect their own lives and property.

Overall, the County is growing at a rapid pace. According to the County’s comprehensive plan, Plan Greenville 2020, the County has grown at a rate of about 14% since 2010 with an anticipated growth of 8% by 2023. This growth will produce a higher level of risk for the County (more buildings and people), but due to the County’s stormwater and floodplain management programs, building codes enforcement, and planning efforts, this growth is not expected to impact the County’s overall vulnerability. However, as this growth continues, it is incumbent on the DMC to monitor and evaluate changes, particularly to vulnerable populations and critical facilities, to ensure that risks do not increase more rapidly than growth. See the figure below from Plan Greenville 2020 for an illustration of population density across the County.

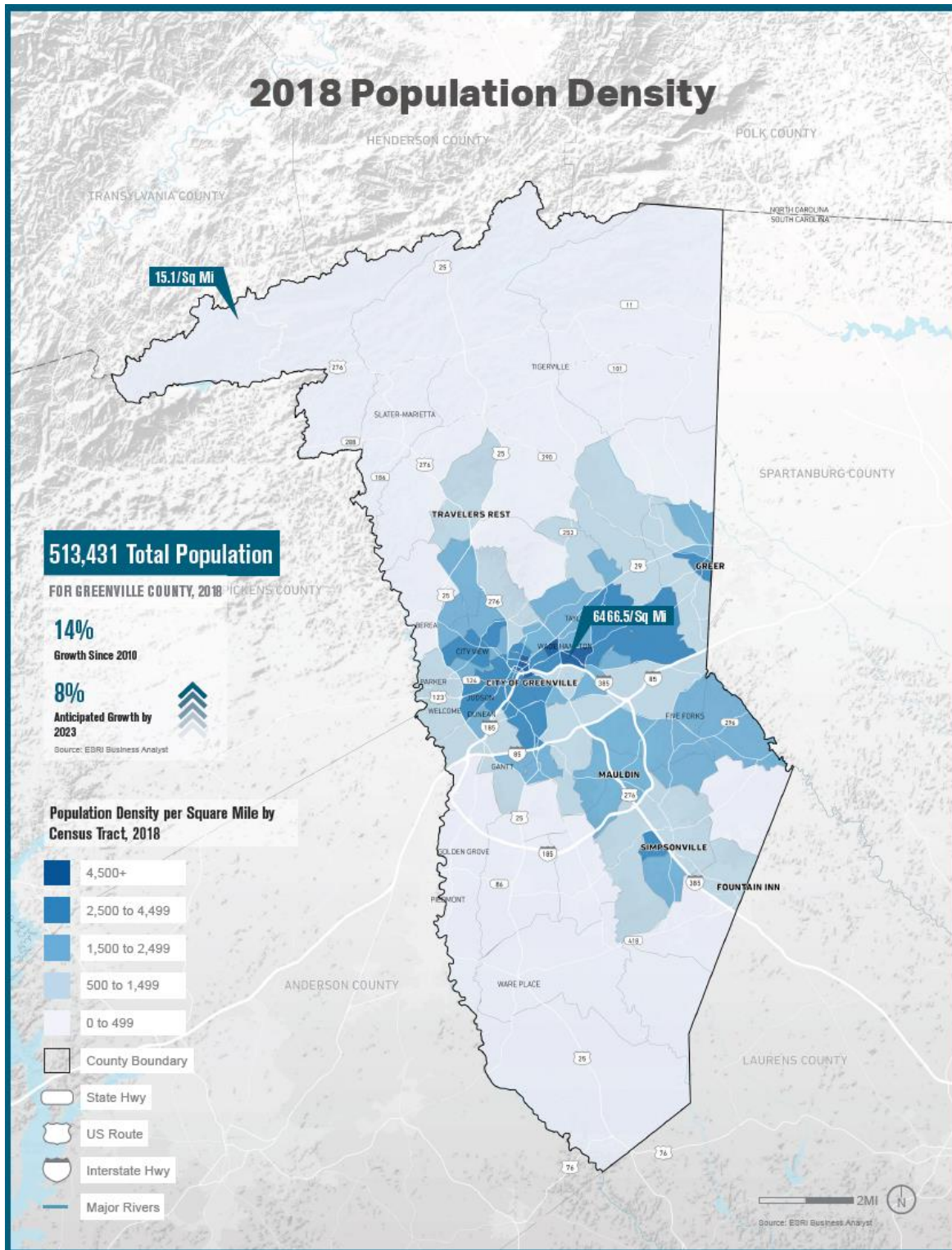


Figure 5-1: 2018 Population Density
(Plan Greenville 2020)

The following sections describe the outcomes of each of the previous planning efforts and discusses some of the County’s more successful mitigation efforts.

5.2 Related Planning Efforts

To effectively prepare and implement a hazard mitigation plan, the plan must be coordinated with other community plans, policies, and programs. Personnel from a variety of departments were included in the hazard mitigation planning process such as; parks and recreation, public works, stormwater management, GIS, and planning. Representation from these key departments helps ensure that issues and concerns from across the County are incorporated into the HMP and that elements from the HMP are appropriately incorporated into other County planning efforts, such as the comprehensive land use plan.

The County’s hazard mitigation effort is enhanced through participation in the National Flood Insurance Program and enforcement of the Flood Damage Prevention Ordinance. Also, this effort is supported by other County planning mechanisms and programs including those listed in the following table. As described in the Appendices, municipal jurisdictions participating in this HMP also have programs in place that enhance their mitigation efforts.

Table 5-1: County Plans and Programs Supporting Hazard Mitigation

Plan or Program	Description
County Comprehensive Plan	The comprehensive plan is a policy document that is adopted by County Council to serve as a guide for future decisions on growth. Provides significant information on County services, transportation corridors, municipalities, mapping, etc. that is used in developing and evaluating mitigation initiatives. Zoning is a major component that considers natural resource protection and flood hazard area development.
Capital Improvement Program	Five (5) year program providing framework for funding non-recurring capital improvement projects, including those related to hazard mitigation (e.g., bridge upgrades, flood prone property acquisition, solid waste facilities).
Emergency Operations Plan	This plan is the result of the all-hazards emergency management program designed to address many types of hazards including severe weather, flooding, hazardous materials, earthquakes, terrorism, and technological incidents.
Stormwater Management Program	The stormwater management program is administered through the Greenville County Land Development Division. This program addresses all aspects of stormwater management including runoff and water quality issues. Stormwater runoff rates, drainage easements and stream buffers, as well as detention pond design and maintenance, relate directly to flood control.

Plan or Program	Description
Land Development Regulations	These regulations address all aspects of land development including but not limited to drainage, transportation, natural areas, commercial structures and residential subdivisions. Their primary goal is to provide for orderly development considering both human and environmental factors. They help to minimize flood damage and ensure access to emergency services in developed areas.
Flood Damage Prevention Ordinance	It is the purpose of the “Flood Control, Drainage, Stormwater Management – Floods and Flood Control” ordinance to protect human life and health, minimize property damage, and encourage appropriate construction practices to minimize public and private losses due to flood conditions.

5.3 Previous Plans

5.3.1 2005 HMP

At the time of the first HMP in 2005, Greenville County had already been working on several mitigation initiatives, despite the Plan being in its infancy. The following initiatives were completed prior to the HMP development in 2005:

- Several drainage projects to reduce flooding impacts at key locations
- Improvements to emergency response based on recent natural hazard experiences
- Flood insurance re-study including digital floodplain mapping

In 2004, the Dwelling Elevation Program was initiated; the County funding assistance began being offered to qualifying residents.

5.3.2 2010 HMP

In 2010, the original initiative goals were reviewed, and progress had been made on most of the initiatives. Several watershed studies were initiated and completed, County GIS data was updated, Repetitive Loss Areas were delineated, and multiple structural projects were completed. The County made a lot of progress from 2005 to 2010; a full list of completed projects can be seen in Table 5-2.

5.3.3 2015 HMP

Between 2010 and 2015, the County continued to expand on its mitigation initiatives. Approximately, 16 stream gages and 20 rain gages have been installed on the Reedy River, Brushy Creek, Gilder Creek, and Mountain Creek Tributary 1. Watershed studies were completed, and several recommendations from the studies were implemented.

5.4 Plan Accomplishments

Greenville County has made significant progress since the first HMP in 2005. Some of the major accomplishments are summarized below.

5.4.1 Dwelling Elevation Program

A dwelling elevation/flood mitigation program has been implemented by Greenville County to assist homeowners with the elevation of their dwellings. The goal of this program is to reduce repeated flooding by providing grants up to \$7,500 to go toward the elevation of homes. To date, 6 homeowners have elevated structures utilizing this program.

5.4.2 Acquisition Program

Greenville County has purchased a total of 183 properties (representing 214 structures) within the floodplains of the Upper Reedy River, Rocky Creek, Gilder Creek and Brushy Creek watersheds. The removal of all structures restored about 106 acres of open floodplain.

In addition, Greenville County has instituted a program to purchase properties within the floodplain during “tax sales” to eliminate the potential of those properties becoming future “loss” structures.

5.4.3 Watershed Studies

Five (5) watershed areas have been studied by the County to identify road/stream crossings and develop possible flood solutions. Studies have been completed for the Brushy Creek, Gilder Creek, Grove Creek, Langston Creek / Upper Reedy River, Rocky Creek North watersheds. As appropriate, these studies have either been submitted for a Letter of Map Change or incorporated into the latest map revision.

5.4.4 Grants

In addition to the Hazard Mitigation Grant Program (HMGP) request for this planning effort, Greenville County was awarded HMGP funding to assist with a public outreach effort related to wildfires. The County also made received funding through grant number DR-4166 to purchase eleven (11) homes. Further, the County is awaiting approval of another HMGP application to prepare a wildfire mitigation plan for the Paris Mountain area of Greenville County.

5.4.5 NAFSMA Presentation

In August 2015, Greenville County was an active participant in the National Association of Flood and Stormwater Management Agencies (NAFSMA) annual conference in Jackson Hole, Wyoming. NAFSMA places special emphasis on floodplain management and offered the County an opportunity to showcase some of its efforts while learning from peers. The County was selected to present two different components of their stormwater program and presented the following topic related to its flood mitigation efforts; “Greenville County Floodplain Management”, by Paula Gucker, Assistant County Administrator for Community Planning, Development & Public Works. This same presentation was later made to several other professional organizations.

FEMA has recognized Greenville County twice in recent years due to the County’s floodplain management efforts. In 2016, FEMA produced a white paper titled, “Greenville County “Buys Down the Risk” With Property Acquisition Program”. This paper highlighted the County’s property acquisition program. In 2018, SCEMD and FEMA again recognized the County’s flood mitigation efforts by including examples from “Greenville County’s comprehensive plan to combat flood risk” in its document titled, “Hazard Mitigation Best Practices”.

Copies of these documents can be found in Appendix B.

5.5 Completed Initiatives

Table 5-2 below contains a listing of mitigation initiatives identified in previous plans that have been partially or fully implemented to date.

Table 5-2: Completed Mitigation Initiatives

Initiative	Description	HMP Cycle
Revisions to Flood Damage Prevention Ordinance	Flood Damage Prevention Ordinance Revisions (Feb/May 2007). Provided clarification and enhancement of requirements regarding floodplain studies/ encroachments.	2005
Brushy Creek Watershed Study	The Brushy Creek Stormwater Master Plan was completed May 2007. The study produced floodplain maps for the watershed and a mitigation alternatives analysis that targeted three major subdivisions. Over 90 flood prone structures located in the 1% Special Flood Hazard Area of this watershed have been removed as a result of this study.	2005
Rocky Creek Watershed Study	In August 2005, the Rocky Creek Stormwater Master Plan was submitted to FEMA with a request for a Physical Map Revision (PMR). FEMA notified the County that the Plan would be processed as a PMR when funding became available. The final report for this study was completed in May 2007. Several bridges in this watershed have been upgraded. The modeling data from this study as well as all other completed studies was submitted to FEMA to support the new County-wide FIS.	2005
Langston Creek / Upper Reedy River Watershed Study	The Upper Reedy Watershed Study was initiated in late 2007 and completed in November 2009. This study provided new floodplain maps for this watershed and an alternatives analysis with recommended flood mitigation measures for targeted areas. Over 25 homes located in the SFHA have been removed as a result of this study. Also, several bridges have been replaced with a resulting higher Level of Service (LOS) with regard to flooding.	2005
Gilder Creek Watershed Study	The Gilder Creek Watershed Study was initiated in late 2007 and completed in April 2010. This study produced new floodplain maps for this watershed and an alternatives analysis that recommended flood mitigation measures for targeted areas. Several bridges in this watershed have been upgraded to a higher LOS and one home has been removed from the SFHA.	2010

Initiative	Description	HMP Cycle
Flood Pool Elevations	The County Floodplain Administrator’s office maintains an elevation database for the nine (9) reservoirs included in the Rabon Creek, South Tyger and Huff Creek Watershed Districts. The impoundment easements for these areas were added to the County GIS in 2012. Future construction within these easements is regulated.	2010
Bridge / Culvert Replacement	The County replaced and upgraded 7 stream crossings during the 2005 HMP cycle and 21 crossings during the 2010 HMP cycle. These upgrades improved channel flow characteristics through the crossings, providing a higher level of service.	2005/ 2010
River Gage Installation	River gages have been installed at four locations on the Reedy River and one location each on Brushy Creek and Gilder Creek. One additional gage has been installed on the Mountain Creek Church Road bridge over Mountain Creek Tributary 1. The National Weather Service utilizes the gage data in forecasting and in issuing emergency alerts.	2010
Formal Agreements with Utility Providers	Greenville County has a Preferred Customer agreement with the electric utility provider to restore power to critical facilities first after a severe weather event.	2010
Enhance Hazard Updates	<p>An informational page regarding Mandatory Purchase of Flood Insurance was added to all floodplain verifications performed for the public (2008). As part of our Community Rating System (CRS) program, the Codes Enforcement website was enhanced to include a floodplain management page with links to flood safety; FEMA; flood facts; elevation grant program; ordinance; permitting; and, frequently asked questions. Also, a floodplain management section targeting building contractors was linked to this site.</p> <p>As part of CRS, Repetitive Loss Areas surrounding repetitive loss structures were delineated. An address list for parcels contained in these areas was developed and is used annually to send relevant information on flooding issues. Also, a Repetitive Loss Area map was generated on GIS.</p>	2005/ 2010

Initiative	Description	HMP Cycle
Stream Crossing Debris Removal	NRCS spent \$1 million for stream bank stabilization and debris removal projects (2005). NRCS received \$250,000 in 2006 and \$750,000 in 2007 for stream bank stabilization and debris removal projects.	2005
Dwelling Elevation Program	<p>Year 2005</p> <ul style="list-style-type: none"> - 15 N Chastain Dr. (Completed/\$7,500 disbursed) - 7 N Chastain Dr. (Completed/\$7,500 disbursed) - 2 Plano Dr. (Completed/ICC funds) - 12 N Chastain Dr. (Completed/ICC funds) - 6 N Chastain Dr. (Completed/ICC funds) <p>Year 2007</p> <ul style="list-style-type: none"> - 302 Hillbrook Rd. (Fire Damage – Elev. Completed/\$7,500 disbursed) 	2005
Develop Inter-Local Agreements	<p>This initiative addresses agreements between municipalities and the National Weather Service (NWS) to share information on development or changes that may affect a downstream community. Currently, a statewide mutual aid agreement is in place.</p> <p>The County notifies the NWS of homes that are removed from the floodplain under our acquisition program. The County and NWS have Memorandums of Understanding for sharing data from County rain/stream gages. Also, an MOU is in place for the Mountain Creek Church Road stream gage where the gage equipment was supplied by the NWS.</p>	2010

Initiative	Description	HMP Cycle
Neighborhood Drainage Improvement Projects	<p>Numerous projects have been completed to improve localized drainage and stream flow. The following summarizes these drainage projects and structure acquisitions.</p> <p>2005 – 3 drainage projects; 2 designs for improvements</p> <p>2007 – 5 crossing/channel improvements; 1 det. pond</p> <p>2010 – 4 drainage and culvert improvements</p> <p>2011 – 6 drainage and culvert improvements</p> <p>2012 – 8 drainage and culvert improvements</p>	2005/ 2010
County Severe Weather Manual	A manual was completed addressing severe weather protocols.	2015
FIRM Updates	New FIRM maps were created, and became effective on August 18, 2014	2010
Critical Facility Review	County critical facilities (e.g., hospitals, fire departments, police departments, and schools) have been identified. The Volunteer Service Corp. has evaluated the adequacy of several disaster shelters in the County. This evaluation was performed to determine if these shelters were designed and constructed to withstand potential disasters.	2015

Initiative	Description	HMP Cycle
<p>Grove Creek Stormwater Master Plan</p>	<p>In June 2012, the County initiated a Stormwater Master Plan study of the Grove Creek Watershed located southwest of the City of Greenville. The field work and preliminary study model are complete. Preliminary data indicates that a minor number of existing structures are located within the modeled Special Flood Hazard Area. A Letter of Map Revision has been prepared and submitted to FEMA for this study so that the data can be incorporated into the FEMA Flood Insurance Rate Maps covering this area. On March 2, 2016, the County received a letter from FEMA stating that the FIRM and FIS report should be revised as a Physical Map Revision and will begin this process. Mitigation alternatives will be presented in the final report for areas and road crossings determined to be at risk for significant flooding. Met with FEMA, SCDNR on June 13, 2017 for our DFIRM Community Coordination Meeting (Grove Creek Maps). Plan to hold a community meeting in January 2018 for public comments.</p> <p>The new FEMA maps with effective date of January 18, 2019 were approved by County Council through the updated Flood Damage Prevention Ordinance # 5031 with effective date of November 6, 2018.</p>	<p>2015</p>
<p>Rocky Creek North Update 2015</p>	<p>In May of 2015, the original 2001 Rocky Creek Stormwater Master plan was updated in response to the August 2014 storm event. The hydrologic and hydraulic models created for the 2001 study were imported into the current HEC-HMS and HEC-RAS model versions along with updated precipitation data, field survey, digital topography and damage assessment. Also, for the Crosscreek Lane analysis, a XP-SWMM 1D/2D model was built. The recommendations from the update include buyouts of selected homes, minor improvements within the Mountainbrooke subdivision, prepare a study of the drainage system within the Merrifield neighborhood.</p> <p>In April 2012, the Oak Grove Lake dam breached, releasing all of the water in the lake over a short period of time. No major flooding occurred as a result of the breach. However, in order to repair the dam, the County was required to perform a Dam Breach Analysis to determine potential impact to downstream properties.</p> <p>Results show that a breach occurring with the reservoir filled to the top of the dam will be contained within the existing 500-year floodplain. Repairs to the dam were initiated and completed in 2013.</p>	<p>2015</p>

6 Data Collection and Public Involvement

6.1 Data Collection

Hazard mitigation planning is data intensive. In addition to gathering and reviewing data from the County and other available sources, Woolpert contacted fifteen (15) agencies and organizations to gather more information regarding the hazards affecting the County and the potential impacts. Below is a list of agencies that were contacted. More detail regarding each contact is contained in Appendix C.

1. US ACE
2. NOAA
3. NWS
4. NRCS
5. FEMA
6. SC DOT
7. SC DNR – Flood Mitigation Program
8. SC DRO
9. SC EMD
10. SC DHEC – Dam Safety Program
11. SC FC
12. Upstate Forever
13. Friends of the Reedy River
14. Save Our Saluda
15. Appalachian Council of Governments

6.2 Summary of Past Events

The following table consists of major hazardous weather events that have occurred in the past five (5) years. It should be noted that there were no occurrences of Winter Storms, Wildfires, Earthquakes, and Landslides in the last five years.

Table 6-1: Previous Hazardous Weather Events

Date	Type of Event	Description	Magnitude	Location	Damage
9/16/2014	Hail	Severe scattered thunderstorms produced quarter sized hail in some areas. Penny sized hail was reported in Fountain Inn.	H2 on the TORRO Hailstorm Intensity Scale (TORRO Scale)	Fork Shoals, Fountain Inn, Simpsonville, Tigerville	Hail and wind gusts from the storm created minimal damage during this event.
2/14/2015	High Winds / Tornadoes	Strong winds up to 58 mph occurred over several hours.	Straight-line Damaging Winds	Greater Greenville, Upper Greenville County	Multiple trees were blown down causing damage to roads and structures. About \$25,000 in property damage was reported.

Date	Type of Event	Description	Magnitude	Location	Damage
5/26/2015	High Winds / TORNADOS	Severe thunderstorms produced strong winds up to 58 mph.	Straight-line Damaging Winds	Berea, Judson, Lakemont, Golden Grove, Greenville, Travelers Rest	Power lines and trees were blown down causing damage to roads. A tree fell on a house in Berea, and siding was stripped from a home in Judson. About \$10,000 in property damage was reported.
9/4/2015	High Winds / TORNADOS Hail	Strong winds up to 62 mph occurred. Quarter sized hail was reported in Greenville.	H3 on the TORRO scale	Greenville, Piedmont	Multiple trees were blown down throughout Greenville. A tree fell on a house on Webster Ave. Another tree fell across I-385 near Stone Ave and blocked traffic. About \$100,000 in property damage was reported.
12/30/2015	Floods	Flash flooding occurred as a result of about 2-3 inches of rain within a few hours.	Flash flooding	Conestee, Greenville, Mauldin	Several roads were impassable due to flooding, however, County-wide stream gages indicated water surface elevations were several feet below the 100-year flood elevation. About \$1,000 in property damage was reported.
11/30/2016	High Winds / TORNADOS	A magnitude EF1 tornado tracked across southern Greenville County and parts of Spartanburg County. An EF1 magnitude indicates wind speeds between 86 and 110 mph.	EF1 tornado	Piedmont, Simpsonville, Woodville	Large limbs and trees were knocked down throughout the entire tornado path. Greenhouses at Woodmont High School in Piedmont were damaged. A garage attached to a home in Simpsonville collapsed. At least 25 houses and mobile homes had damage including minor roof damage, large portions of roofs missing, and in one case an exterior second story and attic wall was removed. About \$500,000 in property damage was reported.
3/1/2017	High Winds / TORNADOS Hail	Scattered thunderstorms produced quarter to golf ball sized hail in several areas, and wind speeds reached 63 mph.	H5 on the TORRO scale	Greenville, Piedmont, Renfrew, Travelers Rest, White Horse	Multiple trees and power lines were blown down. A power pole fell on a house in the Judson Mill area of Greenville, and a tree fell on a mobile home in Taylors. Minor roof damage was experienced by multiple buildings in eastern Greenville, including Bob Jones University. About \$20,000 in property damage was reported.
3/21/2017	Hail	Scattered thunderstorms produced nickel to baseball sized hail.	H7 on the TORRO scale	Batesville, Greer, Locust Hill, Taylors, Tigerville, Travelers Rest	Large hail stones caused damage to vehicles and structures. Multiple vehicles on I-85 had windshields shattered from the hail. No estimation of property damage was reported.

Date	Type of Event	Description	Magnitude	Location	Damage
4/3/2017	High Winds / Tornadoes	Severe thunderstorms produced strong winds and magnitude EF0 tornadoes. An EF0 magnitude indicates wind speeds between 65 and 85 mph.	EF0 tornadoes	Berea, Greenville, Paris Mountain	Multiple trees were blown down, and several vehicles as well as a trailer were damaged by fallen trees. About \$30,000 in property damage was reported.
10/8/2017	High Winds / Tornadoes	Remnants of Tropical Cyclone Nate produced strong winds and a magnitude EF1 tornado. An EF1 magnitude indicates wind speeds between 86 and 110 mph	EF1 tornado	Gowensville, Lake Lanier	Multiple trees were blown down, and several vehicles and structures were damaged by fallen trees. Multiple vehicles, structures, and homes had minor damage from the tornado. One house had a large portion of its roof removed. About \$50,000 in property damage was reported.
11/16/18	Sinkhole	A large sinkhole formed on a commercial property in the City of Greenville	Approximately 50 feet x 20 feet, 10 feet deep	Greenville (Haywood Road area)	A portion of a state roadway and private property were damaged.
4/14/2019	High Winds / Tornadoes	Severe thunderstorms produced strong winds and two magnitude EF1 tornadoes. An EF1 magnitude indicates wind speeds between 86 and 110 mph.	EF1 tornado	Cleveland, Lakemont, Simpsonville	Hundreds of trees were blown down by the Table Rock Reservoir. Multiple trees were blown down near Caesars Head State Park. Multiple homes in Simpsonville sustained minor damage to roofs, gutters, and siding. Large trees were uprooted, and two houses had trees fall on them. A trampoline in the Alder Park area was lifted hundreds of feet by the tornado. A garage in Simpsonville collapsed onto three vehicles inside of it. A house roof deck was uplifted, causing a significant loss of roofing and insulation material. About \$150,000 in property damage was reported.

Date	Type of Event	Description	Magnitude	Location	Damage
October 2019	Drought	Portions of Greenville County entered into drought conditions in mid – 2019 which worsened to an Extreme (D3) drought by October. The drought ended by December 2019.	Extreme (D3) drought	Central Greenville County	Many crops were in distress and feed for livestock was damaged (no dollar values of damages reported).
*2/6/2020	Floods	A major rain event occurred during the final HMP preparation process, and up to 8 inches of rain was recorded in a short period of time.	Flash flooding	Countywide	Flooding caused multiple road failures, but initial results indicate that there was little, if any, damage to residential or commercial buildings. (Table 6-2 below, shows relative flood depths for this storm event)

*Because the February 2020 event occurred during plan preparation, all of the event data is not recorded in this HMP update. This event should be reviewed and included during the first annual update of the 2020 HMP.

Below are maximum water levels recorded at various stream gage stations across the County during the 2015 and 2020 storm events. For the 2015 event, flood depths were minimal and primarily localized.

Table 6-2: Maximum Water Levels

Site	Maximum recorded from 12/30/2015 Storm	Maximum recorded from 2/6/2020 Storm	100-yr Flood Stage	Flood Zone	Note
Hudson	917.6	924.1	926.5	AE	
Parkins	816.2	820.4	821.0	AE	
Landfill	810.5	815.4	813.0	AE	2020 - Exceeded by 2.38'
Log Shoals	729.7	732.8	735.0	AE	
Hwy 418	669.6	675.9	676.3	AE	2020 - Site did not report through entire storm.
Hwy 76	554.76	558.9	558.2	A	2020 - Exceeded by 0.74'
Mills Ave	889.1	890.9	891.8	AE	
Keeler	N/A	920.3	921.5	A	
Tilly	N/A	979.1	979.0	A	2020 - Exceeded by 0.13'
Holland Ford	N/A	656.0	650.5	AE	2020 - Exceeded by 5.52'
Dry Pocket	792.6	796.2	806.0	AE	
East Georgia	674.91	680.5	677.0	AE	2020 - Exceeded by 3.5'
Aiken Chapel	N/A	~847.0	847.5	AE	2020 – Elevations not yet surveyed, pictures indicate 100-yr flood level.

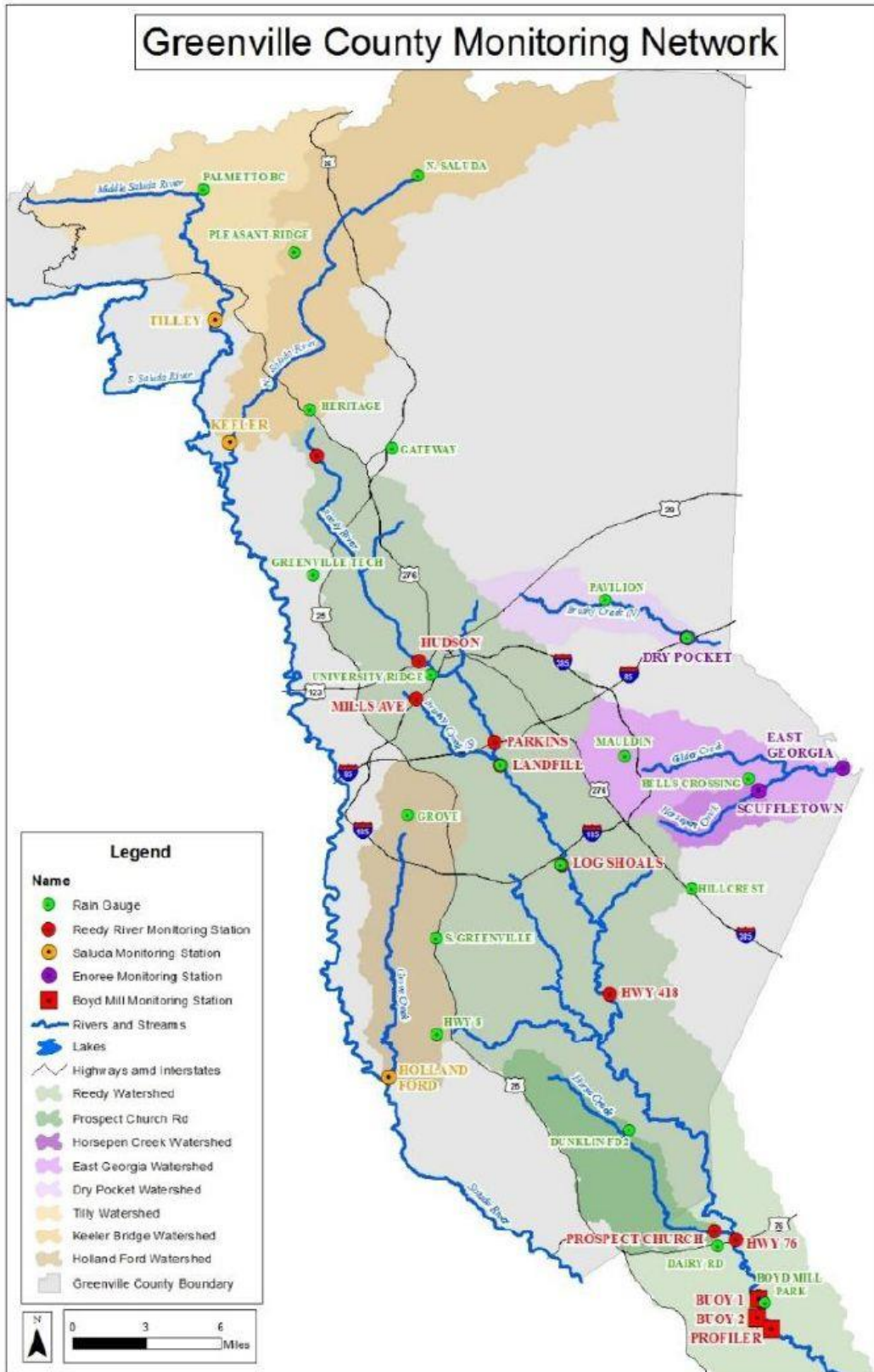


Figure 6-1: Stream Gauge Stations in Greenville County

6.3 Existing Flood Study Data

Over the past fifteen (15) years, Greenville County has engaged Woolpert, Inc. to prepare watershed master plans for multiple watersheds. These plans provide a higher level of detail than the Flood Insurance Rate Maps (FIRMs), determine the level of service road/stream crossings, and consider solutions to potential structural flooding. As appropriate, the data has been submitted to the Federal Emergency Management Agency (FEMA) through the Map Revision process.

The County has subsequently and systematically implemented the recommended solutions for these watersheds to reduce flooding. As a result, approximately 30% of the County's stream crossings in the most flood-prone watersheds have been evaluated for capacity and level of service. Nearly all of the County-owned bridges and culverts with severe level of service issues identified in those watershed studies have been addressed by the County.

Below is a comprehensive list of watersheds studied to date as well as a map outlining the watershed areas.

- Brushy Creek
- Gilder Creek
- Grove Creek
- Langston Creek / Upper Reedy River
- Rocky Creek North

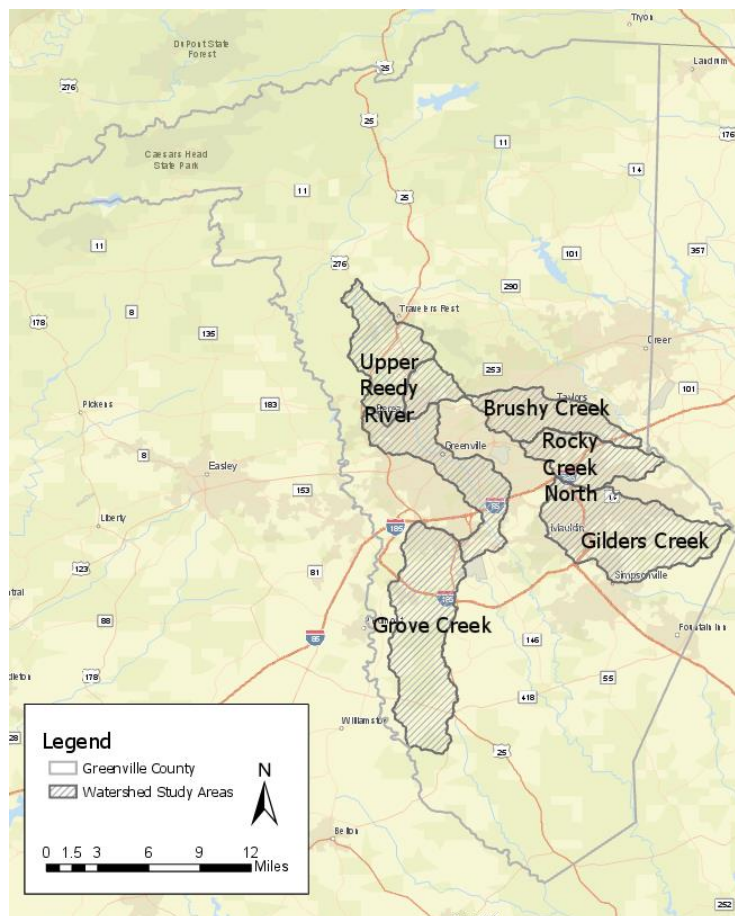


Figure 6-2: Completed Watershed Study Areas

6.4 Public Involvement

Public engagement is an important aspect of hazard mitigation planning and is crucial to understanding the needs of the community as well as an important forum for gathering data related to past events. The DMC represents a broad range of public interests, but to augment the participation of DMC members, the County also hosted three (3) public input events. While not heavily attended, these events were held in two (2) watersheds impacted by flooding in recent years and allowed for the public to review the planning process and provide input into its development.

Public Meeting #1 (September 19, 2019): Two members of the community joined the County and Woolpert for the first of two public meetings to announce the development of updates to the 2015 HMP. A short presentation was provided documenting the intent of the plan and the steps for its development. The meeting took place at Berea Community Center.

Public Meeting #2 (October 8, 2019): A public meeting was held at the Boiling Springs Fire District Training Center, however no members of the public attended. The intent of the meeting was to gather input from the public on the 2015 HMP.

Public Meeting #3 (TBD): A third meeting will be held at County Square in the latter stages of the planning process to allow for additional public review of and input into the HMP. Details of all three (3) meetings are contained in Appendix D.

Comments from attendees were documented and considered when preparing the final plan, however, the few comments received were mostly related to drainage system maintenance and minor localized street flooding. These issues were passed along to the County's Roads and Bridges Department.

7 Hazard and Risk Assessment

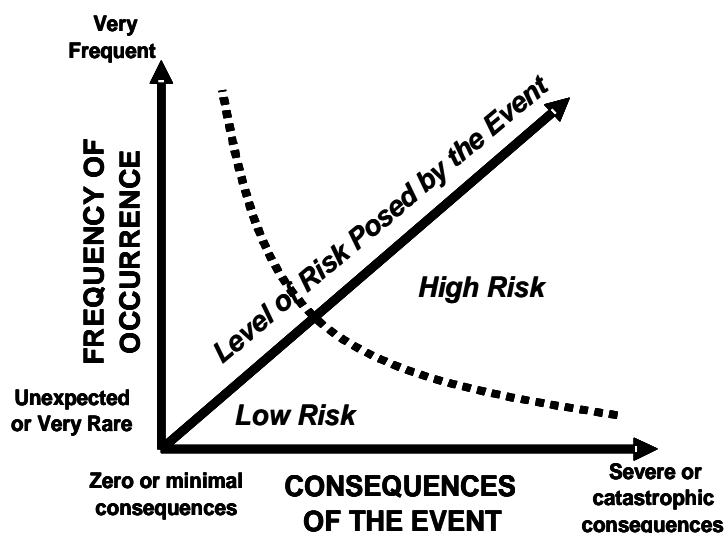
7.1 Introduction

This section of the HMP summarizes the various hazards as well as the risk associated with each. The intent of this section is to provide a compilation of information gathered and judgements made about the hazards threatening Greenville County. This information has been used to further identify relative risk associated with each hazard and to formulate mitigation initiatives and priorities.

While there may be some variation in the impact of natural hazards across jurisdictions, in general, hazards apply equally among all jurisdictions. The following hazards were considered in this planning process: Floods, Winter Storms, High Winds/Tornados, Wildfires, Earthquakes, Drought, Landslides, Sinkholes, Hail, and Climate Change. Included in the following sections is an evaluation of hazard events that occurred during the last two plan cycles.

Assessment of hazards is based on available information that includes a review of historical events. Available information on the extent of damages in terms of areas affect and costs is limited. All relevant natural hazards have been identified and appropriately assessed in order to prepare Greenville County for future events. Maps of historical weather data were created to determine if a pattern exists, and if so, to identify critical facilities that are at a higher risk for certain extreme weather events. Overall, it was found that the hazards are mostly unpredictable, and Greenville County as a whole is equally susceptible to most hazardous weather events.

Risk is comprised of two components; 1) the probability of an event occurring and 2) the consequences of that event. For the purposes of the HMP. That is, if a hazard event occurs frequently, and has very high consequences, then that hazard is considered to pose a very high risk to the affected communities. In comparison, if a hazard event is not expected to occur frequently, and even if it did, the consequences would be minimal, then that hazard is considered to pose a very low risk. The estimate of risk is based on the judgment of the planners regarding both the likely frequency of occurrence of the hazard event and its probable consequences.



The relationship between frequency of occurrence and consequences of an event can be illustrated by the graph to the left. This graph illustrates that some hazards can be defined as “low risk,” for they do not occur often enough and/or do not result in significant impacts even when they do. In comparison, other hazards may occur often enough and/or have sufficiently severe consequences when they do, that they must be considered “high risk.” Each of the hazards considered to be a threat to Greenville County can be assessed for its probability of occurrence and its likely consequences.

By considering the relative risk of the different hazards that threaten Greenville County, greater priority can be given to the “higher” risk hazards in order to most effectively utilize the time and resources available for the mitigation planning process. In this way, the planning approach used for Greenville County supports what can be termed “risk-based planning” because it facilitates the participants’ capabilities to focus on the highest risk hazards.

In earlier HMPs, the DMC derived a “relative risk score” using a qualitative process in which planners recorded, on a numeric scale, the likely frequency of occurrence, the extent of the community that would be impacted, and the likely consequences in terms of public safety, property damage, economic impact and harm to valuable environmental resources. The numeric total of the assessments of each of these is considered to constitute the “relative risk score.”

The same numeric criteria are used to classify the risk that a defined hazard poses to Greenville County. Use of common evaluation criteria enables the planning group as a whole to make comparisons of the relative risk of one hazard type in relation to another. As noted above, such comparisons can also be used to guide and prioritize the planning process by enabling planners to focus on the hazards with the highest assessed risk.

These common risk estimation numeric factors used in the planning process are listed in the following table. For the table below green represents low risk, yellow represents medium risk, and red represents high risk.

Table 7-1: Risk Estimation Factors

RISK FACTOR	EVALUATION CRITERION	ASSIGNED VALUE
Probability of Occurrence	Unknown but rare occurrence	1
	Unknown but anticipate an occurrence	2
	100 years or less occurrence	3
	25 years or less occurrence	4
	Once a year or more occurrence	5
Area Impacted	No developed area impacted	0
	Less than 25% of developed area impacted	1
	Less than 50% of developed area impacted	2
	Less than 75% of developed area impacted	3
	Over 75% of developed area impacted	4
Health and Safety Consequences	No health or safety impact	0
	Few injuries/illnesses	1
	Few fatalities or many injuries/illnesses	2
	Numerous fatalities	3
Consequences to Property	No property damage	0
	Few properties destroyed or damaged	1
	Few destroyed – many damaged	2
	Few damaged – many destroyed	2
	Many properties damaged and destroyed	3
Consequences to Environmental Resources	Little or no environmental damage	0
	Resources damaged with short term recovery practical	1
	Resources damaged with long term recovery feasible	2
	Resources destroyed beyond recovery	3
Economic Consequences	No economic impact	0
	Low direct and / or low indirect costs	1
	Low direct and high indirect costs	2
	High direct and low indirect costs	2
	High direct and high indirect costs	3

A single, numeric value is selected from each of the five risk factors. The five values are then used to derive a total relative risk value for a particular hazard that is “weighted” for the probability of its occurrence.

The total relative risk for a particular hazard is calculated by adding the selected numeric values for each of the “Impact Area,” “Health & Safety,” “Property,” “Environment” and “Economy” and multiplying this total by the numeric value selected for the “Probability of Occurrence,” as illustrated in this formula:

$$\left[\text{Area Impacted} + \text{Health and Safety Consequences} + \text{Consequences to Property} + \text{Consequences to Environmental Resources} + \text{Economic Consequences} \right] \times \text{Probability of Occurrence} = \text{Relative Risk}$$

The resulting numeric value for relative risk can vary from zero, meaning the identified hazard poses no estimated risk at all to the jurisdiction, up to a maximum of 80, which means that the hazard poses a very substantial risk to the jurisdiction.

Pursuant to the requirements of the Disaster Mitigation Act of 2000, Greenville County was required to evaluate a prescribed list of natural hazards. These hazards were: flood, winter storms, high winds/tornados, wildfires, earthquakes, drought, landslides, sinkholes, hail. While many of these hazards are relevant to Greenville County, some are not due to the geographic location and characteristics of the planning area. In the planning process, each of these hazards has been assessed by Greenville County.

In deriving these estimates of risk for each hazard, Greenville County utilized available information regarding the geographic areas that may be impacted by each identified hazard, as well as population, infrastructure, and facilities within those impacted areas. This analysis included inventories of valuable environmental resources, as well as factors that are influential to the economic well-being of the community. For much of the County, this information was available in a geographic information system (GIS) database or was accessed from internet websites and existing GIS databases available from state and federal agencies.

Risk Evaluation

For the Greenville County mitigation planning area, the results of the hazard identification and risk estimation process are shown in Table 7-2. This table shows the relative risk posed by various hazards to Greenville County. The numeric criteria used for this analysis are defined above. Risk is relative, therefore for the table below green represents low risk (score = 0 – 10), yellow represents medium risk (score = 11 – 20), and red represents high risk (score = 21 – 40).

Table 7-2: Risk Estimation

Hazard	Probability of Occurrence	Area of Impact	Consequence of Occurrence				Risk Rating
			Health & Safety	Property	Environment	Economic	
Flood	4	1	1	1	1	2	24
Winter Storms	5	4	1	1	0	2	40
High Winds/ Tornados	5	1	1	1	0	1	20
Wildfires	2	1	1	2	2	1	14
Earthquakes	1	4	1	1	0	1	7
Drought	3	3	1	0	1	1	18
Landslides	1	1	1	1	0	0	3
Sinkholes	1	1	1	1	0	0	3
Hail	4	1	1	1	1	1	20

The highest risk hazards throughout the planning area, in descending order based on the relative risk ratings, are:

1. Winter Storms
2. Flood
3. High Winds/ Tornadoes and Hail
4. Drought heat
5. Wildfires
6. Earthquakes
7. Landslides and Sinkholes

This table was compiled from data supplied by the South Carolina Emergency Management Division, the South Carolina Hazard Mitigation Plan and the risk assessment described in the paragraphs above. This table quantifies past events and provides insight into what can be expected in the future. Drought appears to be the most common hazardous event occurring in Greenville County, while landslides and sinkholes are the least likely to occur, but it is important to note that unlikely events can still result in devastating effects. The majority of deaths due to hazardous weather were caused by winter weather. Flooding proved to be one of the costliest hazards in terms of both money and lives lost.

Table 7-3: Summary of Past Hazard Events and Future Risk

Hazard	Annualized Losses	Total Losses	Deaths	Injuries	Current Relative Level of Risk
Flood	\$436,916	\$24,030,401	4	9	High
Winter Storms	\$675,429	\$37,148,621	14	2	High
High Winds / Tornadoes	\$147,298	\$8,101,414	1	43	Medium
Wildfires	\$6,674	\$367,071	0	0	Medium
Earthquakes	\$0	\$0	0	0	Low
Drought	\$479,182	\$26,355,001	6	0	Medium
Landslides	\$0	\$0	0	0	Low
Sinkholes	\$0	\$0	0	0	Low
Hail	\$290,997	\$1,604,841	1	3	Medium

7.2 Floods

The northern portion of Greenville County is located in the foothills of the Blue Ridge Mountains. As such, many of the County’s rivers and streams originate in the County. Even so, over the past several decades, the County has experienced severe flooding in urbanized areas. While the County has addressed many of the flooding issues, floods still remain a high priority for mitigation planning. In fact, of the 3,585 stream / road crossings in the County, approximately 1,029 bridges have been evaluated through the County’s watershed master planning process.

Flooding is associated with large infrequent rainfall events as well as hurricanes or tropical storms that have moved inland. Problem areas for flooding are commonly found in densely populated areas that have inadequate drainage systems or building located in flood-prone areas. Flash floods may occur in steeply sloped mountainous regions, and they are extremely dangerous due to the velocity of the moving water and debris. Flooding can affect the entire county due to mountainous terrain, buildings located in the floodplain, and areas susceptible to receiving large quantities of runoff.

The FEMA flood map in Figure 7-1 provides flood zones for a 100-year storm event, and the areas that would be impacted. This flood map was used to determine critical facilities that are at risk of flood damage.

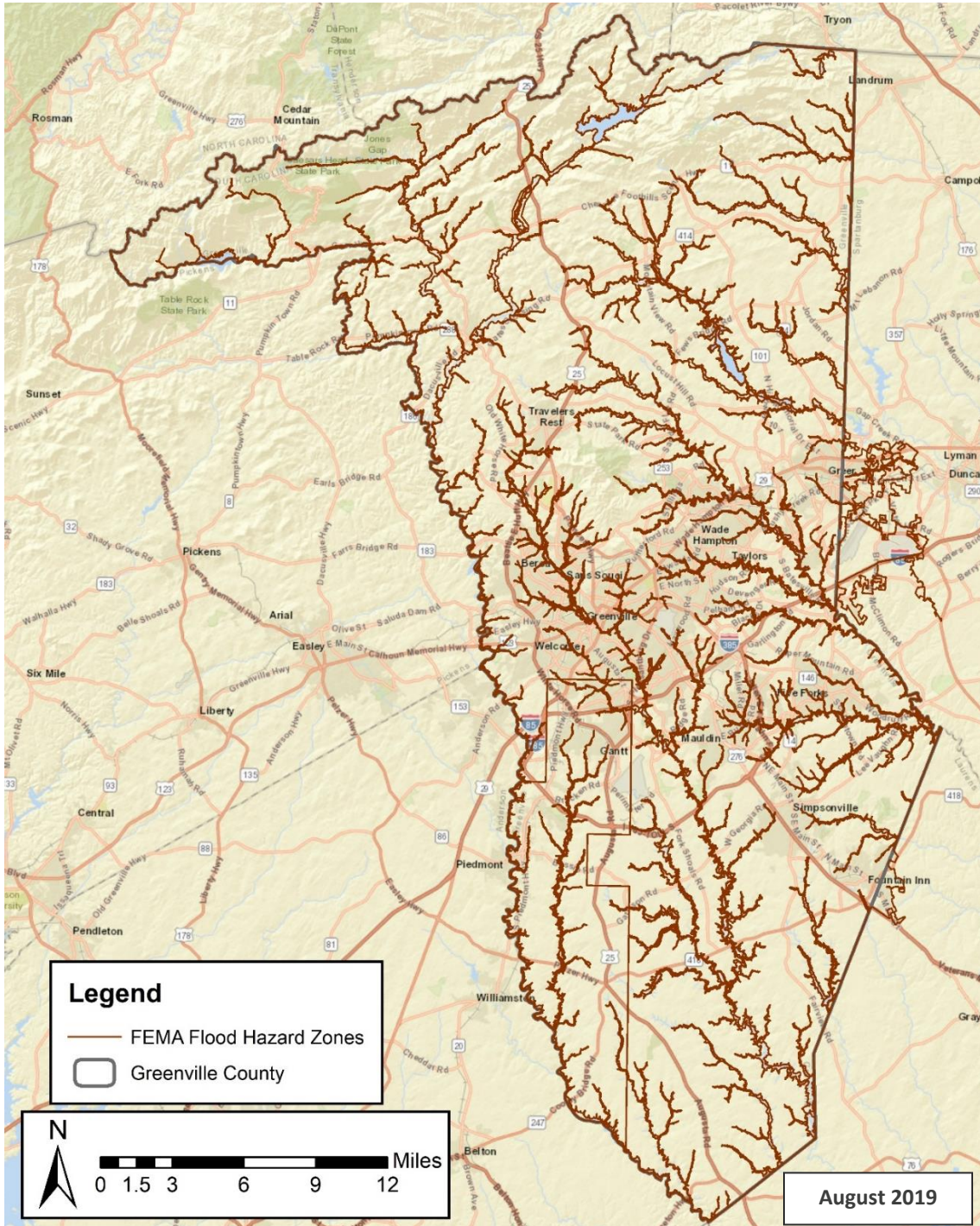


Figure 7-1: FEMA Flood Hazard Zones

The impact of dams in Greenville County was also looked at; Figure 7-2 shows the High (Class 1) and Significant (Class 2) dams in Greenville County that are currently regulated by SCDHEC. In order to be regulated, a dam must contain at least 50 ac-ft of water, be at least 25 feet tall, or pose a threat to life downstream (including overtopping major roads and impacting downstream homes). Low Hazard dams have been excluded from this map for the purpose of this plan because they do not pose a significant threat to life or property downstream.

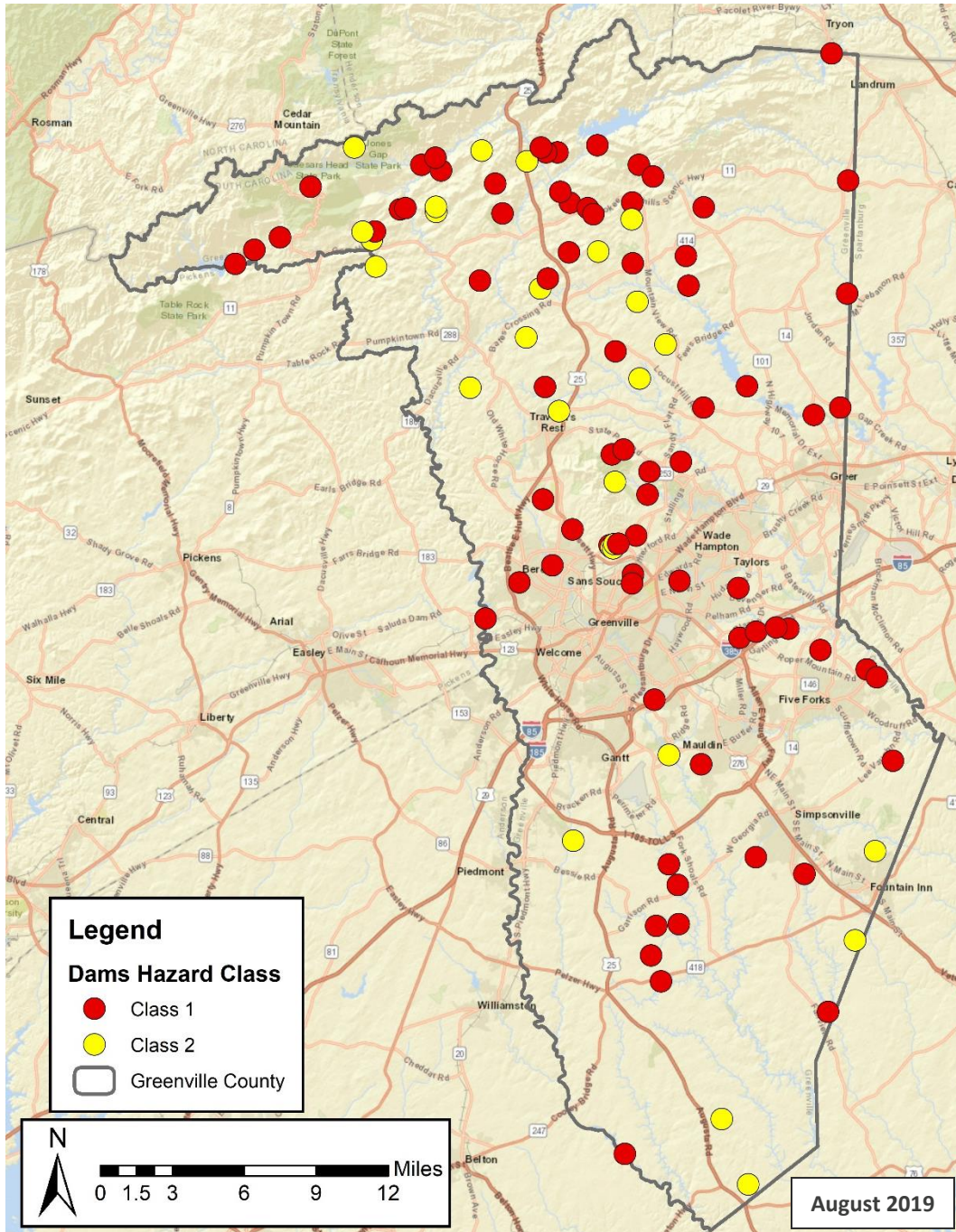


Figure 7-2: High and Significant Hazard Regulated Dams

A flood assessment was conducted to determine critical facilities that may be at risk of flooding due to dam failures and large storm events, and the following locations were determined to be at-risk:

Glassy Mountain Fire Department Station 2
49 Dividing Water Rd, Travelers Rest, SC 29690

Greenville City Fire Department Station 4
800 E Stone Ave, Greenville, SC 29608

Hampton Park Christian School
875 State Park Rd, Greenville, SC 29609

Lake Cunningham Fire Department HQ
2802 N McElhaney Rd, Greer, SC 29651

Slater Marietta Elementary School
100 Baker Circle, Marietta, SC 29661

Tigerville Fire Department HQ
2605 Hwy 414, Tigerville, SC 29688

While flooding can have significant impacts to infrastructure including roads and buildings, it can also create problems for public health. Buildings affected by flooding become susceptible to mold which could lead to health effects such as stuffy nose, irritated eyes, wheezing, and skin irritation. Mold infections may develop in the lungs of people with weakened immune systems. Buildings without air conditioners or those that lose power during a storm are especially susceptible to mold growth; air conditioners work to remove moisture from the air, and the humidity creates an environment that fosters the growth of mold. The Centers for Disease Control and Prevention (CDC) recommends drying out flooded buildings within 24 to 48 hours to minimize the risk of mold development.

Additionally, according to the Centers for Disease Control (CDC), exposure to floodwaters can pose a significant risk to health and safety. At any point, floodwaters can contain:

- Downed power lines
- Human and livestock waste
- Household, medical, and industrial hazardous waste (chemical, biological, and radiological)
- Coal ash waste that can contain carcinogenic compounds such as arsenic, chromium, and mercury
- Other contaminants that can lead to illness
- Physical objects such as lumber, vehicles, and debris
- Wild or stray animals such as rodents and snakes

Exposure to contaminated floodwater can cause:

- Wound infections
- Skin rash
- Gastrointestinal illness
- Tetanus
- Leptospirosis (not common)

It is important to protect yourself from exposure to floodwater regardless of the source of contamination. The best way to protect yourself is to stay out of the water.

If you come in contact with floodwater:

- Wash the area with soap and clean water as soon as possible. If you don't have soap or water, use alcohol-based wipes or sanitizer.
- Take care of wounds and seek medical attention if necessary.
- Wash clothes contaminated with flood or sewage water in hot water and detergent before reusing them.

For more information see <https://www.cdc.gov/disasters/floods/floodsafety.html>

Warning systems play an important role in protecting the general public; cell phone notifications and road signs can alert the public about possible flooding in the area. Cars can become stuck or even wash away in flood waters, and it is not always immediately apparent if downed electrical lines are submerged in the water. In addition to the risk of drowning and electrocution, flood waters could contain any number of dangerous items including medical waste, sewage, coal ash, snakes, and large debris. Sophisticated warning systems coupled with public education programs could prevent injury and death by keeping the public informed about the possible hazards as well as vulnerable locations during an emergency event.

7.3 Winter Storms

Greenville County experiences severe winter storms during the winter months, generally between November and February. These events cause power outages, water line breaks, and reduced emergency services. Typically, as temperatures drop, house fires increase.

Winter storms are commonly associated with precipitation in the form of ice or sleet and cold temperatures that cause major disruptions to many types of services and are dangerous to those without heat and/or water. Roads covered in ice or blocked by fallen trees prevent emergency services from reaching those in need. Overhead lines are commonly torn down by fallen trees or the weight of ice on the lines, and the weight of ice or snow on building roofs can cause them to collapse.

Winter storms can take several forms such as snow, sleet, and freezing rain; these variations are summarized in Table 7-4 below. This information was obtained from the National Severe Storms Laboratory at NOAA.

Table 7-4: Winter Storm Types

Type	Description
Snow Flurries	Light snow falls for a short period of time. There is no accumulation or light dusting from a snow flurry.
Snow Showers	Snow falls for short durations at varying intensities. Some accumulation of snow is possible during a snow shower.
Snow Squalls	Short, intense snow showers that are joined with strong winds. Significant accumulation is possible during a snow squall.
Blowing Snow	Snow that is blown by the wind and reduces visibility. This may not be snow that is falling; it could already be on the ground and picked up by the wind.
Blizzards	Blizzards are snow storms that have wind speeds over 35 mph and reduce visibility to 1/4 mile or less for a minimum of 3 hours. Blizzards could include blowing snow.
Sleet	Snow falls through a thin layer of warm air that partially melts the snow. The partially melted drops then pass through a thick layer of cold air and refreeze before hitting the ground.
Freezing Rain	Snow falls through a thick layer of warm air that fully melts the snow. The fully melted drops then pass through a thin layer of cold air and freeze when they come in contact with anything at or below 32 °F. This can cause layers of ice to form on roads, trees, power lines, and other objects.
Ice Storms	Freezing rain that lasts several hours and creates a significant accumulation.

7.4 High Winds / Tornadoes

High winds in Greenville County are generally associated with severe thunderstorms and tornadoes. High winds may occur in all regions of the County and at any time of the year, but tornadoes are more prevalent during the months of March through June.

High winds and tornadoes have similar effects as winter storms in that they can cause trees to fall; this could lead to damage to homes and electricity lines as well as blocked roads. High winds and tornadoes are often formed as part of larger thunderstorm systems or spin-offs from hurricanes. Mobile and manufactured homes are more vulnerable to this type of weather.

Tornado magnitude is measured on the Enhanced Fujita Scale, and it ranges from EF0 to EF5, with EF0 being the weakest tornado on the scale. This scale replaced the Fujita Scale in 2007, and the following tables provide information on the wind speeds used to categorize tornadoes on these scales.

Table 7-5: Enhanced Fujita Scale and Fujita Scale

Enhanced Fujita Scale (EF-Scale)		Fujita Scale (F-Scale)	
EF0	65 to 85 MPH	F0	< 73 MPH
EF1	86 to 110 MPH	F1	73 to 112 MPH
EF2	111 to 135 MPH	F2	113 to 157 MPH
EF3	136 to 165 MPH	F3	158 to 206 MPH
EF4	166 to 200 MPH	F4	207 to 260 MPH
EF5	201+ MPH	F5	261+ MPH

Figure 7-3 illustrates historical damaging wind events in Greenville County. This data was obtained from the National Weather Service (NWS) and includes data from 1955 to 2017. The datapoints appear to be evenly spread throughout the County, which indicates that damaging wind can occur anywhere.

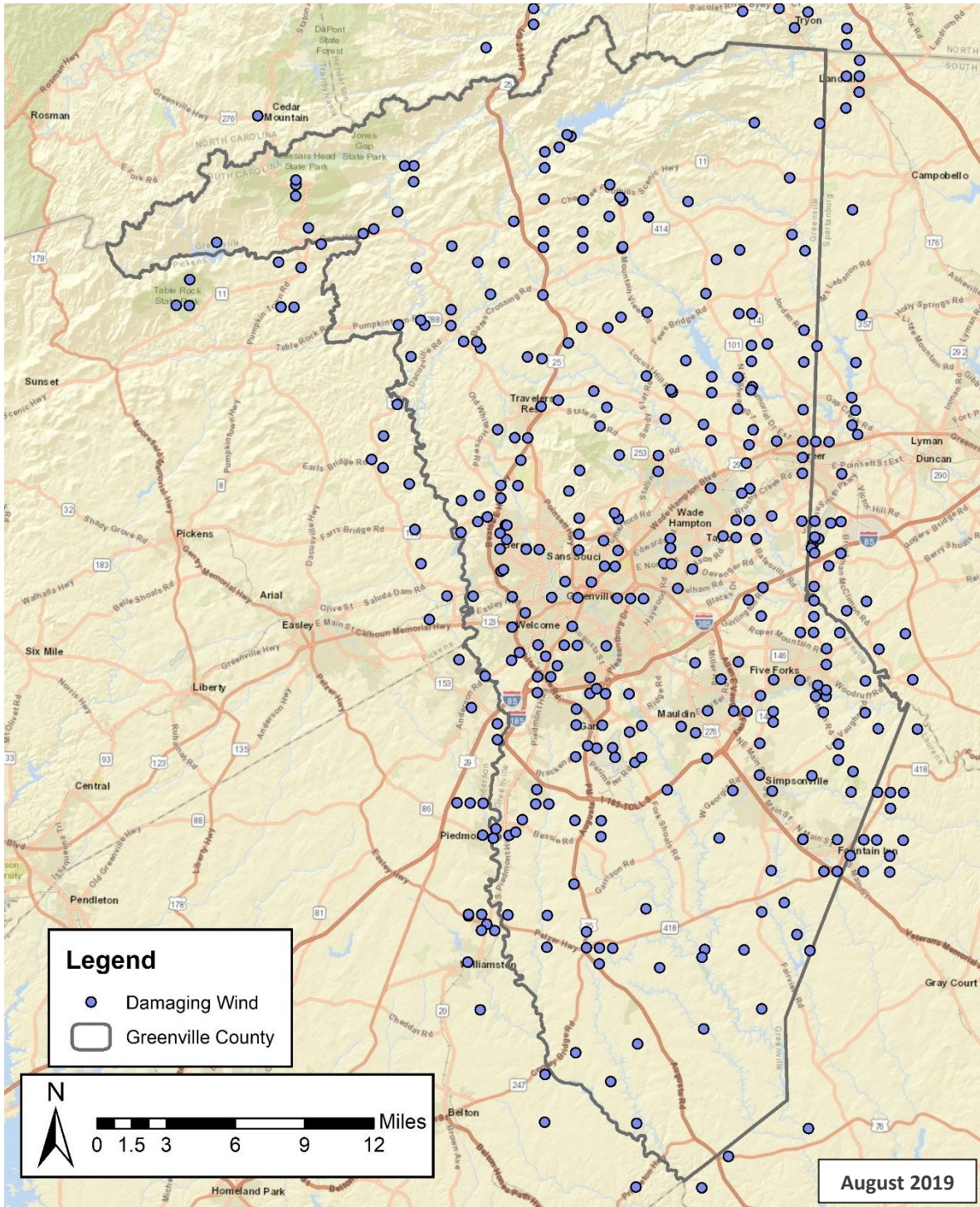


Figure 7-3: Damaging Wind Events from 1955 to 2017

Figure 7-4 displays historical tornado events in Greenville County. Tornadoes appear to occur more in the southern portion of the County, however, there are not many data points, so the risk is likely relatively equal throughout the County. The data displayed in Figure 7-4 was obtained from NWS and spans from 1955 to 2017. This large timespan coupled with the lack of data points indicates that tornadoes are not a frequent hazard in Greenville County.

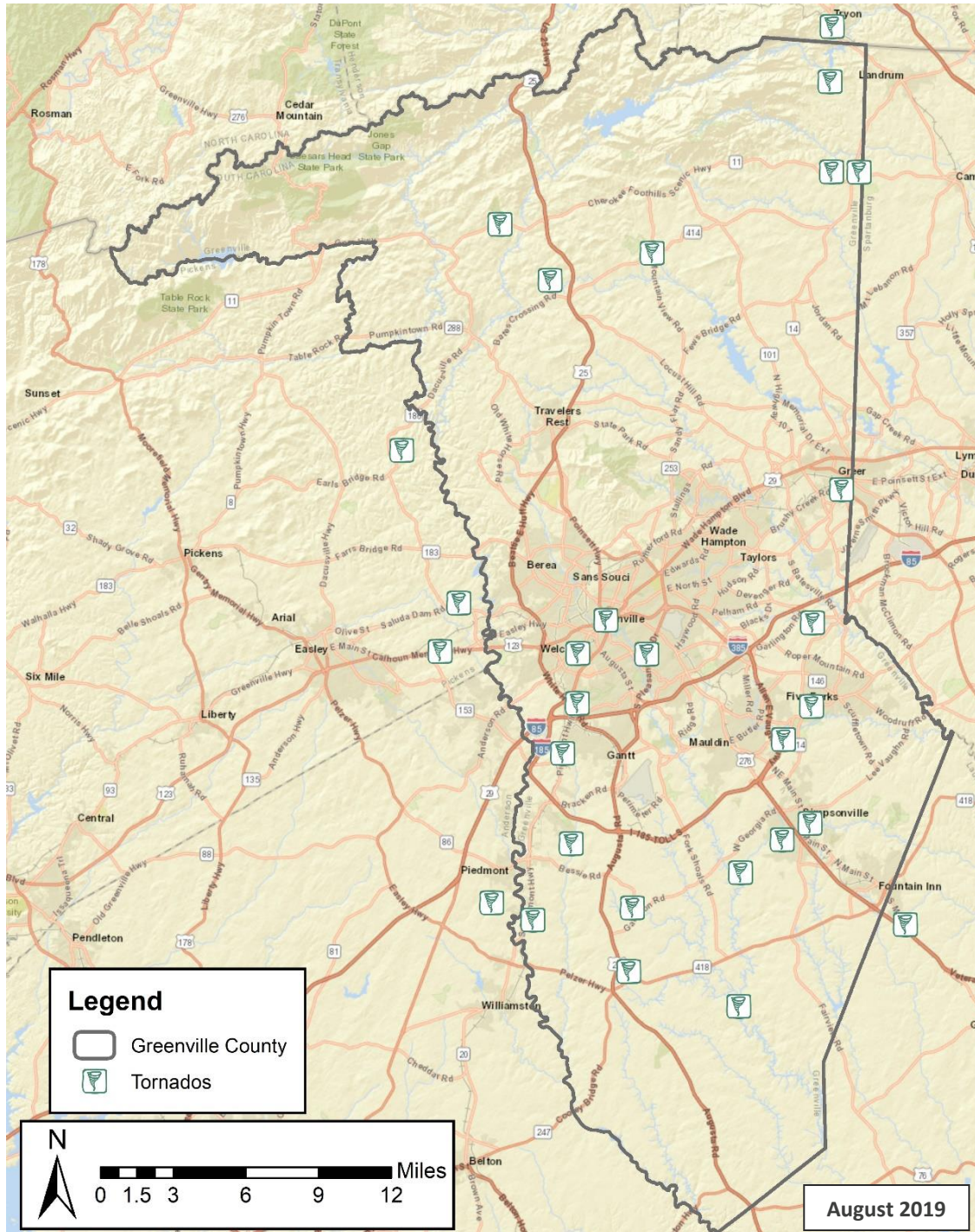


Figure 7-4: Tornado Events from 1955 to 2017

7.5 Wildfires

Historically, Greenville County has not been impacted by major wildfires. The recent Pinnacle Mountain wildfire in adjacent Pickens County, however, has highlighted the potential for such an event occurring in Greenville County. In particular, Paris Mountain contains a number of valuable assets including a state park as well as a significant population vulnerable to wildfire. As of the writing of this plan, the County has applied for and received a Hazard Mitigation Grant to create a public outreach campaign associated with wildfire and is awaiting word from SCEMD and FEMA on another Hazard Mitigation Grant to prepare a wildfire mitigation plan for the Paris Mountain area.

Wildfires are commonly associated with periods of drought; however, they can occur at any time. The most vulnerable population is on urban fringes near wooded areas. The population in Greenville County is continuing to expand north and south of the middle, urbanized band, and these new developments have the highest risk of being affected by wildfires. They can occur from natural or man-made causes such as lightning or campfire; SC EMD has estimated that 80% of wildfires in South Carolina are caused by negligent human behavior, while only 2% are caused by lightning.

Figure 7-5 illustrates historical wildfires from July 1, 1987 to present. The wildfire datapoints were provided by the SC Forestry Commission, and they are scaled according to Fire Size Class, with E being the most detrimental and A being the least. It appears that the most damaging fires have occurred near the North Carolina border, but wildfires can occur anywhere in the county.

Table 7-6 shows the number of wildfires in each size class since July 1, 1987; the size class is determined by the acreage of the fire. The specific data points are visually depicted in Figure 7-5.

Table 7-6: Greenville County Wildfire Class Totals

Fire Size Class	Acreage	Number of Wildfires
A	< 0.25	166
B	0.26 - 9.9	1011
C	10 - 99	142
D	100 - 299	2
E	300 - 999	2

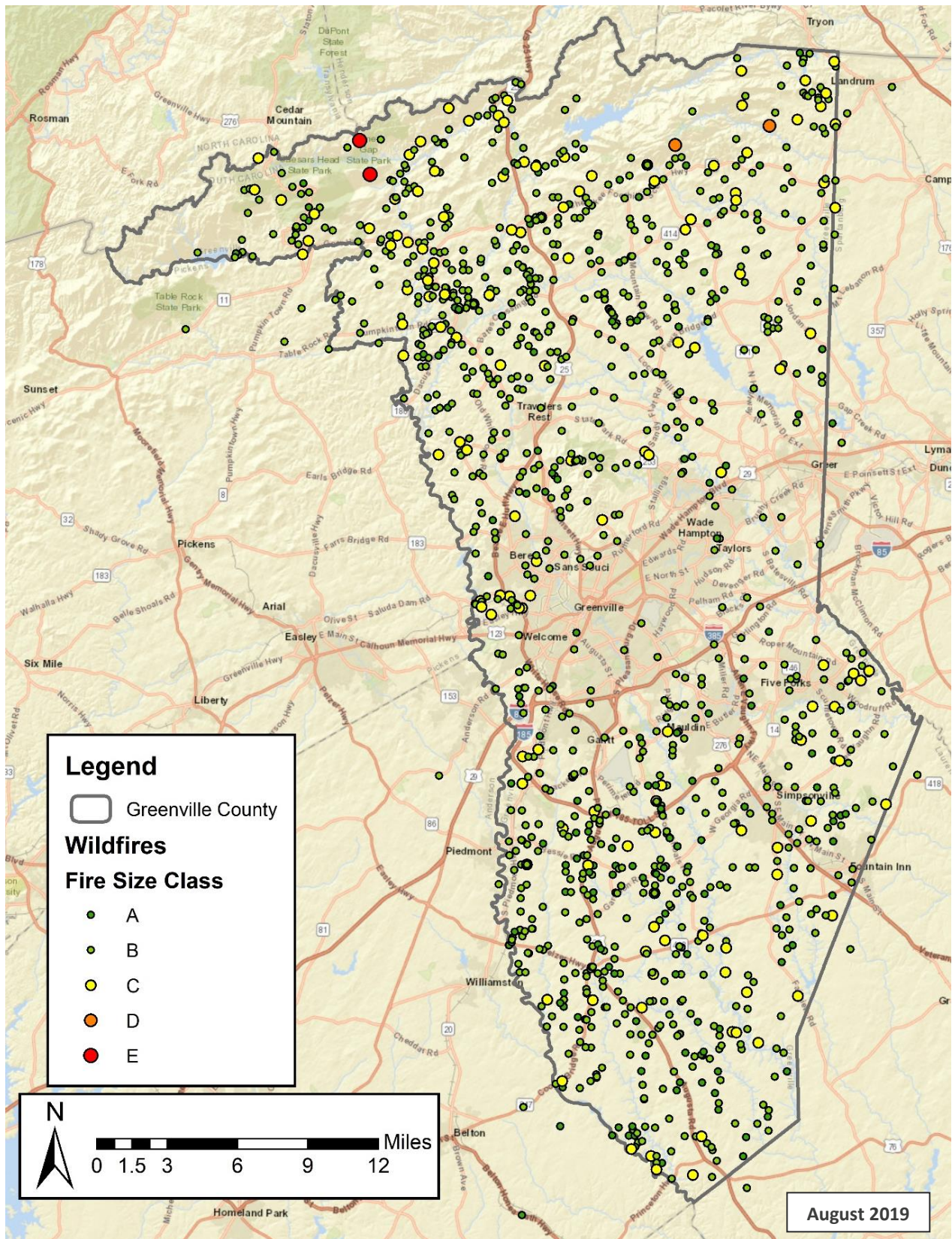


Figure 7-5: Wildfire Events from July 1987 to Present

7.6 Earthquakes

Earthquakes occur when there is a sudden quick movement of large pieces of the earth. When stress builds up in the crust of the earth, it can cause rocks near the surface to break and slip. Slips occur along faults on the surface of the Earth; the three types of faults can be seen in Figure 7-6.

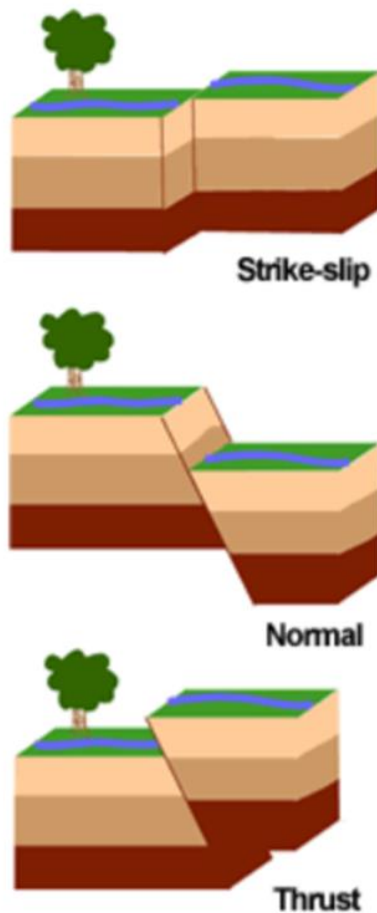


Figure 7-6: Earthquake Faults
(South Carolina Hazard Mitigation Plan, 2018)

Earthquakes are not likely to occur in Greenville County, and if they do, they are often at such a small magnitude that no one would notice. Large-scale earthquakes can lead to major infrastructure damage as well as injuries and death.

The magnitude of earthquakes is most commonly measured on the Richter scale, which is a logarithmic scale of the amplitude of waves that are recorded by seismographs. Due to the logarithmic nature of the scale, each whole number step correlates to approximately 31 times more energy than the preceding whole number value.

Figure 7-7 below was obtained from the 2018 South Carolina Hazard Mitigation Plan, and it shows the vulnerability to earthquakes throughout the entire state. Greenville County has a low to medium risk of earthquakes, however social vulnerability to earthquakes is high in some areas of the County.

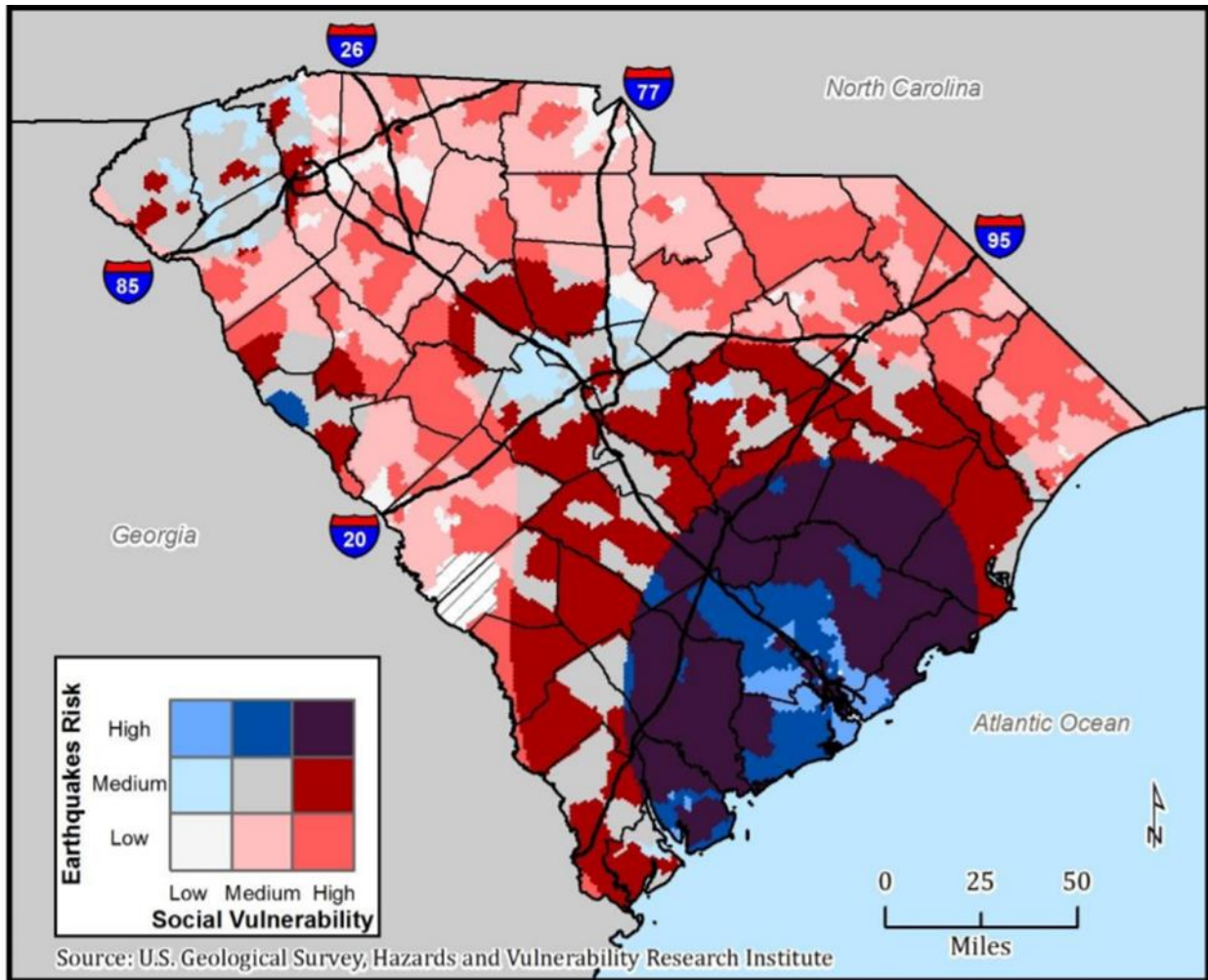


Figure 7-7: South Carolina Vulnerability to Earthquakes
(South Carolina Hazard Mitigation Plan, 2018)

7.7 Drought

A drought is characterized as an extended period of time when a region sees a deficiency in water supply; this is typically caused by a lack of recent precipitation. As drought conditions worsen and water supplies decrease, water restrictions may be imposed on homeowners and businesses, and the cost of water treatment may increase. Agriculture and forestry activities could be severely impacted by drought as well.

Figure 7-8 was obtained from the 2018 South Carolina Hazard Mitigation Plan, and it illustrates the data collected from 2000 to 2016. Greenville County experiences anywhere from 19 to 28 weeks of drought per year.

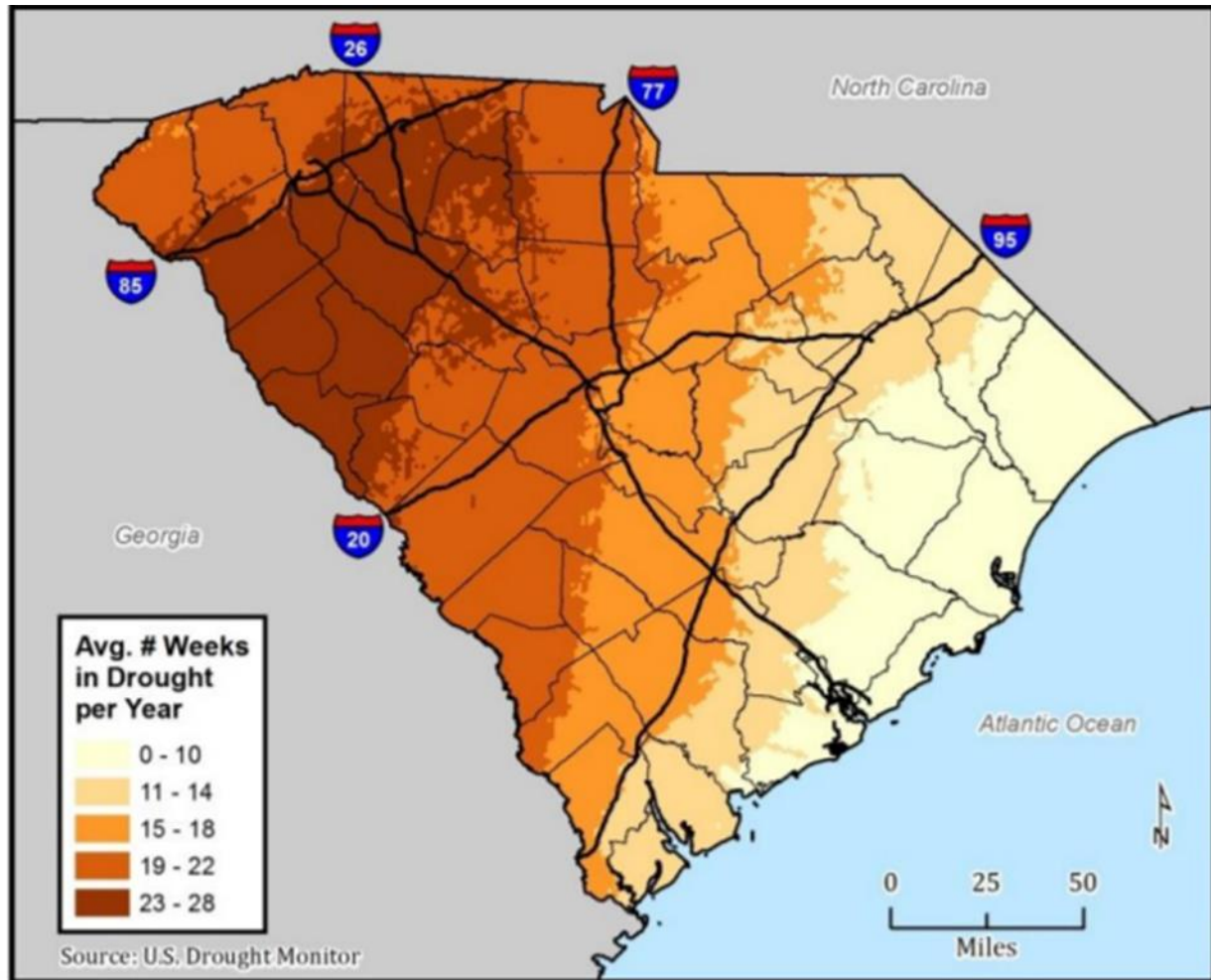


Figure 7-8: South Carolina Drought Risk
(South Carolina Hazard Mitigation Plan, 2018)

Droughts are measured on a scale from D0 to D4, with D4 being the most extreme. This scale was developed by the U.S. Drought Monitor (USDM), and the definitions can be seen in Table 7-7 below.

Table 7-7: Drought Monitor Scale

Classification		Description
D0	Abnormally Dry	<ul style="list-style-type: none"> - Short-term dryness slowing planting, growth of crops - Some lingering water deficits - Pastures or crops not fully recovered
D1	Moderate Drought	<ul style="list-style-type: none"> - Some damage to crops, pastures - Some water shortages developing - Voluntary water-use restrictions requested
D2	Severe Drought	<ul style="list-style-type: none"> - Crop or pasture loss likely - Water shortages common - Water restrictions imposed
D3	Extreme Drought	<ul style="list-style-type: none"> - Major crop/pasture losses - Widespread water shortages or restrictions
D4	Exceptional Drought	<ul style="list-style-type: none"> - Exceptional and widespread crop/pasture losses - Shortages of water creating water emergencies

7.8 Landslides

While the initial HMP planning efforts used the term mudslide, landslide is a more accurate term to describe the potential hazard impacting Greenville. These are both forms of mass wasting, which is a broad term for the downward movement of rock material. Mass wasting also includes mudflow, earthflow, creep, rock fall, and slump; each of these is characterized by the moisture content and the speed of the event. Moving forward in the 2020 HMP, the term landslide will be used.

Landslides occur when there is a slope failure, which refers to a sudden collapse of a slope. Caesar’s Head in Greenville County has steep slopes that make it susceptible to rockslides. Greenville County has moderate to high susceptibility to landslides as seen in Figure 7-9, however according to SCEMD, there have not been any major events in the past. Figure 7-9 was obtained from the 2018 South Carolina Hazard Mitigation Plan.

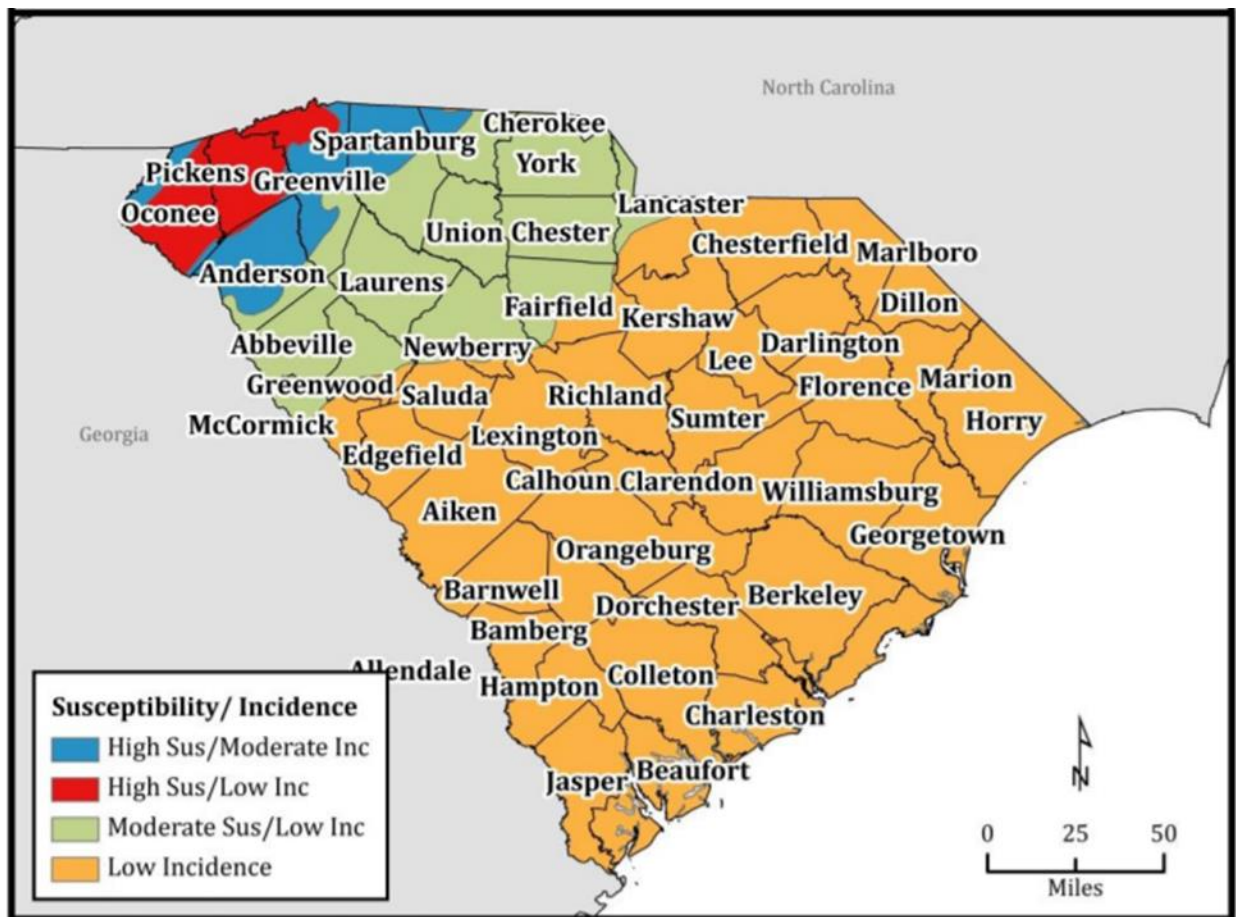
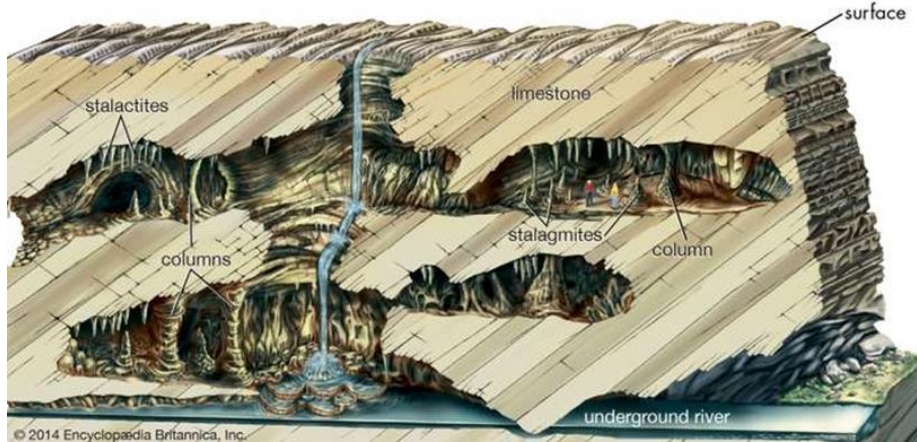


Figure 7-9: Landslide Susceptibility and Incidence in South Carolina (South Carolina Hazard Mitigation Plan, 2018)

7.9 Sinkholes

Small sinkholes associated with poorly compacted soils (such as around buried utilities) are not an item considered in the HMP. Rather, this HMP deals with sinkholes generally associated with karst topography. Karst is a type of topography that occurs when soluble bedrocks such as limestone, dolomite, and gypsum dissolve. This dissolution creates a void under the ground such as a cave, and sinkholes can occur when such voids collapse. An illustration of


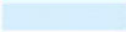






karst topography can be seen in Figure 7-10, obtained from Encyclopedia Britannica. Figure 7-11 illustrates karst areas in South Carolina, obtained from USGS. Greenville County does not have any current or potential karst topography, so it is unlikely that sinkholes will form.

Figure 7-10: Karst Topography
(Encyclopedia Britannica, 2010)



Figure 7-11: Karst Topography in South Carolina
(USGS, 2014)

	Carbonate rocks at or near the land surface
	Carbonate rocks buried beneath <300 feet (ft) of insoluble sediments
	Carbonate rocks buried beneath ≤50 ft of glacially derived insoluble sediments
	Carbonate rocks buried beneath >50 ft of glacially derived insoluble sediments
	Unconsolidated calcareous or carbonate rocks at or near the land surface
	Unconsolidated calcareous or carbonate rocks buried beneath <300 ft of insoluble sediments

While there is no scale to measure magnitude of sinkholes, the sizes can vary drastically. Sinkholes have occurred ranging from a few feet to hundreds of acres wide with depths of less than one foot to over 100 feet. The size will vary greatly on the conditions such as the extent of the voids underground.

7.10 Hail

Hail is formed when water droplets are carried above the freezing level by strong thunderstorm updrafts, as seen in Figure 7-12. Hail continues to cycle through this motion, developing several layers of ice, until it becomes too heavy to be lifted again; at this time, the hail falls to the ground and can impact homes and vehicles. It can occur anywhere in the county because it is formed during severe thunderstorms. The size of the hail stones is relative to the intensity of the updraft caused by the storm, and in some cases, hail can become large enough to injure or kill livestock and people. Hail is typically a concern for property such as buildings and vehicles. Figure 7-12 was obtained from the 2018 South Carolina Hazard Mitigation Plan.

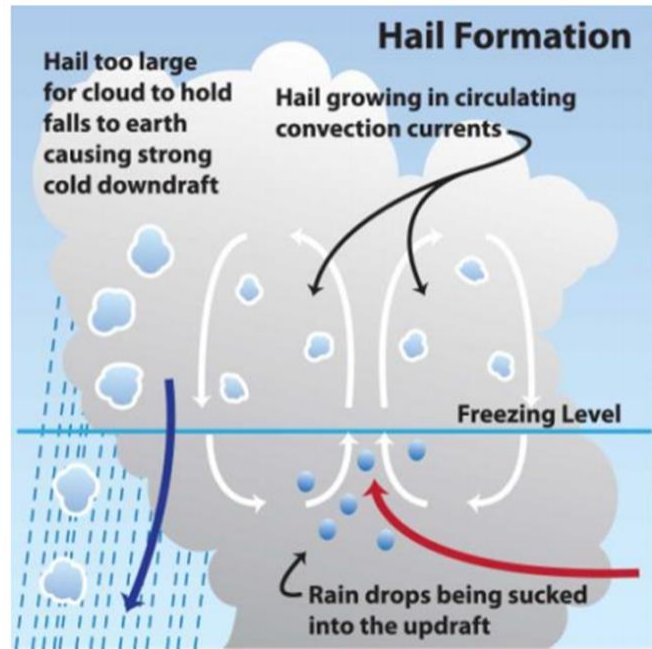


Figure 7-12: Formation of Hail
(South Carolina Hazard Mitigation Plan, 2018)

The magnitude of hail is measured on the TORRO Hailstorm Intensity Scale, which ranges from H0 to H10, with H10 being the largest and most destructive hail sizes. Table 7-8 was obtained from the Tornado and Storm Research Organization, and it summarizes the TORRO scale with hail diameters and typical damage that occurs during each of the events.

Table 7-8: TORRO Hailstorm Intensity Scale

	Intensity	Typical Hail Diameter (mm)	Typical 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 Hailstorm	75-100	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open
H10	Super Hailstorm	>100	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

The hail data displayed in Figure 7-13 was obtained from the National Weather Service, and it includes hail occurring from 1955 to 2017. This hazard appears to be evenly spread across the county.

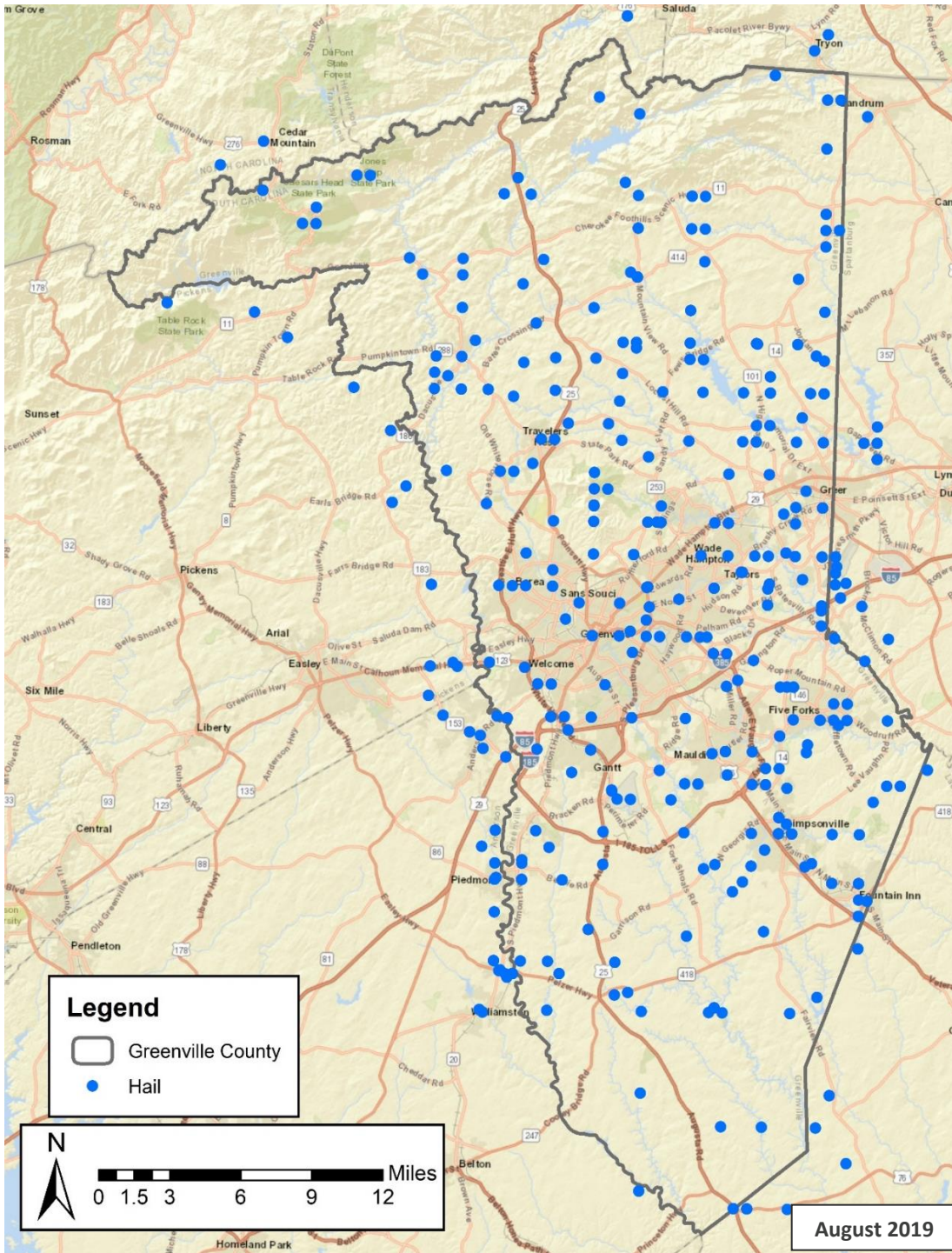


Figure 7-13: Hail Events from 1955 to 2017

7.11 Climate Change

Greenville County acknowledges that climate change can have an impact on hazards affecting the County, however, the long-term nature of climate change indicates that impacts may not significantly increase during this planning cycle. As Greenville County is an inland community, it is not susceptible to some impacts of climate change such as sea level rise and increased intensity of hurricanes and storm surge. Droughts and wildfires are expected to increase in frequency in the future. This could result in significant impacts to agriculture, fire-safety, water supply, and the overall safety of the general public.

The maps below illustrate the mean temperature and precipitation trends in South Carolina, Georgia, and North Carolina. These images show that the temperature in Greenville County has been rising since 1901, and precipitation has been declining. The South Carolina State Climatology Office has reported that between 1901 and 2015, Greenville County has experienced a 0.51 °F increase in annual average temperature and a 5.60-inch decrease in annual average precipitation. The decrease in precipitation coupled with higher temperatures may ultimately lead to longer droughts and more intense heat waves.

As this planning document evolves and adapts to changes in hazards and County infrastructure, additional emphasis may be needed in the area of drought management. As noted in this planning cycle, wildfires are already a growing concern. To address this aspect of climate change, the County has requested funding for the Paris Mountain Area Wildfire Mitigation Plan.

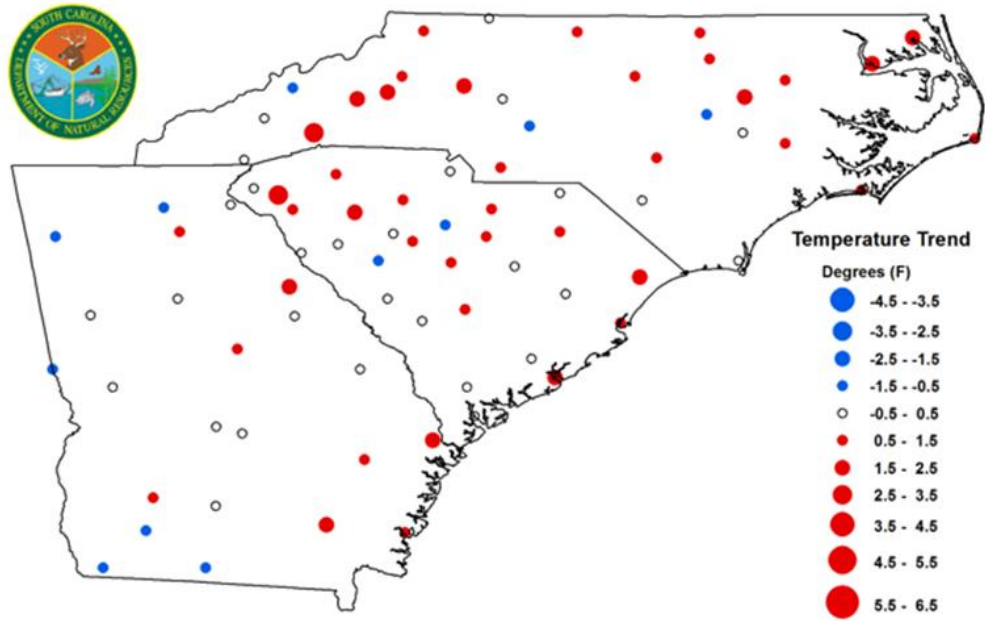


Figure 7-14: Annual Average Mean Temperature Trend, 1901 – 2015
(South Carolina State Climatology Office, 2015)

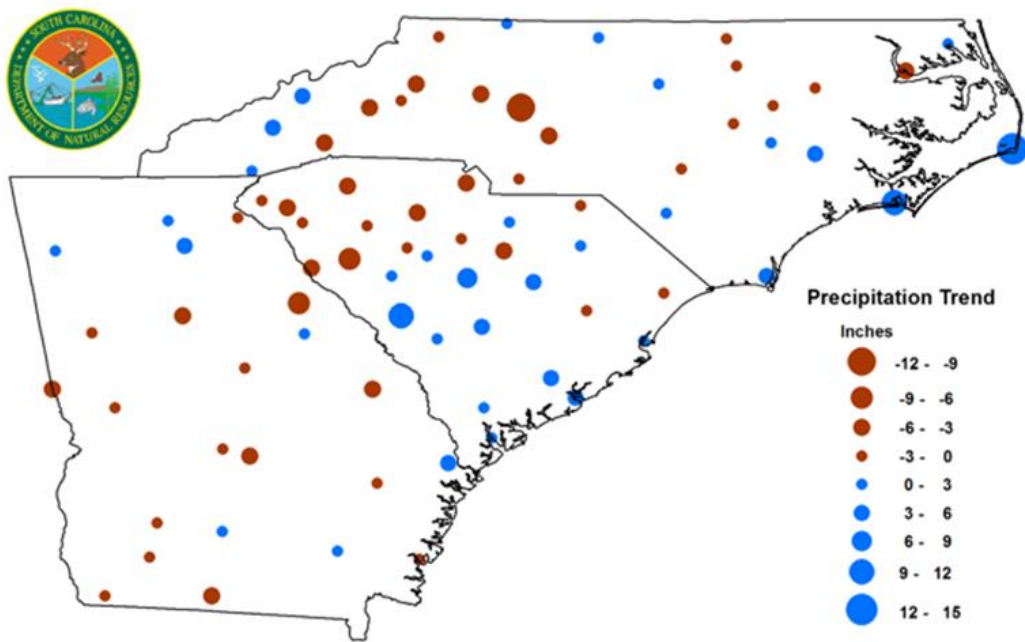


Figure 7-15: Annual Average Precipitation Trend, 1901 – 2015
(South Carolina State Climatology Office, 2015)

8 Floodplain Natural Functions

Being located in the foothills of the Blue Ridge Mountains, Greenville County is rich with natural resources. In particular, the County is headwaters for the Reedy, Enoree, and Saluda Rivers and much of the County is still forested. These rivers and their associated tributaries are not just valuable resource to Greenville County, but also supply recreation and water supply to other communities downstream.

The County recognizes that protecting the natural benefits of floodplains is critical to maintaining quality of life in Greenville and understands its responsibility to be “good neighbors” to downstream communities. The County has multiple efforts across a variety of departments and divisions to protect these resources.

In addition to a flood damage prevention ordinance that goes beyond the minimum standards for the NFIP, the County has implemented a robust land development ordinance and buffer ordinance with the intent of preserving crucial riparian areas to benefit both water quality and flood reduction. According to “Plan Greenville County, Comprehensive Plan dated October 2019 and approved January 2020.

“Current land development practices pose a threat to the abundance and quality of Greenville County’s natural resources and environment. Many streams and waterways in Greenville County are designated as impaired, which means that they do not meet SC DHEC water quality standards. Additionally, there are 22 species of plants and animals in Greenville County that are listed as endangered, threatened, or at-risk. Typically, habitat loss is the cause of these designations.”

As evidence of the County’s efforts to further protect natural floodplain areas, the County has an extensive network of preserved lands including; protected open space, parks, wetlands, floodplains and floodways, and agricultural lands. A map depicting these areas can be found in the Plan Greenville County document at the following web address:

<https://documentcloud.adobe.com/link/track?uri=urn%3Aaaid%3Ausc%3Acba0e965-358b-4928-933d-61780ca64512>

9 Repetitive Loss Area Plan

Greenville County has been diligent in reducing the number of repetitive loss properties through the County’s structure acquisition program. The County has reduced its total number of repetitive loss properties from 44 to 11. The remaining properties are all residential properties spread across the County and are not part of a single watershed or flooding area. Many of the owners of these properties have been approached by the County as part of the County’s ongoing acquisition program but have not accepted the invitation to be purchased.

In its continuing effort to address the remaining repetitive loss properties, the County provides annual public outreach to the impacted homeowners and is open to potential purchase of the remaining properties. The County is also attentive to creating, implementing, and enforcing floodplain management policies to prevent structures from becoming additional repetitive loss properties.

Figure 9-1 below illustrates repetitive loss areas in Greenville County. There are eleven (11) total areas depicted in this map, however only four (4) are located outside of completed watershed study areas. This information can be used by the County to help prioritize future watershed studies. An example of the letters sent to the County’s repetitive loss areas is contained in Appendix E.

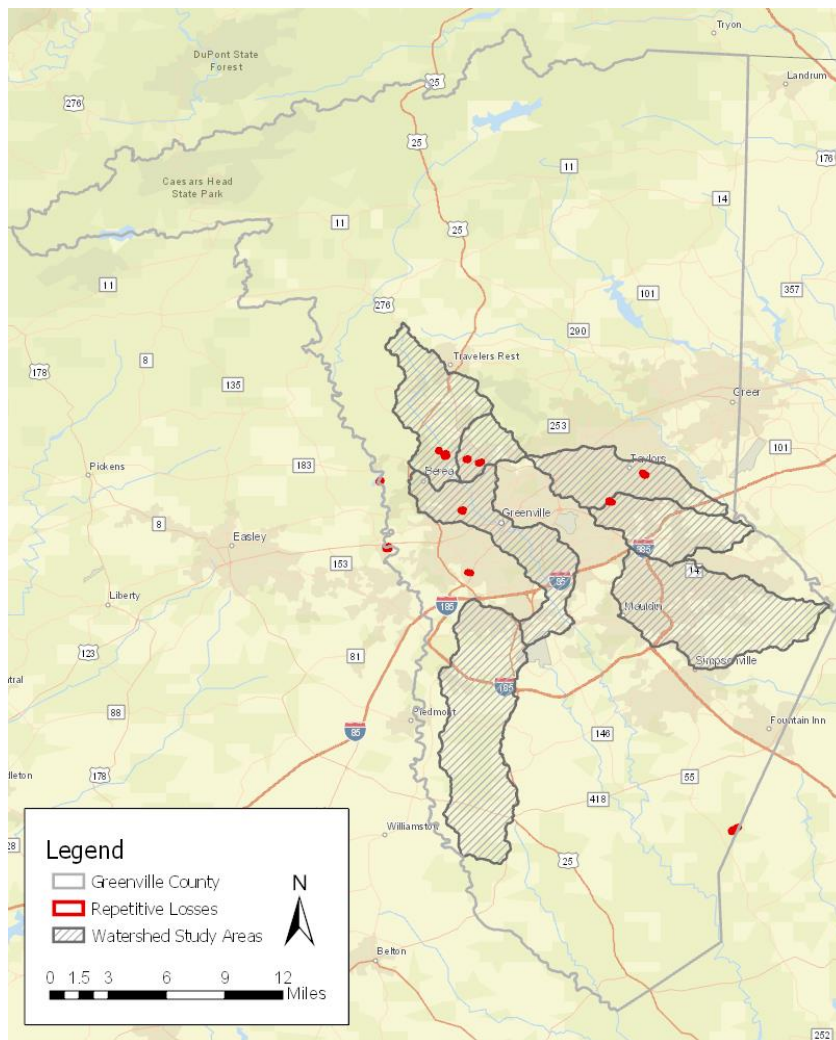


Figure 9-1: Repetitive Loss Areas

10 Prioritized Mitigation Initiatives

10.1 Introduction

Development of mitigation initiatives began with a review of initiatives contained in previous HMPs. Any initiative that was on the current list, but that had not begun implementation remained in consideration for the 2020 HMP. The DMC was also provided an opportunity to discuss potential mitigation measures with their sponsoring organization and submit those initiatives either in writing, at DMC meeting #2, or again at meeting #3.

10.2 Project Descriptions

The following projects were identified by the committee as potential mitigation initiatives and were scored according to the process defined in Section 10.3. All of the “Responsible Party” designations below refer to Greenville County Departments or Divisions, unless otherwise stated.

PREVENTION

- Bridge/Culvert Analysis
 - Replace and upgrade stream crossings to improve channel flow characteristics as needed.

Responsible Party	Funding Source(s)	Timeline	Hazard Addressed	Jurisdictions Covered
Floodplain Administration, Engineering	County Budget	Each crossing is analyzed during the basin study process and programmed for upgrade in subsequent budget	Floods	Greenville County

- Proactive Maintenance of Stormwater Infrastructure
 - Maintain piped infrastructure, ditches, culverts, bridges, and Best Management Practices before hazardous conditions occur.

Responsible Party	Funding Source(s)	Timeline	Hazard Addressed	Jurisdictions Covered
Engineering	County Budget	On-going, more detailed analysis of localized flooding to be prepared as budget becomes available	Floods	Greenville County

- Underground Electricity Plan
 - Coordinate with utility companies to place powerlines underground to prevent hazards and outages associated with falling lines due to weather conditions.

Responsible Party	Funding Source(s)	Timeline	Hazard Addressed	Jurisdictions Covered
Engineering, Land Development	County Budget	On-going	Winter Storms, High Winds/Tornados, Earthquakes	Greenville County, All Municipalities

- Paris Mountain Wildfire Mitigation Plan
 - A Hazard Mitigation Grant application has been submitted to FEMA for development of a plan for the Paris Mountain area.

Responsible Party	Funding Source(s)	Timeline	Hazard Addressed	Jurisdictions Covered
Emergency Management	FEMA HMGP County Budget	Prepare upon award of grant application	Wildfires, Drought, Climate Change	Greenville County

- Repetitive Loss Area Plan
 - A Repetitive Area Loss Analysis was completed by the County per the Community Rating System (CRS) requirements. As a result, the Insurance Services Office (ISO) requires a repetitive loss plan. The County has created and is implementing the plan as required.

Responsible Party	Funding Source(s)	Timeline	Hazard Addressed	Jurisdictions Covered
Floodplain Administration	County Budget	On-going	Floods	Greenville County

- Update Existing Watershed Studies
 - Determine new levels of service for each road crossing.

Responsible Party	Funding Source(s)	Timeline	Hazard Addressed	Jurisdictions Covered
Floodplain Administration	County Budget	As budget becomes available	Floods	Greenville County, All Municipalities

- Enoree River Basin Study
 - Prepare a watershed master plan for the Enoree River basin identifying potential flooding problems and solutions.

Responsible Party	Funding Source(s)	Timeline	Hazard Addressed	Jurisdictions Covered
Floodplain Administration	County Budget	As budget becomes available	Floods	Greenville County

- Travelers Rest and Marietta Area Watershed Study
 - Prepare a watershed study in developing areas of Travelers Rest and Marietta.

Responsible Party	Funding Source(s)	Timeline	Hazard Addressed	Jurisdictions Covered
Floodplain Administration	County Budget	As budget becomes available	Floods	Greenville County, Travelers Rest

PUBLIC EDUCATION & AWARENESS

- Enhanced GIS Database
 - Continue to update the County's GIS with hazard related data

Responsible Party	Funding Source(s)	Timeline	Hazard Addressed	Jurisdictions Covered
Geographic Information Services, Floodplain Administration	County Budget	On-going	All Hazards	Greenville County, All Municipalities

- Realtor Flood Hazard Education
 - Provide hazard data and training to local realtors

Responsible Party	Funding Source(s)	Timeline	Hazard Addressed	Jurisdictions Covered
Floodplain Administration	County Budget FEMA Grant	On-going	Floods	Greenville County, All Municipalities

- Pre-Prepared Hazard Info Ads
 - Prepare ads for hazard preparation to be released immediately before and during natural disasters to provide for a timely response including information on the health and safety risks associated with floodwaters

Responsible Party	Funding Source(s)	Timeline	Hazard Addressed	Jurisdictions Covered
Emergency Management	Public Service Ads County Budget	On-going	All Hazards	Greenville County, All Municipalities

- Flood Signs
 - Develop signage denoting high flood risk areas and crossings

Responsible Party	Funding Source(s)	Timeline	Hazard Addressed	Jurisdictions Covered
Floodplain Administration	County Budget FEMA Grant	As budget / grant become available	Floods	Greenville County

- Enhance Hazards Education
 - Develop additional hazard education programs for County staff and the public, introducing Marty the Moose and educational literature

Responsible Party	Funding Source(s)	Timeline	Hazard Addressed	Jurisdictions Covered
Floodplain Administration	County Budget	On-going	All Hazards	Greenville County, All Municipalities

- Early Warning System Evaluation
 - Review and evaluate the usage of an early warning system to alert the public about potential hazards.

Responsible Party	Funding Source(s)	Timeline	Hazard Addressed	Jurisdictions Covered
Emergency Management, Floodplain Administration, Engineering	County Budget Grants	As budget / grant become available	Floods, Winter Storms, High Winds/Tornados, Wildfires, Drought, Hail	Greenville County, All Municipalities

- Social Media Public Communication
 - Leverage social media and cell phones by creating hashtags to keep the public engaged and informed.
 - Communicate emergency services available to the public on multiple platforms to reach a wider audience.

Responsible Party	Funding Source(s)	Timeline	Hazard Addressed	Jurisdictions Covered
Emergency Management	County Budget	As budget becomes available	All Hazards	Greenville County, All Municipalities

- Emergency Public Communication
 - Determine the most efficient modes of communication for relaying emergency information to the public. This could vary depending on the population, so ensure vulnerable populations are able to be reached.
 - Include references to emergency management websites and social media in communications about hazards. For example, point the public to the EMD website for updates during a hurricane or a local police station Twitter that is providing continuous coverage of an emergency situation.
 - Work with other agencies and departments to create a protocol for communication. This protocol should be written down and developed into an SOP to ensure communication is consistent. Phone numbers used should be general in case of turnover in the department or agency.
 - Establish a protocol for media outlets during a hazardous event. For example, an agreement can be signed by the various media outlets, or a hotline can be established during emergencies for media outlets to contact for information.

Responsible Party	Funding Source(s)	Timeline	Hazard Addressed	Jurisdictions Covered
Emergency Management	County Budget Public Service Ads	As budget becomes available	All Hazards	Greenville County, All Municipalities

- Protection Education
 - Provide education for homeowners and business owners on how to properly prepare for hazardous conditions. This could include agencies to contact, websites to visit, and preventative measures the owner can perform such as boarding up windows.
 - Provide education for homeowners on stream maintenance responsibilities and the impact a poorly maintained stream could have on their property.

Responsible Party	Funding Source(s)	Timeline	Hazards Addressed	Jurisdictions Covered
Floodplain Management Soil & Water Conservation District	County Budget	On-going As budget becomes available	Floods, Winter Storms, High Winds/Tornados, Earthquakes	Greenville County, All Municipalities

NATURAL RESOURCES PROTECTION

- Stream Crossing Debris Removal
 - The County owns and maintains over 1,800 miles of roadway. To the extent practical, provide for removal of debris build up in rivers and streams, especially at road crossings and in highly urbanized areas. This is part of the road maintenance program protocol. Greenville County also implements a beaver dam removal program.

Responsible Party	Funding Source(s)	Timeline	Hazards Addressed	Jurisdictions Covered
Engineering Roads and Drainage	County Budget FEMA Grant	On-going	Floods	Greenville County

- Riparian Area Management Plans
 - Create focused riparian buffer protection plans to target specific issues related to flooding.
 - Identify properties that can be acquired by the county to restore and enhance current riparian areas.

Responsible Party	Funding Source(s)	Timeline	Hazards Addressed	Jurisdictions Covered
Land Development Floodplain Management Planning	County Budget	On-going	Floods	Greenville County

- Runoff Reduction
 - Enhance runoff reduction criteria by including creative practices such as Green Infrastructure and Low Impact Development.

Responsible Party	Funding Source(s)	Timeline	Hazards Addressed	Jurisdictions Covered
Land Development	County Budget	On-going	Floods	Greenville County

EMERGENCY SERVICES

- Early Warning System Enhancement (See Evaluate Early Warning System)
 - Install flood hazard signage, warning lights, and gates on frequently flooded roadways as well as hazard signage for steep roads, frequently icy bridges, and other known hazards on the road.
 - Install warning systems to notify travelers of road blocks due to fallen trees, ice, and other hazardous conditions.

Responsible Party	Funding Source(s)	Timeline	Hazards Addressed	Jurisdictions Covered
Emergency Management Floodplain Management Engineering	County Budget FEMA Grant	As budget / grant become available	Floods, Winter Storms, High Winds/Tornados	Greenville County

- Continue Improvements to Radio Communications
 - Radio communications are critical during disasters and the County currently operates multiple radio systems. Upgrade all radio systems to improve communications across divisions and agencies.

Responsible Party	Funding Source(s)	Timeline	Hazards Addressed	Jurisdictions Covered
Administration Emergency Management	County Budget Grant	On-going	All Hazards	Greenville County

- Communications Protocol
 - Review and continue to coordinate a communication protocol with the news media and to guide the media in disaster reporting

Responsible Party	Funding Source(s)	Timeline	Hazards Addressed	Jurisdictions Covered
Emergency Management Public Information Officer	County Budget	On-going	All Hazards	Greenville County, All Municipalities

- Post-Disaster Review Meetings
 - DMC and emergency response agency post-disaster debriefings to discuss “lessons learned”.

Responsible Party	Funding Source(s)	Timeline	Hazards Addressed	Jurisdictions Covered
Emergency Management Codes Enforcement/Building Engineering	County Budget	As events occur	All Hazards	Greenville County, All Municipalities

- Evaluation of Emergency Routes
 - Review emergency routes and evacuation routes to ensure they are the safest, most appropriate routes

Responsible Party	Funding Source(s)	Timeline	Hazards Addressed	Jurisdictions Covered
Emergency Services Emergency Management Engineering	County Budget	On-going	All Hazards	Greenville County

- Comprehensive Training
 - Provide appropriate level of emergency response training to all County staff.

Responsible Party	Funding Source(s)	Timeline	Hazards Addressed	Jurisdictions Covered
Emergency Management Risk Management	County Budget FEMA Training Programs	As budget becomes available	All Hazards	Greenville County

- Coordinated Bridge De-Icing
 - Continue to coordinate with SCDOT to create a plan for de-icing bridges during winter weather conditions. Currently, “snow meetings” are held with the SCDOT in November and December to prepare for the snow season.

Responsible Party	Funding Source(s)	Timeline	Hazards Addressed	Jurisdictions Covered
Engineering SCDOT	County Budget SCDOT	On-going	Winter Storms, Hail	Greenville County

- Heating and Cooling
 - Continue to provide assistance to the Homeless Alliance and other Non-governmental organizations (NGOs) identifying vulnerable populations and creating plans to provide proper heating and cooling for those populations. Engage with NGOs to find out what type of services they provide that could help with this task.

Responsible Party	Funding Source(s)	Timeline	Hazards Addressed	Jurisdictions Covered
Emergency Management Codes Enforcement	County Budget Grants	As budget / grant become available	Winter Storms, Drought, Hail	Greenville County

- Backup Power
 - Identify critical places that may require backup power such as fueling stations, food sources, and vulnerable populations and, to the extent practical, work with NGOs and others to create a plan to provide this power in the event of an emergency. Critical County facilities already have emergency power plans in-place.

Responsible Party	Funding Source(s)	Timeline	Hazards Addressed	Jurisdictions Covered
Emergency Management	County Budget Grants	On-going	Winter Storms, High Winds/Tornados, Earthquakes, Hail	Greenville County, All Municipalities

PROPERTY PROTECTION

- Elevation Grant Program
 - Continue providing elevation grants to eligible County residents.

Responsible Party	Funding Source(s)	Timeline	Hazards Addressed	Jurisdictions Covered
Floodplain Management	County Budget FEMA HMGP	On-going	Floods	Greenville County

- Flood Mitigation Acquisition Program
 - Continue acquiring appropriate, eligible properties to reduce buildings at high risk of flooding.

Responsible Party	Funding Source(s)	Timeline	Hazards Addressed	Jurisdictions Covered
Floodplain Management	County Budget FEMA HMGP	On-going, as grants become available	Floods	Greenville County

- Identify/Mitigate Infrastructure
 - Identify infrastructure at risk through basin studies and mitigate as appropriate.

Responsible Party	Funding Source(s)	Timeline	Hazards Addressed	Jurisdictions Covered
Engineering Floodplain Management	County Budget FEMA Grant	As budget / grant become available	Floods	Greenville County

STRUCTURAL PROJECTS

- Critical Facility Retrofits/Relocations
 - Identify and evaluate critical facilities for risk and mitigate as appropriate.

Responsible Party	Funding Source(s)	Timeline	Hazards Addressed	Jurisdictions Covered
Floodplain Management Emergency Management Engineering	County Budget FEMA Grant	As budget / grant become available	Floods	Greenville County

Table 10-1: Number of Projects Addressing Hazards by Communities

Community	Floods	Winter Storms	High Winds / TORNADOS	Wildfires	Earth-quakes	Drought	Landslides	Sinkholes	Hail	Climate Change
Greenville County	28	17	15	12	13	13	10	10	13	11
City of Greenville	11	11	12	8	10	8	7	7	7	7
City of Greer	11	11	12	8	10	8	7	7	7	7
City of Mauldin	11	11	12	8	10	8	7	7	7	7
City of Simpsonville	11	11	12	8	10	8	7	7	7	7
City of Fountain Inn	11	11	12	8	10	8	7	7	7	7
City of Travelers Rest	12	11	12	8	10	8	7	7	7	7

10.3 Scoring

To facilitate orderly and meaningful implementation of mitigation initiatives, the 2005 DMC created an Initiative Priority Scoring System. This system has been used in all subsequent planning cycles for prioritizing mitigation initiatives. For the sake of consistency between plans and because of the effectiveness of previous prioritization efforts, the DMC opted to use this same system for the 2020 HMP.

The scoring criteria is contained in Table 10-2 and the final prioritization is contained in Table 10-3.

Table 10-2: Initiative Scoring Criteria

Priority Criterion	Numeric Score
Strategy Effectiveness	
No effect on Risk or Hazard	0
Affects several structures within the County	1
Affects many structures within the County	2
Affects most structures within the County	3
Percentage of Population Benefited	
Less than 10% benefited	0
10% to 50% benefited	1
51% to 75% benefited	2
Greater than 75% benefited	3
Time to Implement	
Cannot be implemented	0
Longer than one year	1
Within one year	2
Immediate	3
Time to Impact	
Cannot be implemented	0
Longer than one year	1
Within one year	2
Immediate	3
Cost to County	
Completely Unaffordable	0
Expensive, but manageable	1
Cost is easily managed	2
Little to no cost	3
Cost to Others	
Completely Unaffordable	0
Expensive, but manageable	1
Cost is easily managed	2
Little to no cost	3
Funding Source	
No known funding source available	0
Requires outside funding	1
Requires budget consideration	2
Within existing county budget	3
Community Support	
Opposed by the entire community	0
Acceptable only to those affected by the project	1
Some community opposition	2
Acceptable community wide	3
Project Feasibility	
Not possible	0
Accomplished with extensive design and planning	1
Accomplished with some design and planning	2
Easily accomplished	3

Table 10-3: Prioritized Initiatives

Proposed Mitigation Activities	Strategy Effectiveness	Population Benefited	Time to Implement	Time to Impact	Cost to County	Cost to Others	Funding Source	Community Support	Project Feasibility	Total Score
Prevention										
Repetitive Loss Area Plan	1	0	3	1	3	3	3	3	3	20
Paris Mountain Wildfire Mitigation Plan	2	1	2	1	2	3	3	3	2	19
Proactive Maintenance of Stormwater Infrastructure	3	3	2	3	2	2	2	2	2	18.5
Underground Electricity Plan	2	3	1	1	3	1	3	3	2	17.5
Update Existing Watershed Studies	2	1	2	1	2	3	3	3	2	16
Enoree River Basin Study	2	1	2	1	2	3	3	3	2	16
Travelers Rest and Marietta Area Watershed Study	2	1	2	1	2	3	3	3	2	16
Bridge / Culvert Analysis	2	1	1	1	1	2	1	2	1	11.5
Public Education and Awareness										
Social Media Public Communication	2	2	3	3	3	3	3	3	3	24
Protection Education	2	2	2	3	3	3	3	3	3	23
Pre-Prepared Hazard Info Ads	3	3	2	3	1	3	3	3	2	22.5
Enhance Hazards Education	3	2	2	1	2	3	3	3	2	21
Realtor Flood Hazard Education	2	2	2	2	2	3	3	3	2	21
Emergency Public Communication	2	2	2	3	3	3	3	3	3	20.5
Early Warning System Evaluation	2	2	2	2	2	3	3	3	3	20.5
Flood Signs	2	2	2	2	1	2	1	2	3	16
Enhanced GIS Database	2	1	1	2	1	2	3	2	2	15.5
Natural Resource Protection										
Stream Crossing Debris Removal	2	1	2	3	2	2	3	3	3	20
Runoff Reduction	2	2	2	3	2	1	3	2	2	19
Riparian Area Management Plans	2	2	2	2	2	3	3	2	2	18.5
Emergency Services										
Communications Protocol	3	3	2	3	3	3	3	3	3	26
Post-Disaster Review Meetings	1	3	3	2	3	3	3	3	3	24
Comprehensive Training	2	3	2	3	3	3	3	3	2	23
Coordinated Bridge De-Icing	1	3	2	3	3	2	3	3	2	22
Evaluation of Emergency Routes	1	3	2	3	2	2	2	3	2	20
Early Warning System Enhancement	2	2	1	3	2	3	2	3	2	18.5
Backup Power	1	2	1	2	2	1	1	2	2	14
Continue Improvements to Radio Communications	2	1	1	3	1	1	1	3	1	13.5
Heating and Cooling	1	0	2	2	2	1	1	2	2	13
Property Protection										
Identify / Mitigate Infrastructure	2	3	2	3	1	2	2	3	2	20
Elevation Grant Program	2	2	2	3	1	1	2	3	2	18
Flood Mitigation Acquisition Program	2	2	2	3	1	1	1	3	2	17
Structural Projects										
Critical Facility Retrofits / Relocations	1	2	2	3	1	2	2	2	2	17

10.4 Paris Mountain Wildfire Plan

Paris Mountain is in unincorporated Greenville County just north of the City of Greenville. In general, the Paris Mountain area is bounded by State Park Road (County Road 22), South Carolina Highway 253, U.S. Route 276, and U.S. Route 25. There are several valuable assets located within the boundaries of this area including, but not limited to; communications equipment including multiple television and radio transmission towers, Paris Mountain State Park, two (2) waste treatment plants, and a large number of residential and commercial structures.

Additionally, access to many of these assets is limited. Altamont Road provides access from the west to the communications equipment and State Park Road provides park access from the south. Subdivision streets provide access to many of the residential structures located at the base of the mountain.

In November 2016, Pickens County suffered from the Pinnacle Mountain wildfire that burned over 6,000 acres that included portions of Greenville County. There have been additional recent wildfires across the nation that have increased awareness of wildfires and their associated risks and hazards. Greenville County recognizes that Paris Mountain is in the urban / forest interface and is susceptible to wildfire. Because of the high risk and number and types of assets located on the mountain, the County intends to enhance this HMP with a future annex addressing wildfire mitigation for the Paris Mountain area.

This planning activity has been included in the Mitigation Initiative list and a Hazard Mitigation Grant has been applied for through the South Carolina Emergency Management Division.

11 Plan Adoption and Update Process

11.1 Adoption Process

Approval and adoption of the plan is an important step in assuring its implementation. The 2005 HMP was approved through Greenville County Council Resolution No. 1118 on December 13, 2004. The 2010 HMP update was approved through Greenville County Resolution No. 1365 on January 5, 2010 and the 2015 HMP update was approved through Greenville County Resolutions No. 1538 on June 02, 2015.

Upon FEMA approval of this 2020 HMP, Greenville County will formally adopt the plan in a public meeting. The resolution for that adoption will follow the same format as previous resolutions and will be placed in Appendix G of this document.

Annually, the DMC will seek input from both the public and participating organizations. Further, approximately once every five years, the DMC will again seek the approval of the plan by the County Council. This interval will provide a sufficient period for the DMC to assess HMP effectiveness. Further, this time frame will coincide generally with the review of the County's Community Rating System program.

11.2 Provisions for Incorporating New Mitigation Initiatives into the Plan

Mitigation planning is a dynamic process that must be continually adjusted to account for changes in the community and to further refine the information, judgments, and proposals documented in the multi-jurisdictional mitigation plan. The process used by the DMC to maintain the plan consists primarily of four functions.

- 1) Continue to expand and improve the mitigation plan by accomplishing additional technical analyses, such as vulnerability assessments and post-event analysis of disasters.
- 2) Continue to expand participation in the planning process by implementing public information programs and by inviting expanded participation by the private sector.
- 3) Routinely monitor implementation of the initiatives in the plan until each is completed and in-place. Assess their actual effectiveness following the next relevant disaster event.
- 4) Issue an updated HMP for use by the participating organizations and to inform the community. When appropriate, submit the HMP to state and federal agencies for approval pursuant to the Disaster Mitigation Act of 2000. This portion of Section 7 describes implementation of these four activities by the DMC to maintain the Greenville County Mitigation Plan.

The technical analyses conducted by the County will be an ongoing effort to continually assess the hazards threatening the community, the vulnerabilities to those hazards, and program framework to control those vulnerabilities. When indicated, the technical analysis also includes formulating proposed mitigation initiatives to eliminate or minimize the identified vulnerabilities. The County has completed the vulnerability assessment based on the best available information. As this process continues and additional data is gathered the DMC will be better equipped to provide more detailed analyses.

In the next planning cycles, the DMC will continue to assess the vulnerabilities of facilities and planning areas. Vulnerability assessments are fundamental to identifying needed mitigation initiatives to propose for incorporation into the plan, and as this process is continued, additional mitigation initiatives will be proposed for incorporation into the plan as necessary. Vulnerability assessment will include a review of the policy and program framework of the County with emphasis on the adequacy of this framework to control the vulnerabilities of the community.

The second type of activity is the continuation of expanded participation in the DMC and the mitigation planning process. The current participants in the planning and the level of their participation are addressed in Section 3.1 of the plan. Gaining additional participation in the planning process is also part of the public information and community outreach component of the plan. The planned public information activities are discussed in Section 6.4.

The third category of plan maintenance activities that will be undertaken by the Greenville County DMC will be to monitor the implementation of mitigation initiatives. The DMC documents the efforts to fund the initiative, to conduct required studies, and to obtain any needed permits, as well as to estimate the time remaining to complete design, needed studies and purchasing or construction. When an initiative is completed, this fact is documented for inclusion in the next HMP Update.

The DMC will conduct an annual review of mitigation initiative effectiveness based on disaster events that occurred during the previous year. As time passes and disaster events occur, this will enable the DMC to accumulate information on the success of mitigation efforts.

Monitoring of the effectiveness of plan implementation and maintenance also involves assessing the effectiveness of the mitigation goals and objectives established for the planning process. As noted above, the DMC established general goals and a number of specific objectives to guide the participants in the mitigation planning process. The DMC's attempts to address the established objectives, with the intent of achieving the associated mitigation goals for the community, is a key measure of the effectiveness of the continuing plan maintenance and plan implementation. Section 10.2 documents the DMC's efforts to achieve the established goals and objectives through the implementation of associated proposed mitigation initiatives. As these initiatives are implemented, and monitored for their effectiveness in future disasters, the DMC will be able to determine the overall success of their mitigation planning effort. In future planning cycles, these goals will be reviewed and re-evaluated to ensure they are still relevant to the unique needs of the community and continue to address current and expected conditions.

The fourth category of plan maintenance activities is to actually incorporate the results of technical analyses, including the development of new mitigation initiatives and to publish the next 5-year cycle HMP Update. The DMC will continue to engage the public in the planning process to expand direct participation in the planning, and to ensure that the DMC reflects the community interests. In order to complete this category of plan maintenance activity, the participants will use the general planning cycle provided in the next section.

Appendix A
Disaster Mitigation Committee Meetings

DMC Meeting 1 – 8/15/2019

Hazard Mitigation Plan Notes

- Need to address utility failures/damages
- Need better preparedness for hazards, messaging via tv/social media, buy flashlights/generators/weather radios in advance, need a goal to address loss of life or ways to mitigate
- Further develop hazard info as development increases, City has LOS analysis and new evaluations, dissemination, community dispatch – Simpsonville does get job of getting info out, IGA already in place – coordination of debris removal to help each other working well
- Vulnerability of people, difference between assisted living and nursing home, assisted living not required to have generators, house initiative to address, strengthen relationship between Emer Management and private sector, continuity of government operations during event, Hal -having a POC that checks on at risk people, Hal – include rep from hospitals in DMC
- Getting communication out earlier to public, develop communication plan in event that Paula/Hesha out of town, continuing operations and other essential day-to-day things (community-church, HOAs) during an event – supplies/equipment, TD center for shelter, protect lives and property, critical facility operations
- Being prepped for aftermath, where to go to get assistance, updating goals? Updating hazard information
- Master list of orgs that provide mitigation support (private entities too), engagement w other partner orgs, public awareness campaign, review/develop projects and landuse planning through haz mit lens, broader goals – reducing damage and loss of life over those listed, improve resiliency, broad/diverse County and having strategies that support varied geography

Meeting Minutes

Date of Meeting:	August 15, 2019	Re:	Greenville County Hazard Mitigation Plan Update Disaster Mitigation Committee Kickoff Meeting
Location:	Greenville County Square	Issue Date:	September 03, 2019
Submitted By:	James Riddle	Conference Call:	
In Attendance:	Disaster Mitigation Committee (see scanned attendance list)		

ITEMS DISCUSSED:

- o The Greenville County Disaster Mitigation Committee (DMC) convened for the first time as noted above to initiate the next update to the Greenville County Multi-Hazard Mitigation Plan (HMP). The meeting included over 30 attendees, with representatives from various local governments, industry, Upstate Forever, and other upstate agencies.
- o After a brief introduction from Brian Bishop, members of the DMC introduced themselves to the overall group. Hal Clarkson then presented an overview of the HMP development process as outlined on the meeting agenda. The presentation included but was not limited to an explanation of the role/expectations of the

committee members, the purpose of the HMP, and general discussion regarding possible hazards and associated mitigation techniques. James Riddle showed mapping of past hazards recorded throughout the County and those that would likely be prioritized for inclusion in the plan.

- Hal then divided the DMC into six small groups and facilitated discussion regarding goal setting for the HMP. Each group was given a copy of the eight goals included in the prior version of the HMP to identify potential gaps or refinements needed to those respective goals. After a brief period of individual group discussion, the following highlights the feedback from each group:
 - Need better pre-preparedness prior to a hazard incident such as advance purchase of flashlights, batteries, generators, and weather radios and messaging via tv/social media to improve awareness of risk and how to mitigate risk. Need goal to address and mitigate potential loss of life.
 - Need to further assess and understand risk as urban development increases. Some communities like Simpsonville does a good job with community dispatch. Intergovernmental agreements are already in place in most cases and working well. Individual communities may need town specific measures.
 - Need to focus on the vulnerability of people and assisted living facilities was discussed. It was pointed out that these facilities are not required to have generators like a nursing home. Need to strengthen relationship between Emergency Management and the private sector. The group discussed the development of an emergency response plan template for assisted living facilities. Need to ensure continuity of government operations during an event. Hal suggested having a point of contact that checks on at-risk folks during an event and ensuring the DMC includes a representative from the area hospitals.
 - Need to communicate with community well in advance of hazards and have redundancy in place when key community representatives are unavailable. Need supplies and equipment to continue day-to-day things during or after an event. Need to ensure operations of critical facilities, shelters, and schools. Need to protect life and property and maintain community infrastructure.
 - The community needs to be prepared in the aftermath of a hazardous event by knowing where to go for assistance. Both funding and resources should be identified prior to an event. Data related to hazards should be kept up to date.
 - Need to develop a list of organizations that provide mitigation support, including private entities, and engage with partner organizations. Need to review/develop projects and look at land use planning through the lens of hazard mitigation. Might needed broader goals such as reducing property damage and loss of life along with improved resiliency. Need goals that support the diversity of the County and varied geographic regions. Consider development of public awareness campaign.
- Hal stated that Woolpert would compile these ideas and potentially revise the County's goals for review by the DMC. Brian closed the meeting and invited the DMC to the first public meeting in September.

Sign-In Sheet

Name	Organization/Mailing Address	Phone	Email
Hal Clarkson	Woolpert	803-214-5881	Hal.Clarkson@woolpert.com
Brian Bishop	Greenville County	864-467-7523	jbishop@greenvillecounty.org
Bryan Thornton	Mauldin Public Works	864-449-1433	bthornton@mauldincity.sc.com
W.R. Woode	Mauldin City PW	862-982-0055	
James Riddle	Woolpert		
Don Shuman	GCPRT	864-288-6470	dshuman@greenvillecounty.org
Roger Case	City of Fountain Inn	864-505-0571	
Kirsten Robertson	Greenville County	864-920-6404	KiRobertson@greenvillecounty.org
Jessica Stumpf	GC EM	864-467-3056	jstumpf@greenvillecounty.org
Wade Shealy	GC Schools	864-355-3390	wshealy@greenville.k12.sc.us
Teresa Barber	Greenville County	864-467-7459	tbarber@greenvillecounty.org
Jeff Nelson	Boiling Springs FD	864-268-3617	jnelson@boilingspringsfd.org
Catherine Lippert	Furman University	803-354-2629	Catherine.Lippert@furman.edu
Megan Chase	Upstate Forever	571-332-3216	mchase@upstateforever.org
Drew Brittain	Upstate Forever	864-561-4754	dbrittain@upstateforever.org
Jay Maret	GCEM		
Imma Nwobodo	GCRA	864-242-9801	inwobodo@gcra-sc.org
Briney Bischof	GCRA	864-242-9801	bbischof@gcra-sc.org
Eric Vinson	City of Travelers Rest	864-834-8740	eric@travelersrestsc
Andy West	City of Simpsonville	864-449-9640	awest@simpsonville.com
Bill Stewart	Mauldin Fire Department	864-289-8925	
Paula Gucker			
Paul Dow	City of Greenville	864-467-4400	pdow@greenvillesc.gov
Meg Coffey	GreenGate Community Initiative (GCI)	864-525-6681	megcoffey@yahoo.com
Lynne Newton	USDA NRCS	864-467-2755	Lynne.Newton@usda.gov
Tyler Stone	GC Planning	864-467-7279	astone@greenvillecounty.org
Hesha Gambell	GC Public Works		hgambell@greenvileecounty.org
Bob Mihalic	Greenville County	864-467-7055	
Charles Kirksey	City of Simpsonville	864-449-0076	ckirksey@simpsonville.com
Jordan Bradway	Prisma Health	864-430-6669	Jordan.Bradway@prismahealth.org
Brandon Grooms	Colonial Pipeline Co	864-809-5397	bgrooms@colpipe.com
Patty Wright	Greenville County	864-467-7523	pwright@greenvillecounty.org

DMC Meeting 2 – 11/8/2019

Meeting Minutes

A new goal was presented to the DMC and objectives related to this goal were proposed.

New goal: Protect public safety and prevent loss of life and injury

Objectives:

- Protect Vulnerable populations (e.g., dialysis patients, elderly) and critical facilities
- Install informational signage in hazardous areas (e.g., steep roads, bridges, floodplains)
- Place powerlines underground
- Install gauges, gates, and warning lights
- Provide warnings for roads blocked by debris

Potential new mitigation activities:

- Install flood hazard signage, gates, and warning lights
- Enhance public outreach activities
 - Be comprehensive and concise
 - Effectively communicate hazard assistance information
 - Leverage social media, cell phones, and hashtags
 - All communities should “point to” existing emergency management website (i.e., leverage existing communications infrastructure)
 - Establish interagency / interdepartmental communications protocol
 - Educate media outlets on protocols and objectives for hazard communications, enter agreements where possible
 - Determine best mode of communication with vulnerable populations
 - Provide homeowner / business owner property protection assistance (education)
- Develop riparian area management plans
 - Identify additional property (developed & undeveloped) acquisition
 - Create “focused” buffer protection plans
 - Enhance runoff reduction criteria (i.e., GI and LID practices)
- Enhance preventative maintenance
 - Proactive maintenance of piped infrastructure, ditches, culverts, bridges, and BMPs
 - Educate homeowners of stream maintenance responsibilities
 - Facilitate underground burial of powerlines
- Coordinate bridge de-icing with SCDOT
- Provide / ensure backup power for critical needs (e.g., fueling stations, food sources, vulnerable populations)
- Provide / ensure proper heating and cooling for vulnerable populations
 - Engage non-profits
- Provide / ensure quick return of daycare facilities post-disaster

Sign-In Sheet

Name	Organization/Mailing Address	Phone	Email
James Riddle	Woolpert	803-214-5920	James.Riddle@woolpert.com
Brian Bishop	Greenville County	864-467-7523	jbishop@greenvillecounty.org
Bill Stewart	Mauldin Fire Department	864-289-8925	
Bryan Thornton	Mauldin Public Works	864-449-1433	bthornton@mauldincity.sc.com
Catherine Lippert	Furman University	803-354-2629	Catherine.Lippert@furman.edu
Geoffrey Habron	Furman University	864-294-3413	Geoffrey.Habron@furman.edu
Gabrielle Soled	ReWa	864-299-4000	gabrielles@re-wa.org
Glen McManus	ReWa	864-299-4000 x260	glenm@re-wa.org
Paul Dow	City of Greenville	864-467-4400	pdow@greenvillesc.gov
Don Shuman	GCPRT	864-288-6470	dshuman@greenvillecounty.org
Wade Shealy	GC Schools	864-355-3390	
Briney Bischof	GCRA	864-242-9801	bbischof@gcra-sc.org
Drew Brittain	Upstate Forever	864-561-4754	dbrittain@upstateforever.org
Hunter Crumley	GS Eng. & Maint.	864-467-7192	hcrumley@greenvillecounty.org
Michael Dey	Home Builders Association	864-254-0133	mdey@hbaofgreenville.com
Eric Vinson	City of Travelers Rest	864-834-8740	eric@travelersrestsc
Dorian Flowers	City of Greer	864-828-2166	dflowers@cityofgreer.org
Tyler Stone	GC Planning	864-467-7279	astone@greenvillecounty.org
Brian Campbell	NOAA	864-608-0352	Brian.Campbell@noaa.gov
Bob Mihalic	Greenville County		
Meg Coffey	GreenGate Community Initiative (GCI)	864-525-6681	megcoffey@yahoo.com
Jordan Bradway	Prisma Health	864-430-6669	Jordan.Bradway@prismahealth.org
Patty Wright	Greenville County	864-467-7523	pwright@greenvillecounty.org

DMC Meeting 3 – 12/13/2019

Meeting Summary

The Disaster Mitigation Committee met on December 13, 2019 to discuss the scoring of the mitigation initiatives discussed in the HMP. Each initiative was given a score based on the process outlined in the main body of the HMP document. These scores will be used when prioritizing different initiatives.

Appendix B
NAFSMA and FEMA Documents



Floodplain Management

A locally funded and supported
robust program with a vision “
Let the Floodplains Flood”

Paula Gucker

Assistant County Administrator for
Community Planning,
Development, and Public Works

- Greenville County, SC

Hal Clarkson, PE, CFM

Project Director

- Woolpert, Inc.

INTRODUCTIONS

“You are going to make a difference. A lot of times it won't be huge, it won't be visible even, but it will matter just the same.”

- Batman

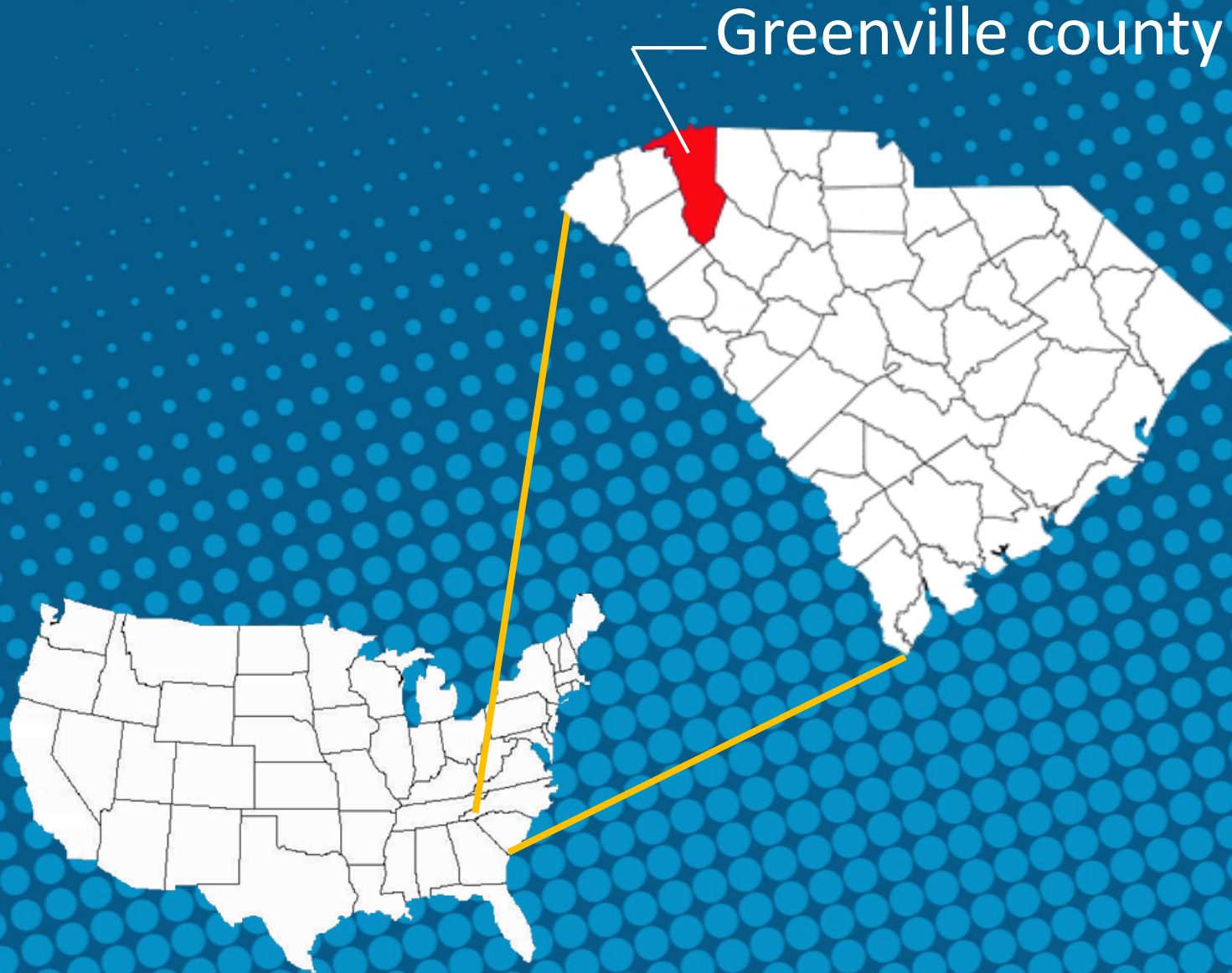


Gotham city (Greenville county, sc)...



“Son, we are the Gotham City ~~Police Department~~ Public Works Department. What do we do when we come face-to-face with hell on Earth? We get to work.”
– James Gordon

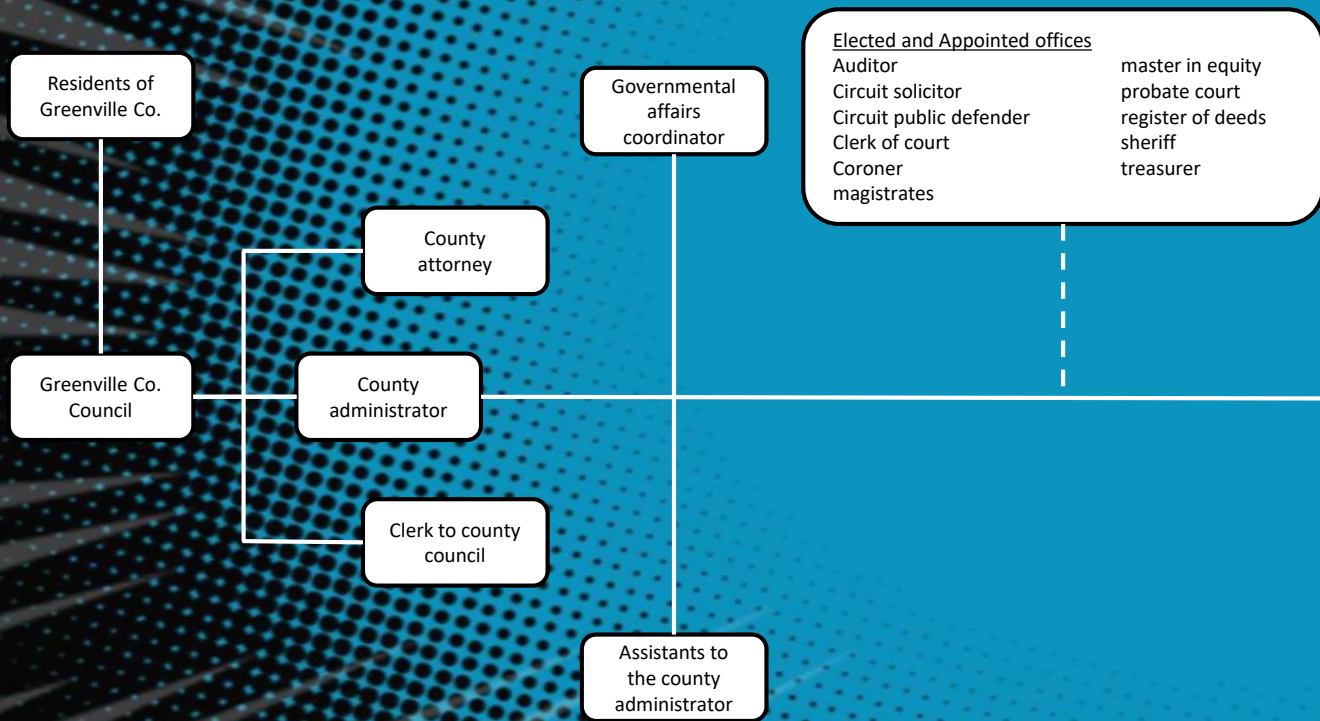
Location...



- Located in foothills of Appalachian Mountains
- Approximately 800 square miles
- Current Population \approx 474,266
- Annual Rainfall \approx 50 inches

Org chart...

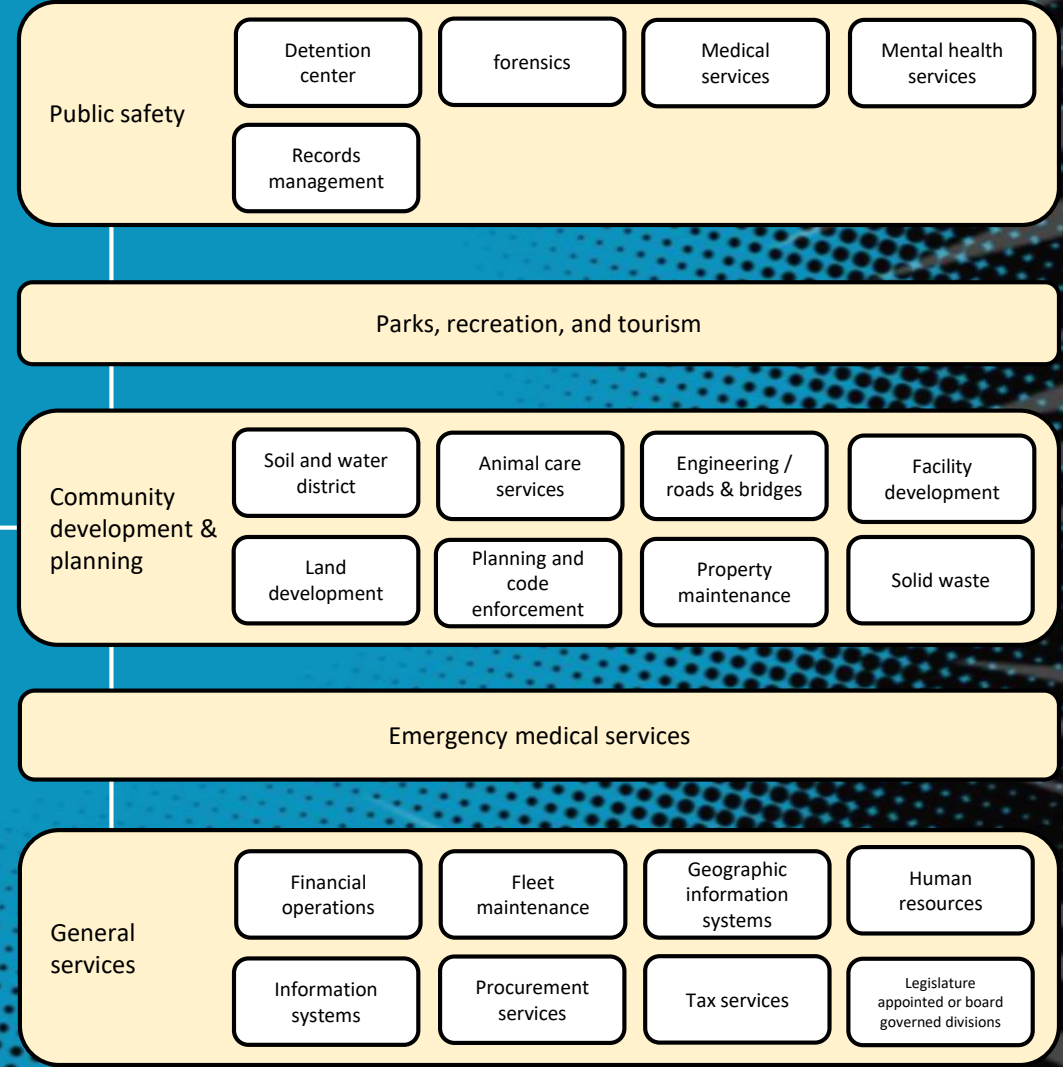
- Where do floodplain management responsibilities reside?



Elected and Appointed offices
 Auditor
 Circuit solicitor
 Circuit public defender
 Clerk of court
 Coroner
 magistrates

master in equity
 probate court
 register of deeds
 sheriff
 treasurer

Greenville county organizational chart



Doctor doom (flood events)

- Tropical storm jerry (august 1995)
- West Side Storm (july 2004)
- Latest event in August 2014



“No matter how bad things get, sometimes good is out there, just over the horizon.”
– Green Lantern



League of Extraordinary Men and women



↑ County Council ↑



Role: protect the interest of the emPire

Wonder woman (Paula Gucker)

Role: Agent of SHIELD (County Council)

- Visible and accessible
- Love / hate relationship with council and citizens
 - Takes the “heat” for Council
 - Tells citizens what they need to know, not what they want to hear
- Focused on “big picture”
- Quick response (Rocky Creek)

“I need a day when there aren’t twenty crises to deal with, but I don’t see that coming anytime soon.”
– Iron Man



Superman (Brian Bishop)

- Role: Floodplain Manager
 - Fights for truth, justice, and the American way
- Enforces ordinance
- Coordinates studies and planning



Aquaman (Hal Clarkson - Woolpert)

Role: Controls the water....

Provide technical support

Studies

Bridge / culvert analysis

Planning assistance

Looking for long term, sustainable solutions



“Our ancestors called it magic, but you call it science. I come from a land where they are one and the same.”

- Thor



Captain America (JSW & Associates,

inc.: Assists with property buyouts

Rescues those in peril

Fair buyout process -
county totally removed
from negotiation
process

“Trust is what
makes an army,
not a bunch of
guys running
around shooting
guns.
- captain America



Philosophy...

- Let the floodplains flood to:
 - Provide wildlife and plant habitat
 - Replenish soils
 - Recharge groundwater
 - Filter impurities
 - Protect people and infrastructure

“You will give the people an ideal to strive towards. They will race behind you. They will stumble. They will fall, but in time they will join you in the sun. In time, you will help them accomplish wonders.”

– Jor-el, Superman’s father

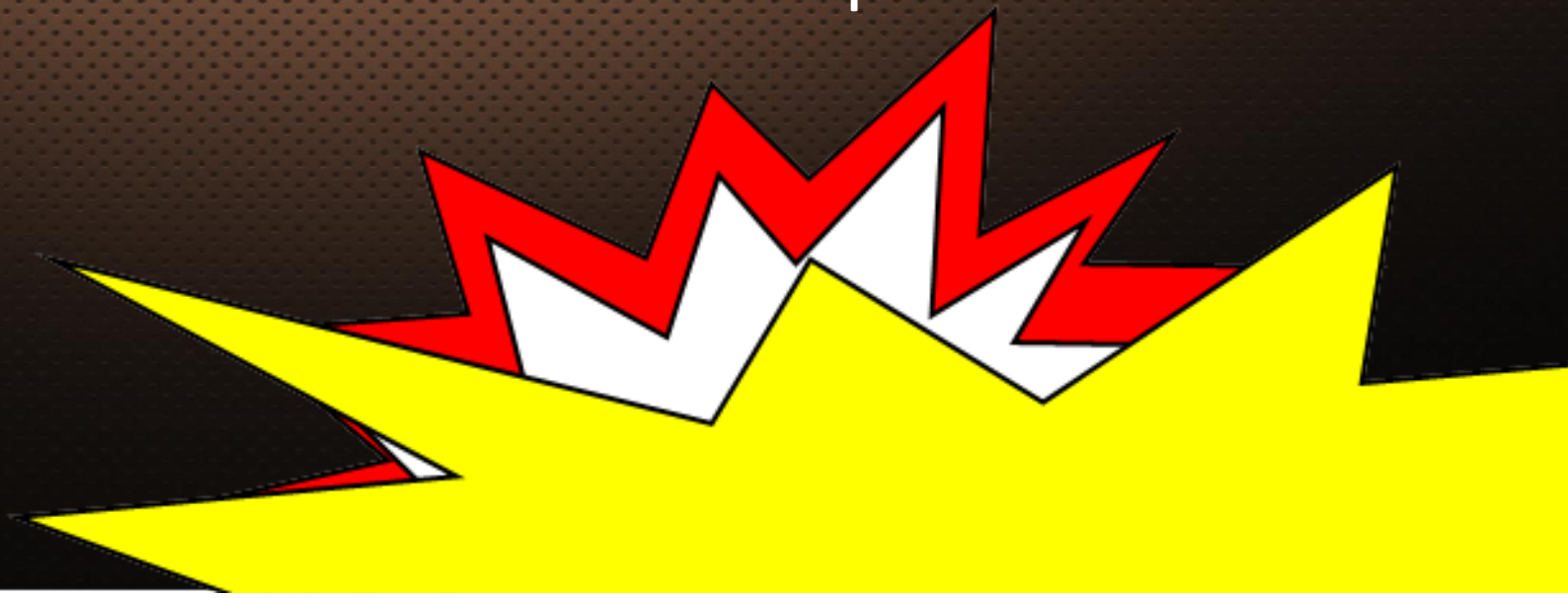


"The future is worth it. All the pain, all the tears. The future is worth the fight."

– Martian Manhunter

Using the powers for good...

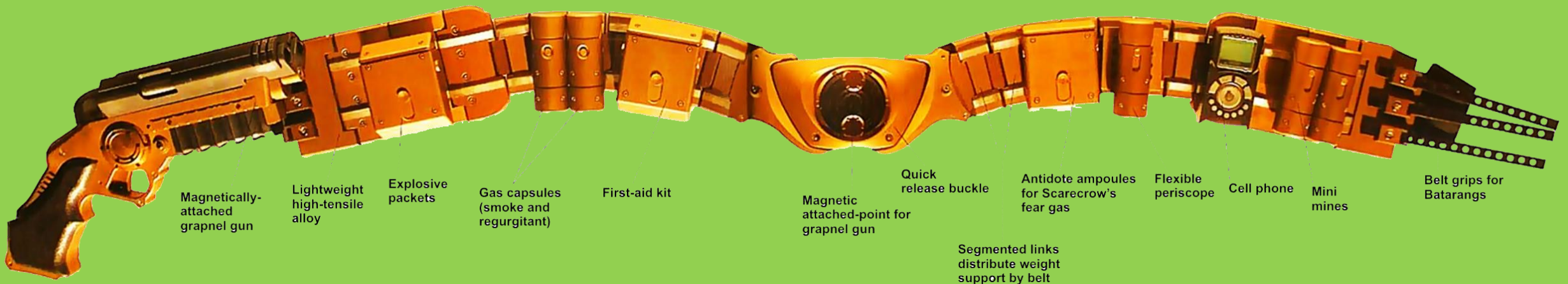
1. Reducing personal injury and loss of life
2. Reducing damage to private property and public infrastructure
3. Reducing cost of emergency response
4. Maintaining, enhancing, and restoring the natural functions of the floodplain



Superhero utility belt...

- Watershed prioritization and systematic study
 - Responded/adjusted to flood events (e.g., Rocky Creek watershed)
- Meaningful Hazard Mitigation Plan
- Progressive ordinance and active enforcement
- Systematic implementation of solutions
 - Infrastructure upgrades
 - Focused on channel capacity, road crossings, property protection
 - Elevation program
 - \$7,500 per elevation project – County funded
 - Buyouts
 - FEMA and County funded elements
- Partnerships

It doesn't matter who we are, what matters is our plan." - Bane

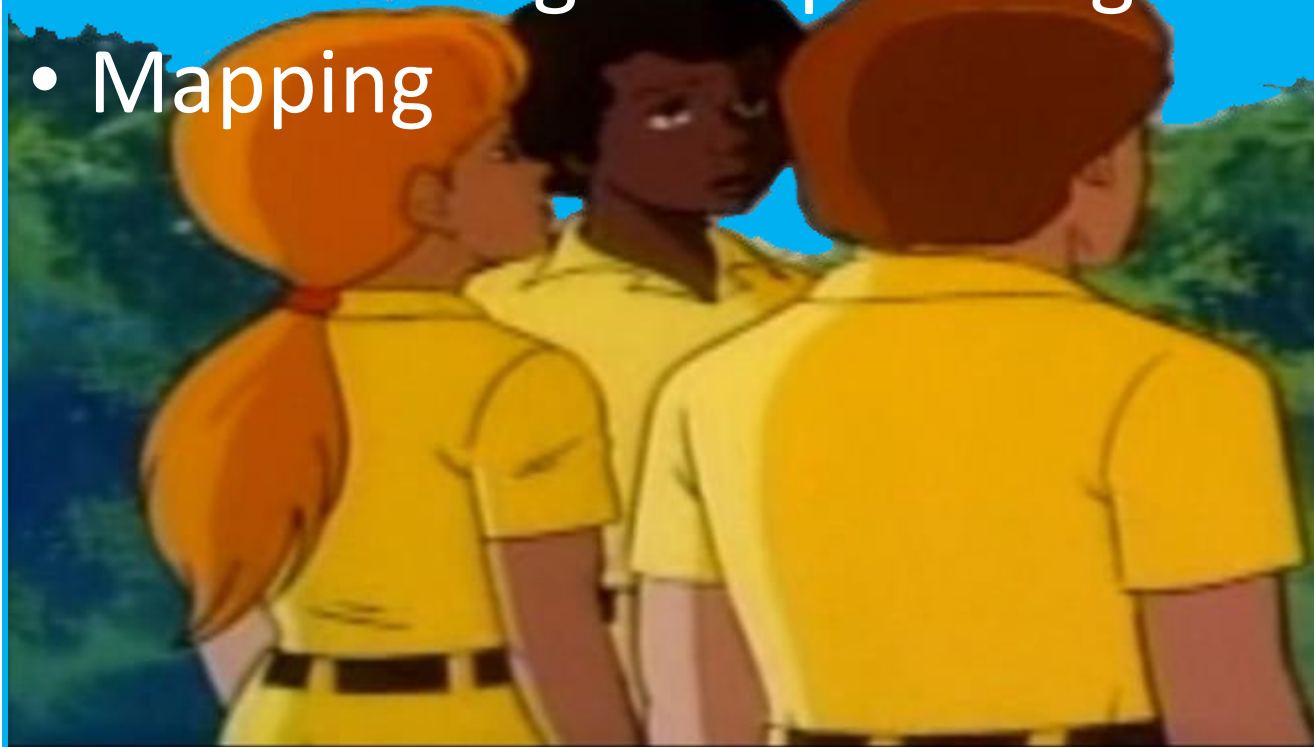


The battles...

- Watershed studies: Rocky creek, brushy creek, gilder creek, upper reedy, grove creek
- Hazard mitigation planning
- Mapping

“...and knowing is half the battle.”

- G.I. Joe



Why this makes sense...

- The benefits
 - Bringing communities together
 - Benefiting the County's trail system

"Sometimes the truth isn't enough, sometimes people deserve more. Sometimes people deserve to have their faith rewarded."

- Batman



Evil defeated...

- 165 homes bought
- 24 RLS mitigated
- 6 homes elevated
- Over 75 culverts/bridges upgraded
- Average 9 neighborhood drainage projects each year
- 533 trees planted
- 2 community gardens established
- \$1.2M grant application awaiting fema approval
- 64.5 acres returned to the floodplain



“No matter how many times you save the world, it always manages to get back in jeopardy again.”

“Sometimes I just want it to *stay* saved! You know?! For a little bit. I feel like the maid: “I just cleaned up this mess! Can we keep it clean for, for 10 minutes?! Please?!”

– Mr. Incredible

Neighborhoods/watersheds of implementation

- Brushy Creek

- Lake Fairfield
- Botany Woods
- Wellington Green Kingsgate
- Northside Heights
- Chestnut Hills
- Brookwood
- Heritage Hills
- Howell circle
- Del Norte

- Rocky Creek

- Mountain Brook
- Merrifield
- Foxcroft
- Rolling green

- Reedy River

- Buncombe Park Subdivision
- Berea Forest Subdivision
- Upper Reedy Watershed
- Mountain View Acres
- Western Hills
- Sharon Park
- Longforest Acres

- Gilder Creek

- Chandler Ridge
- Lee Vaughan

Brushy creek

Project name	Property Acquisitions	Repetitive loss structures	notes
Northside Heights	6		
Chesnut hills	1	1	
Brookwood	1		
Heritage hills	5		
Del norte	56	11	
Botany woods	4		
Lake Fairfield	15	1	<ul style="list-style-type: none"> – Vehicular Bridge and Roadway removed – New Cul-de-sacs – Elevated Pedestrian Bridge to maintain connectivity – Restoration of the Floodplain – Community Partnership with Lake Forest Garden
Howell circle	1		
Wellington green / Kingsgate	25	6	<ul style="list-style-type: none"> – Acquired a National Park Service Grant to design community garden, park and trails – Floodplain restoration program – wildflower and tree planting as well as stream bank restoration – Greengate Neighborhood leases and maintains the area

Rocky Creek

Project name	Property Acquisitions	Repetitive loss structures	notes
Mountain brook	1		– Culvert replaced
Merrifield			– undergoing drainage design project
Foxcroft	2		
Rolling green	3		

Reedy river

Project name	Property Acquisitions	Repetitive loss structures	notes
Buncombe park subdivision	13		
Berea forest subdivision	2	1	
Upper reedy watershed	10		
Mountain view acres	20		– 1 house, 19 mobile homes
Western hills	2		
Sharon park	3	1	
Longforest acres	12	3	– property stabilized with grass for parking lot for recreation – adjacent to the swamp rabbit trail

Gilder creek

Project name	Property Acquisitions	Repetitive loss structures	notes
Chandler ridge	1		
Lee Vaughan	1		

Before...



...After









Before...



...After

Before...



...After

The moral of the story...

“Everyday I wake up knowing that no matter how many lives I protect, no matter how many people call me a hero, someone even more powerful could change everything”.

– Spiderman



“Was that over
the top, I can
never tell.”
- the riddler



Questions...

Hazard Mitigation Best Practice



SCEMD



FEMA

November, 2018



A resident enjoys the natural serenity of land that was cleared following a Greenville County land acquisition.

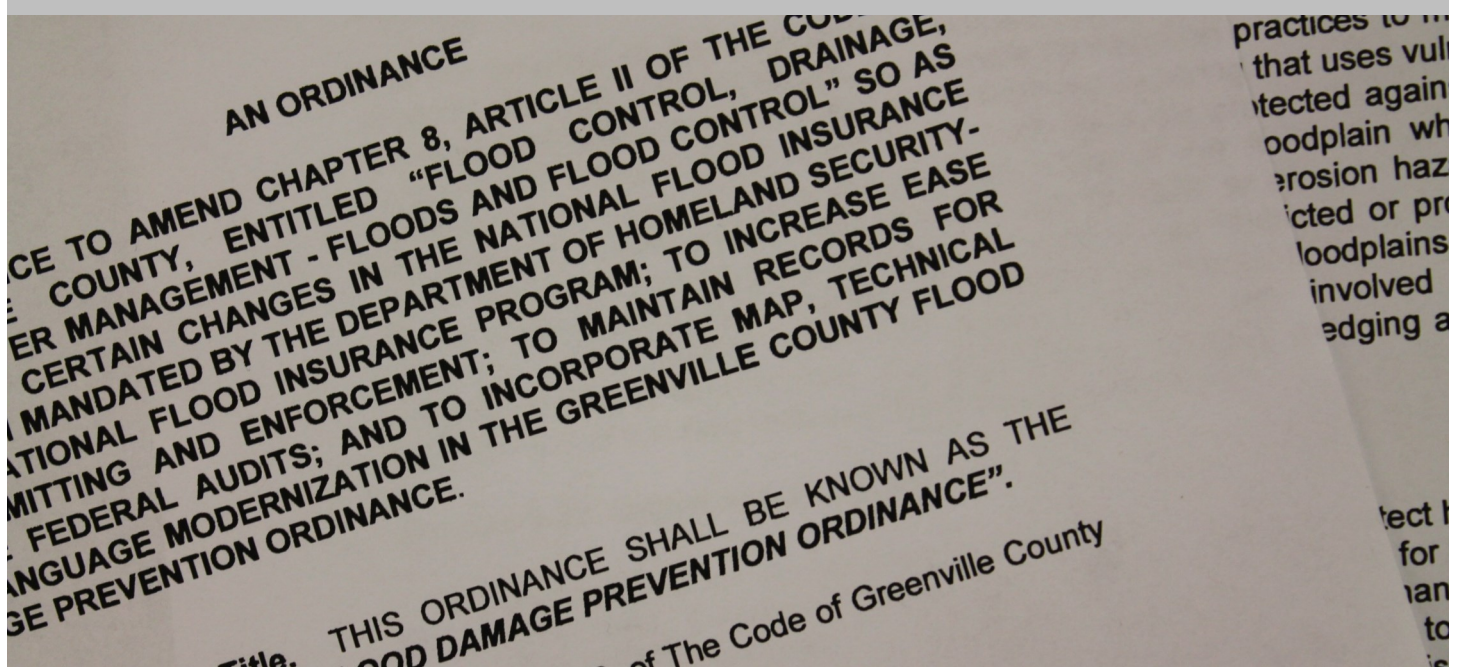
A Plan to Rise Above It All

One County's Comprehensive Plan to Combat Flood Risk

(Greenville County, SC) Surrounded by the scenic rolling foothills of the Blue Ridge Mountains, Greenville County South Carolina is the state's most populous county. It boasts that it is the "economic engine of South Carolina", and is also known for its rich culture and tradition

While Greenville County has numerous areas that are subject to flooding, the people of Greenville have a plan to rise above it all. "We don't want the same problem we had 20 years ago," said Brian Bishop, the county's floodplain administrator. "We are looking 20 years in the future."

The county has gone all in to create a comprehensive program to combat flood risk. "It started because we wanted to get people out of harm's way," said Paula Gucker, the Greenville County Assistant Administrator for Community Planning, Development and Public Works. "Not only are buildings staying dry, but there's a public safety benefit," she said. "There were times when you couldn't even get emergency services in."



Greenville County's Flood Damage Prevention Ordinance

One way the county is ensuring the health, safety and welfare of people in the county is through code enforcement. The Greenville County Flood Damage Prevention Ordinance greatly reduced the risk of future flood damage by encouraging responsible building and making sure that new or substantially improved homes are elevated or built to reduce their risk of flooding.

“We ended up with one of the strictest (ordinances) in the country,” said Gucker.

This progressive ordinance requires new, substantially damaged, or substantially improved residential structures to have its lowest floor (including utilities) elevated four feet above the Base Flood Elevation (BFE). Nonresidential structures have the option to floodproof in lieu of meeting the elevation requirement. Properties that have a ground elevation that is below the BFE are considered to be in a Special Flood Hazard Area (SFHA) which has a one percent chance of flooding in any given year.

According to Bishop, people are opting for higher ground rather than paying for the additional risk of building in a floodplain. In his four years with the county, he has only permitted a handful of houses to be built in the floodplain.

Greenville County participates in the Nation Flood Insurance Program (NFIP) Community Rating System (CRS). The CRS is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. Participation in this program allows the NFIP to offer discounted flood insurance to many of the county's residents and businesses.

“Rates are extremely good here (in Greenville County).” said Jerry Pilkington, an insurance broker and 27-year insurance industry veteran. He represents insurance firms in Greenville County, as well as other communities in several states. “If it rains, people need it (insurance). You don't need it until



An elevated home demonstrates Greenville County's ordinance requirements (Courtesy of Greenville County)

you need it,” Pilkington continued. “I am all about asset protection.”

The county also manages and protects their floodplains. Floodplains provide for recreation and a habitat for wildlife. When it rains heavily, these areas give the water a place to go. Bishop said it’s important to “let the floodplains do what they are supposed to do.”

Another part of Greenville County’s floodplain management strategy is a voluntary property acquisition program, where homeowners can sell homes located in areas of high flood risk to the county for a fair price. The county then clears the land, using it for things like parks and gardens, but a restricted deed is recorded stating that no structures can be placed on the property. Residents provide input for what goes into the newly created space.

“At first there was some opposition to the program. Property owners assumed the county was trying to take their property from them. Now that they understand the benefits, I don’t get much pushback. It’s a benefit to everyone,” said Bishop.

A resident who often walks in one of the areas said, “They had a problem here for a while. Now it’s a nice walking area.”

The acquisition program is mostly funded through county storm water and utility fees, with additional help from FEMA’s Hazard Mitigation Grant Program.

A lot of people contributed to making these programs work, including the Greenville County Depart-



A bench swing awaits visitors in one of the areas cleared by land acquisition

ment of Floodplain Management, Roads and Bridges, Parks and Recreation, Property Maintenance and Facilities. The State, FEMA and the National Park Service also assisted.

“It all works well together,” said Gucker. “The county is going to be in a really good place in the future,” she added.

***For more information about
flood insurance and other topics visit:***

www.scemd.org

or

www.fema.gov



SCEMD



FEMA

Greenville County “Buys Down the Risk” With Property Acquisition Program

Greenville County, SC: Creeks can be deceiving. The unassuming, meandering bodies of water convey a sense of calm to passersby, and sets scenes of solitude for the homeowner peering at its subtle wonder. Throughout history, communities have grown up around these bodies of water, resulting in thriving businesses and robust economies. But growth and development does not come without risks, and communities like Greenville County have learned to manage this risk in order to save lives and property, while ensuring future growth and prosperity for residents.

Greenville county Assistant Administrator, Paula Gucker, recalls the history behind the decision to build an increasingly aggressive property acquisitions program to minimize flood risk. “It started back in 1995 when Hurricane Jerry came through here,” said Gucker. “It dumped 18.9 inches of rain over a fairly large part of the county of Greenville. It was the Brushy Creek/Gilder Creek area, and it dumped enough rain in such a short amount of time that there were numerous floods.”

Although Gucker began working for the County in 2001, nearly six years after the massive flood event, she became a proponent of sound floodplain management practices and progressive approaches to dealing with flooding. The county commissioned a Flood Task Force that reviewed the county’s flood history, looking at where and why floods were occurring. One of the suggestions for dealing with flooding was to dredge Brushy Creek. However, property owners in the area were required to sign off on the plan. “We got about four houses down and people said they weren’t signing,” said Gucker. “They didn’t want us there so the whole project dropped.” The Flood Task Force was disbanded.

Between 2002 and 2004, Gucker and her staff reestablished the Flood Task Force, which recommended watershed studies, suggested different options for mitigating property in the floodplain, and different ways to strengthen the floodplain ordinance. “We looked at floodwalls, we looked at elevating homes, we looked at dredging the creeks, we looked at stream bank stabilizations,” recalled Gucker. “But we knew from the engineering modeling we had done, that some of the properties were so deep in the floodway* at that time, that there wasn’t much we could do. If we elevated them, we couldn’t get them up high enough to get them out of the water.

As a member of the Federal Emergency Management Agency’s (FEMA) National Flood Insurance Program (NFIP), Greenville County conducted detailed studies of the watershed and found that the amount of new development occurring upstream of Brushy and Gilder creeks was causing severe flooding during storm events. The new, detailed engineering studies conducted in coordination with FEMA and the South Carolina Department of Natural Resources determined the level of risk—low-to-moderate or high—for the entire county and identified floodways. The county then updated their flood damage prevention ordinance to eliminate building in the floodway. “It was a long process to do this,” said Gucker. “We started with Brushy, because that was the worst of it. It took us two years to do the watershed study for Brushy. We finished it in 2007, and the final study was adopted by council. They asked that we look at doing this in every watershed, and look at how we were going to make sure nobody ever built in the floodplain without doing due-diligence. Property owners have to build 4 feet above the base flood elevation (BFE*), and they can’t build in the floodway.”



Flooding in Del Norte



Open space in Del Norte post acquisition

The county then began discussions regarding the acquisitions. Public meetings were held to get input from residents and property owners. Initially, the public had many concerns. “There were concerns that we were going to disconnect neighborhoods. There were concerns that we weren’t going to pay property owners what their homes were really worth, that we were just going for a land-grab to get them out of there. In the meantime, we started researching who could help us with this,” recalled Gucker.

After responding to residents’ concerns, the county decided to move forward with property acquisitions. A request for proposals was released, and a contractor’s bid was accepted. The acquisitions firm that Greenville County selected implemented a detailed and thoughtful approach to handling property acquisitions. Initially, people were upset during the community planning meetings. “We got everybody in the room, and we sat up front and explained exactly how the process worked,” said Gucker. “After we went through that first round in the two neighborhoods that we started in, word got out that this wasn’t so bad, that it was a pretty good deal, the county was being really fair. Now when we have people come in to discuss buyouts, they’re very calm, cool and collected, and they’re like ‘what took you so long?’”

Greenville County sets aside an estimated \$1-1.2 million dollars per year for the annual acquisition of 10-12 homes. Some years they buy more, some years less. The buyouts are 100% county funded; the property owners pay nothing. “This is done through our storm water fee and our floodplain management program,” says Gucker. “Now we have a FEMA grant to take care of some repetitive loses.” To date, 166 homes have been acquired and 84.29 acres have returned to the floodplain as open space.

Opponents of property buyouts are often concerned about the impact on communities: dwindling tax base, change in neighborhood aesthetics, or loss of business growth opportunities. But the vast majority of Greenville County buyout participants remained within the unincorporated county and the area continues to thrive. “I only know of two people who moved out of the community,” said Gucker. “One moved to be with family on the coast and the other moved out of state. Everyone else has relocated within Greenville County.”

Greenville County serves as an example of a community that utilizes property acquisition and other tools in the floodplain management toolbox to protect its residents and property owners from the devastating effects of flooding. While some would shout from the rooftops about this tremendous level of success, county administrators remain humble. “We’re very quiet,” said Gucker. “We just don’t toot our own horn. We probably should more,” she adds.



*Floodways are the area in a high risk flood zone where water is deepest and runs fastest.

*BFE is the anticipated height floodwaters are expected to reach during the 1-percent-annual-chance flood (commonly referred to as the 100-year flood).

For more information about the National Flood Insurance Program and to see if your property is located in a designated floodplain, visit: <http://www.floodsmart.gov/floodsmart/>.

Appendix C

Call Log

United States Army Corps of Engineers (US ACE)

US ACE

Mary Hope Green

July 30, 2019 – 3:45pm

I was transferred to the voicemail of Mary Hope Green and left her a message explaining the project. I left my phone number and asked her to please give me a call back.

National Weather Service (NWS)

NWS

Jake

July 31, 2019 – 3:30pm

I spoke with Jake about the project, and he said they can provide us with information. He took down my phone number to give to a hydrologist who was not in the office today. He said he thinks the most beneficial information he could provide would be flood events. He also said NWS could have a meeting with us to come up with a plan for things like tornados and winter storms. These types of events are pretty evenly spread across the county, so instead we should plan for different threat levels. He said the hydrologist should get back to me soon, but if not, Jake will follow up with me.

National Oceanic and Atmospheric Administration (NOAA)

NOAA

Trisha Palmer

August 20, 2019 – 12:00pm

Jake from National Weather Service passed on my information to Trisha Palmer with NOAA, and she called me to discuss the information they have available online. She emailed me links to the Climate Prediction Center as well as to the databases for historical tornado and storm information.

Natural Resources Conservation Service (NRCS)

Soil and Water Conservation District

Kirsten Robertson, Director

July 22, 2019 – 3:00pm

As a previous member of the DMC during the last hazard mitigation plan update, Kirsten was aware of the County mitigation plan and process. I explained the requested data needs and was told that Soil and Water (SW) was involved during the aftermath of the 2015 flood. SW performed inspections and took photos of 2 bridges that had washed out during the event. However, the photos and any associated data were stored on an external hard drive that recently malfunctioned and had not been backed up. SW assisted the County in soliciting USDA emergency watershed protection funds due to this event, but the County was not awarded the grant. Kirsten stated that Hessa should have information related to the two fast-tracked bridge replacements.

Federal Emergency Management Agency (FEMA)

FEMA

Britney

July 31, 2019 – 3:15 PM

I was directed to the voicemail of Britney by a robot phone system. I left her a message letting her know that I am hoping to get some information to help with our planning efforts and asked her to call me back.

South Carolina Department of Transportation (SC DOT)

SC DOT

Tony Thompson

July 30, 2019 – 4:15 PM

I left a voicemail for Mr. Thompson explaining the project and asked if DOT has any hazard planning materials or historical data on roads flooding or icing over. I left my phone number and asked him to please call me back.

SC DOT

Chris Madden

July 31, 2019 – 12:20 PM

Mr. Madden called me regarding the voicemail I left for Mr. Thompson. He said that the only road that comes to mind is I-85, but he said it is currently under construction, and they have not had any issues since construction started. He said they have a list of roads that they try to keep clear for hospitals and first responders. I left him my email address, and he is going to send me the list if he can track it down.

South Carolina Department of Natural Resources (SC DNR)

SC DNR

Laura

July 15, 2019 – 2:15 PM

I spoke with Laura who informed me that the information I am looking for would be located on the FEMA mapping website – msc.fema.gov. She said they plan on the state level, but the FEMA site will provide me with historical data.

South Carolina Disaster Recovery Office (SC DRO)

SC DRO

July 30, 2019 – 2:45 PM

The SC DRO website does not have a phone number, so I sent an email to the address listed on the website. I explained the project and asked if they could please contact me. I included my office phone number for SC DRO to contact me at.

SC DRO
Paul Fonderino
July 31, 2019 – 11:20 AM

Paul called me about my email and explained that he does not have what we are looking for. He said they focus on low to moderate incomes and do not have plans for hazards. He said they get their data from SoVI. He also told me to speak with NFIP for historical flood reports and Department of Insurance for data on costs associated with disasters. Paul said there is a product called SHELDUS that is a hazard database for the U.S., and it can be used to focus on smaller areas such as states and counties.

South Carolina Emergency Management Division (SC EMD)

SC EMD
Megan Wood
July 12, 2019 – 2:00 PM

I spoke with Megan Wood and explained the project. She told me she has some data/information on Greenville County that she can email me including historical data, but she does not have any GIS files. She also told me that a good person to contact is Lindsey McCoy at SCEMD for more info.

South Carolina Department of Health and Environmental Control (SC DHEC)

SC DHEC
John McCain & Kelsey Grogan
2:45 PM

I spoke with John McCain and Kelsey Grogan about providing us with dam inundation maps for the county. John asked me to send him an email with our request, and he will copy the Freedom of Information department in his reply. He told me it would be easiest to send us the raw outputs from DSS-WISE, and then I can sort through the data and import it into GIS.

South Carolina Forestry Commission (SC FC)

SCFC
Jeff Baumann
July 15, 2019 – 10:15 AM

I explained the project to a receptionist who transferred me to Jeff Baumann. He was not available, so I left a voicemail explaining a little bit about the project, and I noted that specifically we would be looking for any historical data or GIS files on wildfires in Greenville County. I left my office number and asked him to call me back.

SCFC
Jeff Baumann
July 18, 2019 – 10:15 AM

Mr. Baumann called me back and said he can provide data on wildfires. He asked what specifically we would need, and I explained that we are looking for location information on wildfires as far back as possible to try to delineate areas where fires are most likely to occur. I told him the data will be used for planning purposes such as evacuation routes. He said he will look through the data he has available and send me a spreadsheet with the

information. He explained that the cities often have gaps because typically a local fire station will handle fires in those areas, but also there are not usually many wooded areas in cities for wildfires to occur.

Upstate Forever

Katie Hottel, GIS Coordinator
August 1, 2019 – 3:10pm

Katie could not think of any areas where Upstate Forever's efforts have integrated with disaster mitigation or associated planning. However, she said she would send an email internally and copy me regarding data that might be of use in case others within her organization have any relevant information. I emailed Katie a summary of what we were looking for to help her develop her internal email. She did say that they were working to develop a coverage or listing of "sensitive lands", but the focus was for water quality rather than anything related to natural disasters.

Friends of the Reedy River

Katie Callahan, President
August 1, 2019 – 5:30pm

Katie was not aware of any crossover from their work into disasters and hazard mitigation. She asked whether the plan would address water quality threats. I told her I did not believe that was included, but I would double check. She indicated that the "Bramlett site", a Brownsfield wetland area now owned by Duke right next to Unity Park and former coal ash operation was a concern, in addition to Lake Conestee dam. She also mentioned concerns related to septic tank drain fields and flooding from failing trees/stream banks and subsequent downstream log jams. Katie said would send an email to the board to see if others could assist with our request. She also is sending me a recent study from a Clemson related to flood prone areas state-wide.

Save Our Saluda

Melanie Ruhlman, President
August 7, 2019 – 4:45pm

Melanie brought up a few areas that *may* have some relevance for the hazard mitigation plan. She indicated a recent erosion issue on the Middle Saluda River under Long Shoals Road. The County addressed the issue, but based upon policy, did not extend the needed fix onto private property. SOS found resources to extend the stabilization effort, but the County should consider a more flexible policy with authority to extend emergency efforts onto private property under certain conditions. Unrelated to this project, a farmer was required to obtain a permit (and pay an engineer) for a relatively basic culvert replacement in the floodplain. Melanie indicated that agriculture was categorically exempted from these requirements through the Clean Water Act. Melanie said farmers should be exempt from these County requirements or they might provide a barrier to needed culvert replacements. Melanie also stated that she believed there were efforts associated with the recent County comprehensive plan to preserve floodplains that might have relevance for hazard mitigation.

Appalachian Council of Governments

Appalachian Council of Governments

Chip Bentley

July 30, 2019 – 2:30 PM

I was directed to the voicemail of Chip Bentley (Deputy Director). I left a message briefly explaining the project and asked if they do any sort of planning for emergencies/hazards. I left my number and asked him to call back.

Appendix D
Public Meetings

Public Meeting 1 – 9/19/2019

Meeting Minutes

Date of Meeting: September 19, 2019 **Re:** Greenville County
Hazard Mitigation Plan Update Public Meeting
Location: Berea Community Center **Issue Date:** September 20, 2019
Submitted By: James Riddle **Conference Call:**
In Attendance: See scanned attendance list

ITEMS DISCUSSED:

Two members of the community joined the County and Woolpert for the first of two public meetings to announce the development of updates to the 2015 hazard mitigation plan. Hal provide a short presentation documenting the intent of the plan and the steps for its development. The following are comments provided by the public after the presentation:

- One member of the community indicated that there is frequent flooding on Sulphur Springs Road, just north of its intersection with Hunts Bridge Road. The local resident indicated that runoff flows from the Midguard Storage Building (formerly K-Mart) onto Sulphur Spring Road causing considerable safety issues for motorists. He indicated that firemen from the Berea Fire Station #3 located just north of this location have had to block lanes or close the road. The resident did not recall this area having these issues in the past and speculated that there may be a maintenance issue with the on-site drainage system. The resident has contacted SCDOT about addressing the issue for the state road but is unaware that any corrective actions have taken place.
- The second citizen present for the meeting indicated flooding problems at 111 Club Circle, located on Saluda Lake. He indicated flooding backing up from existing roadside ditches during storm events. Brian stated that if the Lake is at flood stage and the system is therefore experiencing tailwater, there is little the County can do to improve flooding. However, this road is County-owned, and the drainage system could be cleaned if needed.
- Brian indicated to both residents that we would follow-up to further inspect and/or explore ways to reduce the flooding.

Sign-In Sheet

Name	Organization/Mailing Address	Phone	Email
L Fortner		864-467-1638	charleslyf2001@yahoo.com
Lawanda Curry		864-676-2180	
Michael Chaedwick		864-906-3958	mikeddav@charter.net
Hal Clarkson	Woopert	803-244-5881	hal.clarkson@woolpert.com
Dakarai Sadler		864-309-9966	dakarasadl@gmail.com
Brian Bishop	Greenville County	864-467-7523	jbishop@greenvillecounty.org
Patty Wright	Greenville County	864-467-7523	pwright@greenvillecounty.org

Public Meeting 2 – 10/08/2019

Sign-In Sheet

Name	Organization/Mailing Address	Phone	Email
Brian Bishop	Greenville County	864-467-7523	jbishop@greenvillecounty.org
James Riddle	Woolpert	803-214-5920	James.Riddle@woolpert.com
Patty Wright	Greenville County	864-467-7523	pwright@greenvillecounty.org

Appendix E
Repetitive Loss Example Letter



Office of the Floodplain Administrator

Brian Bishop
Floodplain Administrator
jbishop@greenvillecounty.org
(864) 467-7523
www.greenvillecounty.org

June 2019

To: Repetitive Loss Area Property Owners

**Re: Repetitive Loss Areas and Floodplain Management Information
National Flood Insurance Program (NFIP)**

Dear Sir or Madam:

You are receiving this letter because you own and/or reside in a home located in an area that is subject to flooding. In fact, one or more properties located in your area have experienced "repetitive losses" due to flooding. Repetitive loss properties are those properties for which two or more claims of more than \$1,000 have been paid by the NFIP within any 10-year period since 1978. Although repetitive loss properties represent only 1% of all the NFIP's insurance policies, they have accounted for nearly one-third of the claim payments.

Greenville County is concerned about repetitive flooding and has an ongoing program to address problem flooding areas. However, there are things that each property owner can do to protect themselves from damage caused by flooding events. The enclosed Brochure provides information on flooding issues and floodplain management such as:

Local Flood Hazards	Permit Requirements
County Flood Services	Flood Insurance
Flood Warnings	Natural and Beneficial Functions
Property Protection Measures	Drainage System Maintenance
Flood Safety	

Greenville County also has a program to assist residents whose structures are located in floodplain areas and/or have experienced structural flood damage. The Residential Elevation Grant Program will provide up to \$7,500 to elevate flood prone homes which meet eligibility requirements. For more information on this program please visit our web site at www.greenvillecounty.org/floodplainadministration. Information related to flood insurance can be found at www.floodsmart.gov.

Please contact our office if you have questions regarding the enclosed information or floodplain management issues.

Sincerely,

Brian Bishop, P.E., CFM
Floodplain Administrator
h:\floodplain\crs - iso\2019\2019 rl letter.doc

Appendix F
Participating Municipal Hazard Mitigation
Plans

Appendix G
2020 Hazard Mitigation Plan Resolutions

A RESOLUTION

A RESOLUTION APPROVING AN UPDATE TO THE GREENVILLE COUNTY MULTI-JURISDICTION HAZARD MITIGATION PLAN

WHEREAS, the health and safety of all Greenville County citizens are threatened by potential natural disasters, which are caused by flood events, winter ice storms, tornadoes, and other natural disasters; and

WHEREAS, to minimizing the impact of these hazards, public and private sector interests of Greenville County have joined together to implement a comprehensive disaster mitigation effort as outlined in the Multi-Jurisdictional Hazard Mitigation Plan (Plan); and

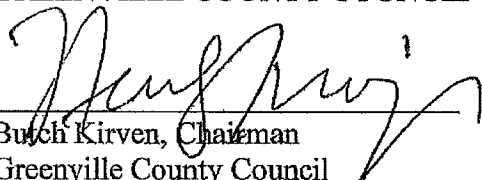
WHEREAS, from time to time, this Plan needs to be revised and updated to continue to improve communications, response activities, and the protection of structures in Greenville County; and

WHEREAS, an update has been considered and approved by the Greenville County Hazard Mitigation Committee;

NOW, THEREFORE, BE IT RESOLVED that Greenville County Council hereby approves an update to the Greenville County Multi-Jurisdiction Hazard Mitigation Plan.

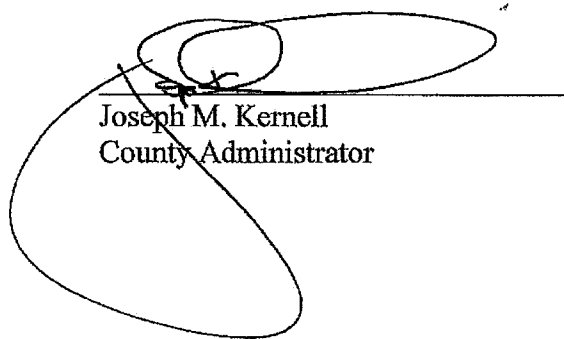
ADOPTED IN REGULAR MEETING THIS 16th DAY OF JUNE, 2020.

GREENVILLE COUNTY COUNCIL


Burch Kirven, Chairman
Greenville County Council

ATTEST:


Regina McCaskill
Clerk to Council


Joseph M. Kernell
County Administrator