1.1 1.7 2.3 2.10 3.3 4.5

Subtask 2.3: Neuse River Basin Literature Review Expansion

North Carolina Flood Resiliency Blueprint

Prepared for the North Carolina Department of Environmental Quality by AECOM, ESP Associates, and Insight

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Table of Contents

Figures

Tables

Definitions

A comprehensive list of definitions applicable to multiple Flood Resiliency Blueprint documents is provided in a separate document.

Acronyms

ARC – American Red Cross

BCP – Beaver Control Program

BFE – Base Flood Elevation

CAD – Computer Aided Design

CDBG – Community Development Block Grant

CERT – Community Emergency Response Team

COG – Council of Government

COOP – Continuity of Operation Plan

CPRC – Central Pines Regional Council

CRES – Coastal Region Evacuation and Sheltering

CRS – Community Rating System

DFE – Design Flood Elevation

DFRIS – Digital Flood Risk Information System

DMS – Division of Mitigation Services

DOT – Department of Transportation

ECU – East Carolina University

EM – Emergency Management

EMS – Emergency Medical Services

EOC – Emergency Operations Center

EOP – Emergency Operations Plan

ES – Emergency Services

ETJ – Extra-Territorial Jurisdiction

FEMA – Federal Emergency Management Agency

FIMAN – Flood Inundation Mapping and Alert Network

FIRM – Flood Insurance Rate Map

GIS – Geographic Information System

GUC – Greenville Utilities Commission

H&H – Hydrologic and Hydraulic

HMA – Hazard Mitigation Assistance

HMGP – Hazard Mitigation Grant Program

HMP – Hazard Mitigation Plan

HMRRP – Hurricane Matthew Resilient Redevelopment Plan

HUD – Department of Housing and Urban Development

HVAC – Heat, Ventilation, and Air Conditioning

JLOW – Jordan Lake One Water

LiDAR – Light Detecting and Ranging

N/A – Not Available

NBS – Nature Based Solutions

NC – North Carolina

NCCNMS – North Carolina Coordinated Needs Management Strategy

NCDCM – North Carolina Division of Coastal Management

NCDACS – North Carolina Department of Agriculture and Consumer Services

NCDEQ – North Carolina Department of Environmental Quality

NCDMS – North Carolina Division of Mitigation Services

NCDOT – North Carolina Department of Transportation

NCDPS – North Carolina Department of Public Safety

NCEM – North Carolina Emergency Management

NCFMP – North Carolina Floodplain Mapping Program

NCOEMS – North Carolina Office of Emergency Medical Services

NCORR – North Carolina Office of Recovery and Resiliency

NCSU – North Carolina State University

N.E.W. – Nash, Edgecombe, Wilson

NFIP – National Flood Insurance Program

NI – Natural Infrastructure

NIFMP – Natural Infrastructure Flood Mitigation Program

NRCS – Natural Resources Conservation Service

NS – Non-Structural

NSF – National Science Foundation

ODS – Office of Dam Safety

P – Planning

RCCP – Resilient Coastal Communities Program

RHMP – Regional Hazard Mitigation Plan

RRP – Regional Resilience Portfolio

RWP – Regional Watershed Plan

S – Structural

SFHA – Special Flood Hazard Area

SMNR – Special Medical Needs Registry

SWCD – Soil and Water Conservation District

TBC – To Be Continued

UDO – Unified Development Ordnance

UNC – University of North Carolina

US – United States

USACE – United States Army Corps of Engineers

USGS – United States Geological Survey

WWTP – Water and Wastewater Treatment Plant

1 Introduction

1.1 Purpose and Intended Uses of Neuse River Basin Literature Review Expansion

This document is an expansion of Task 1.1, which provided the initial foundational literature review and data collection inventory of existing data, planning efforts, research projects, studies, and regional scale modeling to support development of the North Carolina Flood Resiliency Blueprint (Blueprint). The purpose of the current document is to expand the previous literature review to document the most current plans, reports, and documents that identify current flood resiliency efforts and sources of flooding within the Neuse River Basin. This includes existing local/regional/state resilience efforts, policy, and plans. Further documentation is provided to identify existing investments in flood resilience: structural, non-structural, nature-based, and planning including details such as age/condition, need for future maintenance, and current ownership/ management. For plans, the report indicates if recommendations have been implemented and any barriers to implementation. This includes current state, regional, or local resilience staffing levels and relative levels and types of expertise.

Technical Advisory Group representatives are subject matter experts who provide advisory input and feedback during the development of the Blueprint. Their expertise contributes to identifying key components of existing work including this Neuse River Basin literature review.

This inventory will enable all those involved to build upon existing efforts to help meet the intent of the North Carolina Flood Resiliency Blueprint. Phase I is a statewide effort to create a basis of knowledge including an understanding of the vast amount of resiliency planning done throughout the state. Stakeholders from each basin will have the opportunity to add local and regional planning efforts to narrow the North Carolina Flood Resiliency Blueprint consideration for regional and local needs.

1.2 Neuse River Basin

The Neuse River Basin is comprised of four eight-digit hydrologic unit codes (03020201 (Upper Neuse), 03020202 (Middle Neuse), 03020203 (Contentnea), and 03020204 (Lower Neuse)) and covers over 6,200 square miles of both land and open water. The Neuse River Basin covers all or part of 17 counties: Carteret, Craven, Durham, Franklin, Granville, Greene, Johnston, Jones, Lenoir, Nash, Orange, Pamlico, Person, Pitt, Wake, Wayne, and Wilson.

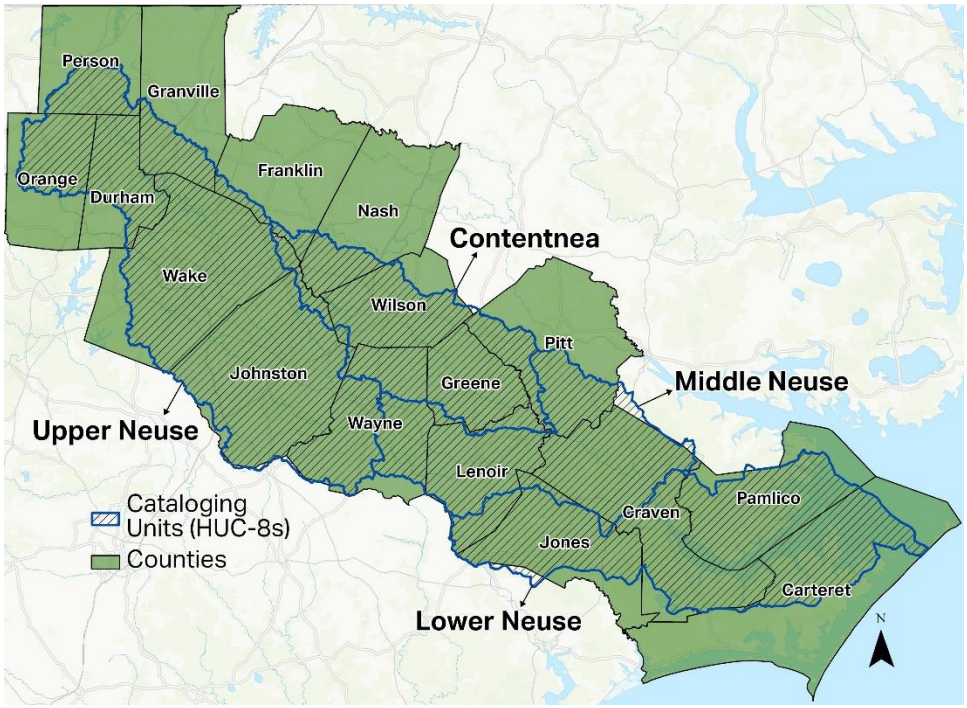

Figure 1. Counties and HUC-8 Watersheds in the Neuse River Basin

1.3 Connections to Other North Carolina Flood Resiliency Blueprint Tasks

There are various interconnections between this Neuse River Basin literature review expansion (Task 2.3) and other tasks in the Blueprint, listed below.

- **Task 1.1** - presents the foundational literature review for state-wide existing data, planning efforts, research projects, studies, and regional scale modeling.
- **Task 1.7** - identifies specific recommendations from existing statewide planning efforts that correspond with flood resilience strategies.
- **Task 2.10** - identifies existing recommendations.
- **Task 3.3** – provides recommendations for integrating and leveraging other state, federal, and regional flood resiliency efforts

The following sections organize reviewed materials by the following purposes.

- Plans and Strategies
- Technical Reports and Memos
- Research Projects and Studies
- Programs

For each source, the report includes the components outlined in the above Purpose and Intended Use section as well as overview tables of each source that catalog flood resilience investments described in the source, identify the type of investment, and furnish other elements of interest.

1.4 Inclusion Criteria

Inclusion criteria for literature review resources are listed below. Resources identified that do not meet the inclusion criteria but are valuable for awareness and reference are documented in Table 16 in the Appendix.

- Basin-wide or smaller geographic scope. The geographic scope for this Neuse River Basin literature review expansion is Neuse River Basin-wide or a smaller scale within the basin.
- Credible and vetted. Resources have local, state or agency support and/or have been reviewed by subject matter experts.
- Up-to-date, latest version. Generally, resources were published in 2017 or later, in response to Governor Roy Cooper's 2018 Executive Order 80. For resources updated annually, only the latest version was reviewed although earlier versions may be mentioned or linked in the document.

2 Index

2.1 Summary Table Overview

Summary table fields are described below along with included options.

- Age and Update Cycle: narrative form that includes the year it was published or released along with any known information on the update cycle.
- Relative Level of Detail: the level of detail points of interest for existing flood resilience efforts is covered including sources of flooding, age/condition, need for future maintenance, current ownership/management, barriers to and status of implementation.
    - **Low**: somewhat detailed but key points covered generally; some topics missing or broad
    - **Medium**: moderately detailed with some key points supported by Neuse relevant descriptions, data, maps, and other visualizations; a few topics missing or broad
    - **High**: highly detailed with most key points supported by Neuse and applicable geographic area relevant information; most points of interest covered explicitly
- Sources of Flooding:
    - **Coastal**: caused by water from the ocean coming on land either as tides, storm surge, or wave action.
    - **Compound**: occurs when multiple factors or processes like storm surge, high tides, heavy rainfall, river discharge, and other factors converge, leading to more severe and widespread flooding in a particular area than if these factors acted independently.
    - **Dam and Levee**: flooding occurs when a dam or levee fails to contain floodwater. The failure can result from floodwater overtopping the dam or levee as well as if the dam or levee experience a structural failure, or breach, resulting in a release of floodwater.
    - **Flash**: characterized by a rapid rise in water, high velocities, and a large amount of debris.
    - **Rain**: occurs when a rainfall event creates a flood independent of an overflowing water body.
    - **Riverine**: occurs when stream and rivers exceed the capacity of their natural or constructed channels to accommodate water flow and thus water overflows the banks, spilling out into adjacent low-lying, dry land.
    - **Urban and Stormwater**: occurs when excess rainfall in an urban area is greater than can be conveyed away from the developed area by the urban drainage system.
- Investments in Flood Resilience: references existing or proposed investments in flood resilience and identifies the type of investment.
    - **Structural (S):** direct actions used to prevent floodwaters from reaching properties. Structural measures involve the construction of man-made structures that control and redirect water flows. Structural mitigation generally includes:
        - Reservoirs
        - Levees/floodwalls/seawalls
        - Channel modifications
        - Enlarging culverts or bridge openings
        - Diversions
        - Storm sewers

- Beach nourishment

- **Non-Structural (NS):** physical and nonphysical measures, which when applied to structures vulnerable to flooding, or those measures incorporated as programmatic floodplain management actions, result in a reduction in life loss and property damage and/or an increase in flood resiliency. These measures generally cause no adverse effects on flood stages, velocities, flood duration or the environment in which the measures are implemented. Common examples include…

  - Acquisition, elevation, and/or relocation of at-risk structures and property
  - Wet and dry floodproofing (i.e., retrofitting/modifying existing structures)
  - Local level policies, regulations, and guidance concerning land uses, zoning, building codes, etc.
  - State level policies, regulations, and guidance
  - Flood insurance
  - Emergency services including early warning systems, evacuation routing, shelters and critical facilities
  - Public education and outreach

- **Nature-Based Solutions (NBS)**: also referred to as "nature-based infrastructure," "natural infrastructure," or "green infrastructure;" actions that protect, sustainably manage and/or restore natural and modified ecosystems in ways that address flood related challenges effectively and adaptively, providing benefits for both people and the environment. Examples of NBS include:

  - Wetland establishment, restoration, and preservation for flood storage
  - Conservation of natural resources including reforestation, riparian buffer restoration/protection, streambank and shoreline protection, etc.
  - Adaptive forestry and agricultural practices
  - Green stormwater infrastructure that mimics natural features to capture, treat, and disperse rainwater such as green roofs, bioswales (vegetated low-lying areas and specialized soil mixes), rain gardens, etc.
  - Reconnection of rivers and streams to their floodplains
  - Coastal marsh to reduce the impact of waves, storm surge, and coastal erosion.

- **Planning (P):** collaborative processes that identify, evaluate, and prioritize the sources and impacts of flooding to people and property with the purpose of forming implementable solutions for flood mitigation. Examples of (P) include:

  - Emergency preparedness and response planning
  - Stormwater and floodplain management planning
  - Technical support and funding programs
  - Data collection, modeling, and mapping

2.2 Resource Inventory Summary

This document contains a review of existing local/regional/state resilience efforts, investments, policy, and plans relevant to the Neuse River Basin. All 35 plans, strategies, technical reports, memos, research projects, studies, and programs reviewed in this document are highlighted in Table 1 below. The Resource Summary Table (Table 1) includes the title of the resource, a link to that resource as well as factors described in the inclusion criteria (section 1.4) including the year it was published (for programs the year it was started), the update cycle of that resource, the relative level of detail, sources of flooding identified, and categories of flood resiliency actions.

Table 1. Resource Summary (2.2)

Title and Link	Year	Update Cycle	Relative Level of Detail	Sources of Flooding	Investments			
					S	NS	NBS	P
Hurricane Matthew Redevelopment Plan: Carteret County https://files.nc.gov/rebuildnc/documents/matthew/rebuildnc_carteret_plan_combined.pdf	2017	-	Medium	Coastal; Rain; Riverine	✓	✓	✓	✓
Hurricane Matthew Redevelopment Plan: Craven County https://files.nc.gov/rebuildnc/documents/matthew/rebuildnc_craven_plan_combined.pdf	2017	-	Medium	Coastal; Rain; Riverine	✓	✓	✓	✓
Hurricane Matthew Redevelopment Plan: Franklin County https://files.nc.gov/rebuildnc/documents/matthew/rebuildnc_franklin_plan_combined.pdf	2017	-	Medium	Rain; Riverine	✓	✓		
Hurricane Matthew Redevelopment Plan: Greene County https://files.nc.gov/rebuildnc/documents/matthew/rebuildnc_greene_combined.pdf	2017	-	Medium	Rain; Riverine	✓	✓	✓	✓
Hurricane Matthew Redevelopment Plan: Johnston County https://files.nc.gov/rebuildnc/documents/matthew/rebuildnc_johnston_plan_combined.pdf	2017	-	Medium	Rain; Riverine	✓	✓	✓	✓

Title and Link	Year	Update Cycle	Relative Level of Detail	Sources of Flooding	Investments			
					S	NS	NBS	P
Hurricane Matthew Redevelopment Plan: Jones County https://files.nc.gov/rebuildnc/documents/matthew/rebuildnc_jones_plan_combined.pdf	2017	-	Medium	Rain; Riverine	✓	✓	✓	✓
Hurricane Matthew Redevelopment Plan: Lenoir County https://files.nc.gov/rebuildnc/documents/matthew/rebuildnc_lenoir_combined.pdf	2017	-	Medium	Rain; Riverine	✓	✓	✓	✓
Hurricane Matthew Redevelopment Plan: Nash County https://files.nc.gov/rebuildnc/documents/matthew/rebuildnc_nash_plan_combined.pdf	2017	-	Medium	Rain; Riverine	✓	✓	✓	✓
Hurricane Matthew Redevelopment Plan: Pamlico County https://files.nc.gov/rebuildnc/documents/matthew/rebuildnc_pamlico_plan_combined.pdf	2017	-	Medium	Coastal; Rain; Riverine	✓	✓		✓
Hurricane Matthew Redevelopment Plan: Pitt County https://files.nc.gov/rebuildnc/documents/matthew/rebuildnc_pitt_plan_combined.pdf	2017	-	Medium	Rain; Riverine	✓	✓		✓
Hurricane Matthew Redevelopment Plan: Wake County https://files.nc.gov/rebuildnc/documents/matthew/rebuildnc_pitt_plan_combined.pdf	2017	-	Medium	Rain; Riverine	✓	✓	✓	✓
Hurricane Matthew Redevelopment Plan: Wayne County https://files.nc.gov/rebuildnc/documents/matthew/rebuildnc_wayne_plan_combined.pdf	2017	-	Medium	Rain; Riverine	✓	✓	✓	✓
Hurricane Matthew Redevelopment Plan: Wilson County https://files.nc.gov/rebuildnc/documents/matthew/rebuildnc_wilson_plan_combined.pdf	2017	-	Medium	Rain; Riverine	✓	✓	✓	

Title and Link	Year	Update Cycle	Relative Level of Detail	Sources of Flooding	Investments			
					S	NS	NBS	P
Eastern Carolina Regional Resilience Portfolio https://www.rebuild.nc.gov/resiliency/resilient-communities/rise/eastern-carolina#Tab-FundedProjectHighlight-3617	2022	-	High	Coastal; Flash; Rain; Riverine; Urban & Stormwater		✓	✓	✓
Mid-East Regional Resilience Portfolio https://www.rebuild.nc.gov/resiliency/resilient-communities/rise/mid-east	2022	-	High	Coastal; Flash; Rain; Riverine; Urban & Stormwater	✓	✓	✓	✓
Upper-Coastal Plain Resilience Portfolio https://www.rebuild.nc.gov/resiliency/resilient-communities/rise/upper-coastal-plain	2022	-	High	Coastal; Flash; Rain; Riverine; Urban & Stormwater	✓	✓		✓
Triangle J Regional Resilience Portfolio https://www.rebuild.nc.gov/resiliency/resilient-communities/rise/triangle-j	2022	-	High	Flash; Rain; Riverine; Urban & Stormwater	✓	✓	✓	✓
Kerr-Tar Regional Resilience Portfolio https://www.rebuild.nc.gov/resiliency/resilient-communities/rise/kerr-tar	2022	-	High	Flash; Rain; Riverine; Urban & Stormwater	✓	✓	✓	✓
Cape Fear Regional Hazard Mitigation Plan https://www.chathamcountync.gov/home/showpublisheddocument/56417/637679232925770000	2020	Quarterly review and plan maintenance; formal update every five years	Medium	Dam (Levee not included); Flash; Rain; Riverine; Urban & Stormwater	✓	✓	✓	✓
Eno-Haw Regional Hazard Mitigation Plan https://www.orangecountync.gov/DocumentCenter/View/19321/Eno-Haw-Final-Hazard-Mitigation-Plan-PDF	2020	Quarterly review and plan maintenance; formal update every five years	Medium	Dam (Levee not included); Flash; Rain; Riverine; Urban & Stormwater	✓	✓	✓	✓

Title and Link	Year	Update Cycle	Relative Level of Detail	Sources of Flooding	Investments			
					S	NS	NBS	P
Pamlico Sound Regional Hazard Mitigation Plan https://www.cravencountync.gov/DocumentCenter/View/870/Pamlico-Sound-Regional-Hazard-Mitigation-Plan-2020-PDF	2020	Quarterly review and plan maintenance; formal update every five years	Medium	Coastal; Dam & Levee; Flash; Rain; Riverine; Urban & Stormwater	✓	✓	✓	✓
Tar River Regional Hazard Mitigation Plan https://gis.aecomonline.net/irisk2/NCHMP.aspx?region=30	2021	Quarterly review and plan maintenance; formal update every five years	Medium	Dam & Levee; Flash; Rain; Riverine; Urban & Stormwater	✓	✓	✓	✓
Neuse River Regional Hazard Mitigation Plan https://www.rebuild.nc.gov/documents/neuse-river-regional-hazard-mitigation-plan/download?attachment	2020	Quarterly review and plan maintenance; formal update every five years	Medium	Coastal; Dam (Levee not included); Flash; Rain; Riverine; Urban & Stormwater	✓	✓	✓	✓
N.E.W. Regional Hazard Mitigation Plan https://www.nashcountync.gov/DocumentCenter/View/7237/NEW-Regional-HMP-Final-Plan	2020	Quarterly review and plan maintenance; formal update every five years	Medium	Dam & Levee; Flash; Rain; Riverine; Urban & Stormwater	✓	✓	✓	✓
Wake County Multi-Jurisdictional Hazard Mitigation Plan https://s3.us-west-1.amazonaws.com/wakegov.com.if-us-west-1/s3fs-public/documents/2021-06/2020%20MP%20Wake%20County%20Complete%20Revised.pdf	2019	Quarterly review and plan maintenance; formal update every five years	Medium	Dam (Levee not included); Flash; Riverine; Urban & Stormwater	✓	✓	✓	✓
Neuse River Basin Flood Analysis and Mitigation Strategies Study https://www.rebuild.nc.gov/documents/files/neuse-mitigation-report/open	2018	-	High	Dam & Levee; Flash; Rain; Riverine; Urban & Stormwater	✓	✓		

Title and Link	Year	Update Cycle	Relative Level of Detail	Sources of Flooding	Investments			
					S	NS	NBS	P
Neuse River Basin Flood Risk Management Technical Report https://www.saw.usace.army.mil/Portals/59/siteimages/Flood%20risk%20management/NRB/FINAL_Neuse_River_Basin-Technical_Report-02212023_508%20v1_1.pdf?ver=e6vLMewgY2OYkt6n871hrA%3d%3d	2023	-	High	Rain; Riverine	-	-	-	-
Flood Abatement Assessment for Neuse River https://connect.ncdot.gov/projects/research/RNAProjDocs/Final%20Report%20RP2018-32.pdf	2020	-	High	Dams & Levee; Flash; Rainfall; Riverine; Urban & Stormwater	✓	✓		✓
Improving North Carolina's Resilience to Coastal Riverine Flooding https://repository.library.noaa.gov/view/noaa/49651	2021	-	High	Rain; Riverine	✓	✓	✓	✓
Financial Risk of Flood Events in Eastern North Carolina https://collaboratory.unc.edu/wp-content/uploads/sites/476/2021/05/financial-risk-of-flood-events-in-eastern-north-carolina.pdf	2021	-	High	Coastal; Flash; Rain; Riverine; Urban & Stormwater	✓	✓		✓
Supporting Environmental Justice in Connected Coastal Communities Through a Regional Approach to Collaborative Community Science https://www.nsf.gov/awardsearch/showAward?AWD_ID=2052889&HistoricalAwards=false#:~:text=Our%20team%20of%20academic%20researchers%20takes%20a%20transdisciplinary,from%20diverse%20communities%20throughout%20the%20region%20and%20beyond	2021	Ongoing – scheduled to be completed by August, 2026	Low	Coastal, rainfall, and riverine flooding		✓		✓
NC Floodplain Mapping Program https://flood.nc.gov/ncflood/	2000	Ongoing	High	-		✓		✓
Natural Infrastructure Flood Mitigation Program	2020	Ongoing	Medium-Low	-	✓		✓	

Title and Link	Year	Update Cycle	Relative Level of Detail	Sources of Flooding	Investments			
					S	NS	NBS	P
https://www.deq.nc.gov/about/divisions/mitigation-services/natural-infrastructure-program#:~:text=The%20pilot%20project%2C%20and%20the%20Natural%20Infrastructure%20Program,streams%20which%20help%20store%20water%20and%20reduce%20flooding								
Central Pines Regional Council https://www.centralpinesnc.gov/environment-resilience/water-resource-management	-	Ongoing	Medium-Low	Flash, Rainfall, Riverine, Urban & Stormwater	✓	✓	✓	✓
NC Resilient Coastal Communities Program https://www.deq.nc.gov/about/divisions/coastal-management/coastal-adaptation-and-resiliency/nc-resilient-coastal-communities-program#Phase3Awards2022-2023-11442	2020	Ongoing	Medium-High	Coastal, Flash, Rainfall, Riverine, Urban & Stormwater	✓	✓	✓	✓

3 Review and Inventory

The Neuse River Basin, with headwaters in the Piedmont that runs through the Coastal Plain until reaching the Atlantic coast, has experienced frequent and severe flooding over the past two decades with three major hurricanes resulting in loss of life and billions of dollars in damage and recovery related costs. The historical and ongoing flood hazard challenges in the Neuse have resulted in numerous resiliency efforts and investments. The review and inventory serve as a comprehensive overview of up-to-date and credible flood resiliency efforts with resources covering Basin-wide or smaller geographic scopes. Resources included in this review include plans and strategies, technical reports and memos, research projects and studies, as well as programs.

Each resource covered includes a background section on the impetus for, the intended purpose and geographic scope of the effort. The summary of flood resiliency efforts subsections describes the development process including relevant participants, stakeholder and community engagement activities, prioritization, and other key details. The sources of flooding subsections highlight how each resource identifies flooding including the sources of flooding categories described in section 2.1 of this document and any other relevant details. Investments in Flood Resilience subsections include a summary and table with a snapshot outline of existing and proposed flood resiliency investments and actions by the categories described in section 2.1 (i.e., structural, non-structural, nature-based solutions, and planning). The full list of each resources investments and actions can be found in section 5.4 of the Appendix. Lastly, relevant sources for each resource covered are provided.

3.1 Plans and Strategies

This section covers three primary plan and strategy types with Neuse River Basin relevant flood resiliency efforts including Hurricane Matthew Resilient Redevelopment Plans, Regional Resilience Portfolios, and Hazard Mitigation Plans. The several individual regional, county, and/or municipal plans that fall under each plan type are summarized together as the overall development process, document structures, and intent are similar. A comprehensive overview of each individual plan within these plan types are detailed in Section 5.4 of the Appendix.

3.1.1 Hurricane Matthew Resilient Redevelopment Plans

3.1.1.1 Background

Following Hurricane Matthew in 2016, the Disaster Recovery Act of 2016 directed North Carolina Emergency Management (NCEM) to lead efforts in a resilient redevelopment program for all fifty counties included in the Presidential Disaster Declaration. The purpose of the program was to create a path for impacted communities to rebuild and revitalize through the creation of Hurricane Matthew Resilient Redevelopment Plans (HMRRPs). The comprehensive planning program also served as the foundation of the state's Recovery Action Plan, which the United States (US) Department of Housing and Urban Development (HUD) required for the allocation of Community Development Block Grant (CDBG)-Disaster Relief program funds. The locally driven plans identified redevelopment strategies, reconstruction projects, and defined unmet funding needs. There are 13 counties that significantly intersect the Neuse River Basin with HMRRPs having flood specific mitigation action

recommendations. These counties include Carteret, Craven, Franklin, Greene, Johnston, Jones, Lenoir, Nash, Pamlico, Pitt, Wake, Wayne, and Wilson.

While each plan has uniquely tailored action recommendations for the participating counties, the overall planning processes and plan structure follow a similar template. Due to these similarities, the next section summarizes the HMRRPs planning processes while the accompanying tables compare and highlight key actions and recommendations of individual plans.

3.1.1.2 Summary of Flood Resiliency Efforts

The Regional Resilience Portfolio (RRP) action strategies provide recommendations at both the county and local scale. NCEM also led the development of four regional HMRRPs, based on the prosperity zones defined by the North Carolina (NC) Department of Commerce, to provide a more holistic picture of recovery and redevelopment needs. Three of the four regional HMRRPs provide flood related recommendations relevant to the Neuse River Basin including the North Central, Northeast, and Southeast regions. Stakeholder engagement and public participation served as the backbone of the HMRRP planning process and action strategy development. Three to four public meetings that included data discovery, analysis, collaboration, and interaction informed both county and regional scale HMRRPs. Meetings had two parts with the first part being an in-depth workshop where collaboration between county officials, subject matter experts, and local planners occurred. The second part of the meetings was a public open house where residents had the opportunity to gain experience and contribute to the planning process. The plans sort action strategy recommendations into four resilient redevelopment pillars including housing, economic development, infrastructure, and environment. Participating stakeholders ranked and approved proposed actions as high, medium, and low priority groups during the final meeting of the HMRRP process. Each proposed action in the plans include a priority group and rank, timeframe, location and accompanying map, project summary and summary table. The summary tables provide a high level of detail through a question and response format. Questions addressed in this section of the HMRRPs include:

- Articulate how this project addresses an unmet need that has been created by damage from Hurricane Matthew.
- Is this project consistent with existing plans (describe points of intersection/departure)?
- Does this project comply with existing local and state authority (codes, plans, and ordinances)?
- Does this project meet the intents and goals for the Hurricane Matthew Recovery Act?
- Explain any benefits or impacts to the economy of the county from this project.
- How long this solution will be effective?
- How effective is the risk reduction (assessed by what flood frequency interval a proposed project is designed for, i.e., 50-, 100-, 200-, 500-year events)?
- How many public facilities are involved in this project (buildings and infrastructure)?
- Is coordination with other communities /counties needed to complete this project?
- Is this project consistent with federal laws?
- To what degree does this project adversely impact local floodplain/coastal zone management?
- To what degree will it be possible to positively quantify the environmental benefits and the return on investment of this project?
- What impact will this action have on the local economy/tax base?
- What impacts to the environment of the county will result from this project?
- What is the capability of the local government to administer this project?
- What is the financial range of this project?

- What is the level of public support for this project?
- What is the technical feasibility of this project?
- Who will administer this project?

3.1.1.3 Sources of Flooding Identified

Each HMRRP has a Storm Impact section that provides a local 48-hour observed rainfall depth map of Hurricane Matthew as well as a riverine and coastal flooding summary. Plans outline sources of riverine flooding using United States Geological Survey (USGS) gages, applicable county, river name and location, drainage area, peak Matthew Elevation, and the previous/existing peak flood elevation record. Plans similarly describe sources of coastal flooding using a map ID, applicable county, site description, body of water, and estimated peak surge. Table 18 and Table 19, located in section 5.3.1 of the Appendix, contain riverine and coastal flooding sources identified in the 13-county scale HMRRPs.

3.1.1.4 Investments in Flood Resilience

The HMRRPs culminated into an extensive set of resilient redevelopment recommendations with the purpose of mitigating the impacts of flooding, covering structural, non-structural, nature based, and planning action categories. Table 2 provides a snapshot of these recommendations while section 5.4.1. of the Appendix contains the full accounting of proposed actions for the 13 Neuse River Basin specific HMRRPs.

Table 2. Snapshot of Flood Resilience Investments (3.1.1.)

Plan	Investment	Type				Age	Maintenance	Ownership/ Management	Status & Barriers
		S	NS	NBS	P				
Carteret County Hurricane Matthew Resilient Redevelopment Plan (HMRRP)	Acquisitions: The Carteret County Planning Dept. has a list of repetitive loss properties and potential candidates for elevation.		✓			2017	Green space management post buyout	County Planning Department; NC Office of Recovery and Resiliency (NCORR)	1-2 years
Pamlico County HMRRP	Kershaw Road Culverts: Increase culvert capacity and elevate roadway out of 500yr floodplain, or alternatively reroute road out of floodplain where possible.	✓				2017	-	Pamlico County; NC Department of Transportation (NCDOT)	1-2 years
Wake County HMRRP	Unmapped Stream Studies: There is a need for studies to map areas of frequent and nuisance flooding to better understand risk for future flood events. Approximately 66 miles of streams not currently mapped as Federal Emergency Management				✓	2017	-	Wake County	Immediately (2017)

Plan	Investment	Type				Age	Maintenance	Ownership/ Management	Status & Barriers
		S	NS	NBS	P				
	Agency (FEMA) Special Flood Hazard Area (SFHA) may have experienced flooding during Hurricane Matthew.								
Greene County HMRRP	Implement riparian buffers: This project would provide funding for the county to implement riparian buffers along waterways.			✓		2017	-	Greene County	5-10 years

3.1.1.5 Resources

The following resources, hyperlinked as bullets below, include the 13 counties and three regional HMRRPs that cover areas geographically relevant to the Neuse River Basin.

- Carteret County: https://files.nc.gov/rebuildnc/documents/matthew/rebuildnc_carteret_plan_combined.pdf
- Craven County: https://files.nc.gov/rebuildnc/documents/matthew/rebuildnc_craven_plan_combined.pdf
- Franklin County: https://files.nc.gov/rebuildnc/documents/matthew/rebuildnc_franklin_plan_combined.pdf
- Green County: https://files.nc.gov/rebuildnc/documents/matthew/rebuildnc_greene_combined.pdf
- Johnston County: https://files.nc.gov/rebuildnc/documents/matthew/rebuildnc_johnston_plan_combined.pdf
- Jones County: https://files.nc.gov/rebuildnc/documents/matthew/rebuildnc_jones_plan_combined.pdf
- Lenoir County: https://files.nc.gov/rebuildnc/documents/matthew/rebuildnc_lenoir_combined.pdf
- Nash County: https://files.nc.gov/rebuildnc/documents/matthew/rebuildnc_nash_plan_combined.pdf
- Pamlico County: https://files.nc.gov/rebuildnc/documents/matthew/rebuildnc_pamlico_plan_combined.pdf
- Pitt County: https://files.nc.gov/rebuildnc/documents/matthew/rebuildnc_pitt_plan_combined.pdf
- Wake County: https://files.nc.gov/rebuildnc/documents/matthew/rebuildnc_wake_plan_combined.pdf
- Wayne County: https://files.nc.gov/rebuildnc/documents/matthew/rebuildnc_wayne_plan_combined.pdf
- Wilson County: https://files.nc.gov/rebuildnc/documents/matthew/rebuildnc_wilson_plan_combined.pdf
- Southeast Region: https://files.nc.gov/rebuildnc/documents/matthew/rebuildnc_southeast_region_plan_draft.pdf
- North Central Region: https://files.nc.gov/rebuildnc/documents/matthew/rebuildnc_north_central_region_plan_draft.pdf
- Northeast Region: https://files.nc.gov/rebuildnc/documents/matthew/rebuildnc_northeast_region_plan_draft.pdf

3.1.2 Regional Resilience Portfolio Program

3.1.2.1 Background

The NC Office of Recovery and Resiliency (NCORR) in partnership with the NC Rural Center, regional councils of governments (COG), planning consultants, and local subject matter experts-initiated the RRP Program in 2022 to assist North Carolina regions in expanding natural hazard related resilience efforts. Nine regions, defined by COG geographies (see Figure 2) in Eastern North Carolina, participated in the program that produced tailored climate change and natural hazards vulnerability assessments and climate resilience project portfolios. Vulnerability assessments identified current and future hazards in a region and evaluated the relative strengths and weaknesses of a region when managing those hazards. Project portfolios, informed by the vulnerability assessment findings, include shovel ready prioritized projects with detailed implementation pathways to reduce risk and enhance regional resilience efforts. Five out of the nine regions that participated in the program have areas that are within or significantly intersect the Neuse River Basin including the Eastern Carolina, Mid-East, Upper Coastal Plain, Kerr-Tar, and Triangle J regions.

While each plan has uniquely tailored action recommendations for the participating regions, the overall planning processes and plan structure follow a similar template. Due to these similarities, the next section summarizes the RRPs planning processes while the accompanying tables compare and highlight key actions and recommendations of individual plans.

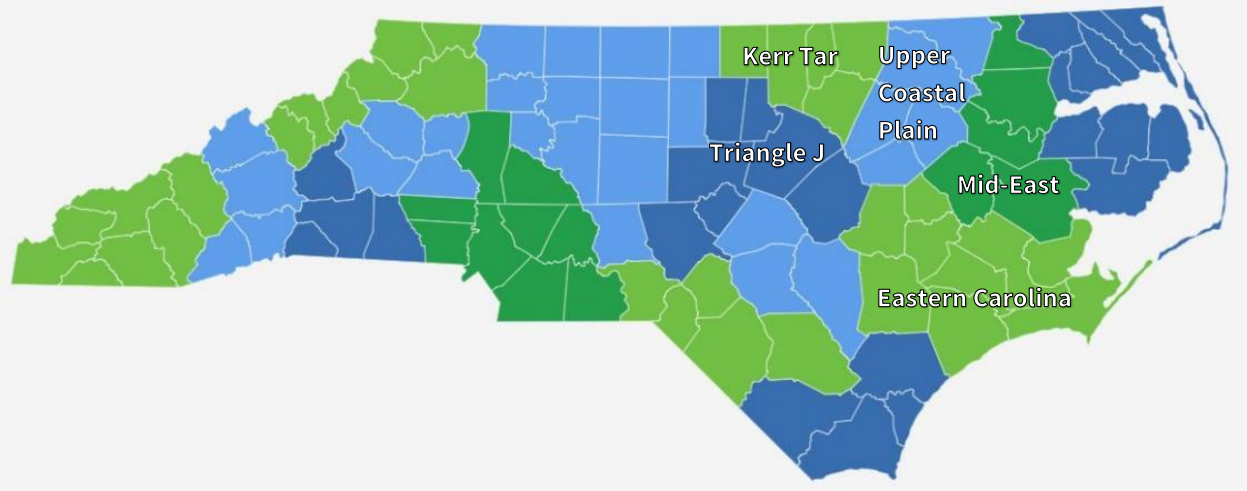

Figure 2. NC Council of Government Regions (source: https://www.ncarcog.com/regional-councils/)

3.1.2.2 Summary of Flood Resiliency Efforts

The program provided vulnerability assessments and prioritized actions at a multi-county (regional) scale to increase coordination among areas that face interrelated natural hazard impacts. The two-part planning process began with the development of climate change and natural hazards vulnerability assessments. Stakeholders developed vulnerability assessments through a five-step process that included a literary review, geospatial analysis, stakeholder partnership meetings, surveys, and two public workshops per region. The literary reviews identified existing plans, policies, programs, and data sources to build a regional profile that covered physical setting, population demographic, economic, housing, critical infrastructure, and community support service topics. Stakeholders identified and prioritized natural hazards through meeting discussions and surveys.

Assessments include high priority hazard profiles, informed by geospatial risk assessment analyses and regional profiles, which include the following details…

- Description
- Location and extent
- Climate change impacts
- Impact on…
    - Social vulnerability and equity, health, and safety
    - Housing, critical infrastructure, and community support systems
    - Economy
    - Natural environmental systems
- Cascading impacts on other hazards
- Additional data needs

The stakeholder partnership used the regional vulnerability assessment findings to support the development of climate resilience project portfolios. Stakeholders, community leaders, and residents discussed potential projects over a series of meetings where participants voted for ten projects believed to be most beneficial to the region. The partnership refined the list of ten projects to incorporate feedback from the stakeholder and public workshops and further prioritized based on a resilience scorecard rating. Projects received a score based on several categories including reduction in risk, scale, cost, benefits, timeframe, feasibility, socioeconomic, climate justice and equity, environmental impacts, and public and stakeholder support. The final portfolio includes five to seven projects with the highest overall score. Each project outlined in the resilience portfolios has a high level of detail with a focus on reducing barriers to implementation by providing a path to action. Project sections include…

- Description - Hazards and Sectors Addressed, Local/Service Area
- Potential Impact and Populations Served
- Roles of Lead and Supporting Agencies
- Cost Estimate and Potential Funding/Match Sources
- Benefits Provided - Physical, Socioeconomic, Environmental, Equitable Outcomes
- Steps for Implementation and Timeframe
- Integration with Existing Plans, Programs, and Policies
- Challenges/Obstacles - Legislative Challenges, Permitting, Zoning Requirements

3.1.2.3 Sources of Flooding Identified

The vulnerability assessments and project portfolios do not directly identify sources of flooding. The documents provide general flood type descriptions that impact the regions including riverine, flash, stormwater/urban, coastal, and storm surge flooding. Assessments highlight climate change as a current and future factor exacerbating flooding across all regions due to more frequent and severe storms in conjunction with sea level rise. In place of flood source identification, the vulnerability assessments focus on how flooding impacts key sectors by providing tables and maps that illustrate how housing, infrastructure, economic development assets, public health, and historical and cultural resources intersect the 1.0 and 0.2 percent annual chance floodplain.

3.1.2.4 Investments in Flood Resilience

The US Economic Development Administration, US HUD-CDBG – Mitigation fund, and in-kind support from NCORR and NC Rural Center provided the funding for administrative and technical aspects of the Regional Resilience Portfolio Program. Regional resilience project portfolios received $600,000 in support of project implementation from the Duke Energy Foundation's Accelerator Grant Program. Each region received one to two awards of up to $65,000 to implement a prioritized project identified in the project portfolios. Table 3 describes the projects, all of which have the purpose of mitigating the impacts of flooding, awarded Accelerator grants for the Eastern Carolina, Mid-East, Kerr-Tar, and Triangle J regions that cover structural, non-structural, nature based, and planning action categories. Recommendations not funded through the Accelerator grants are in section 5.4.2. of the Appendix.

Table 3. Snapshot of Flood Resilience Investments (3.1.2.)

Plans	Investment	Type				Age	Maintenance	Ownership/ Management	Status & Barriers
		S	NS	NBS	P				
Eastern Carolina Regional Resilience Portfolio RRP	Beneficial Reuse of Acquired Properties – Goldsboro, NC		✓	✓		2022	-	Community Technical Assistance, Inc	Green development of an acquired parcel could occur within a matter of months; Establishing consensus on the ideal use of each property
Mid-East RRP	Upsizing Regional Stormwater Infrastructure	✓				2022	-	Local stormwater administrators and engineering staff	Project is expected to be completed over the long term, likely taking several years to complete; challenges are striking balance between grey-green infrastructure and high costs.
Upper Coastal Plain RRP	Comprehensive Plans and Zoning Ordinances Address Climate Change		✓		✓			Upper Coastal Plain COG	5-15 years; large undertaking for locales that lack staff capacity and resources
Kerr-Tar RRP	Environmentally Friendly Farming Practices to Improve Soil Health		✓	✓		2022	Testing and reporting of soil conditions	Working Landscapes, an organization based in Warren County, NC	2 years; Barriers may include knowledge gaps in cover crop methods, although the implementers will create educational

Plans	Investment	Type				Age	Maintenance	Ownership/ Management	Status & Barriers
		S	NS	NBS	P				materials for participants
Triangle J RRP	Develop a Privately Owned Dam Inventory and Dam Ownership Guidebook		✓		✓	2022	-	Deborah McGuffin, Moore County Cooperative Extension Director.	May need assistance bringing in technical specialists.

3.1.2.5 Resources

The following resources, hyperlinked as bullets below, include the five RRPs that cover areas geographically relevant to the Neuse River Basin.

- Eastern Carolina: https://www.rebuild.nc.gov/regional-resilience-project-portfolio-eastern-carolina-region/open
- Mid-East: https://www.rebuild.nc.gov/regional-resilience-project-portfolio-mid-east-region/open
- Triangle J: https://www.rebuild.nc.gov/climate-resilience-projects-triangle-j-region/open
- Kerr Tar: https://www.rebuild.nc.gov/climate-resilience-projects-kerr-tar-region/open
- Upper Coastal Plain: https://www.rebuild.nc.gov/climate-resilience-projects-upper-coastal-plain-region/open

3.1.3 Hazard Mitigation Plans

3.1.3.1 Background

A combined effort between county, city, and town departments, NCEM, Federal Emergency Management Agency (FEMA) Region IV, residents, and stakeholders create hazard mitigation plans (HMPs) with the purpose of reducing the impacts natural and human-induced hazards have on people and property. These plans identify, assess, and mitigate hazard risk and ensure participating jurisdictions are eligible for disaster assistance from FEMA's Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation, and Flood Mitigation Assistance programs. In the Neuse River Basin, there are five regional hazard mitigation plans (RHMPs) and one multi-jurisdictional Hazard Mitigation Plan (HMP) that include flood related recommended actions for 17 counties and approximately 80 cities and towns that significantly intersect the Basin. These plans include:

- Cape Fear RHMP (2020)
- Eno-Haw RHMP (2020)
- Tar River RHMP (2021)
- Neuse River RHMP (2020)

- N.E.W. (Nash, Edgecombe, Wilson) RHMP (2020)
- Pamlico Sound RHMP (2020)
- Wake County Multi-Jurisdictional HMP (2020)

While each plan has uniquely tailored action recommendations for the participating jurisdictions, the overall planning processes and plan structure follow a similar template. Due to these similarities, the next section summarizes the RHMPs planning processes while the accompanying tables compare and highlight key components of individual plans.

3.1.3.2 Summary of Flood Resiliency Efforts

As their title suggests, these plans are regional in scope meaning counties, incorporated municipalities, and unincorporated areas work together to create a set of actions informed by one another. At the county and local scale, RHMPs outline action plans for individual counties, cities, and towns. Action plans address medium and high priority natural hazards, based on a priority risk index score that assigns a degree of risk using probability, impact, spatial extent, warning time, and duration categories. While each of the Neuse relevant HMPs cover anywhere from 9 to 15 medium or high priority hazards, plans consistently rank flood related hazards as one of the highest priorities to address.

Community and hazard profiles as well as vulnerability and capability assessments (see Section 3.5, Barriers to Implementation) inform the recommended flood mitigation actions across the six plans. Community and stakeholder engagement also played a role in selecting feasible and effective recommendations with at least two public engagement meetings and four planning committee meetings. NCEM staff, local government staff, community officials, and other stakeholders participated in planning committee meetings (also open to the public) to facilitate discussion, gain consensus, and begin data collection efforts. Further public outreach included public participation surveys that had a combined 836 responses across the six plans.

The plans prioritize actions as low, medium, or high based on suitability, risk reduction, and cost criteria. There are six mitigation categories that define proposed actions including prevention, property protection, natural resource protection, emergency services (ES), structural projects, and public information and outreach. Each proposed action has a specific local lead department or agency for implementation as well as a timeline goal to ensure responsibility and assist in evaluating implementation progress. Members of planning committees meet quarterly for regular reviews and plan maintenance as well as after a significant hazard event. Participants formally update every five years, with the Neuse relevant HMPs scheduled update being 2025-2026.

3.1.3.3 Sources of Flooding Identified

The plans identify three primary types of flooding hazards impacting the Neuse River Basin including flash, riverine, and coastal floods. RHMPs describe sources of flooding for each flood type as well as more specifically as detailed in Table 20 and Table 21, located in the Appendix. The plans detail several factors that cause or exacerbate localized flood events (flash, riverine, or coastal). Inadequate capacity of pipe systems, clogged inlets, blocked drainage outfalls, and improper grade of asphalt are common infrastructure challenges and sources of all three types of flooding. Heavy/excessive precipitation over an extended period is the primary source of riverine flooding in the RHMPs. Impervious surfaces and intense rainfall over a brief period, commonly caused by slow-moving thunderstorms, is the primary source of flash flooding. The plans indicated coastal flooding normally

occurs due to abnormally high tides or tidal waves as well as storm surge and heavy rains in combination with high tides, tropic storms, and hurricanes.

3.1.3.4 Investments in Flood Resilience

The HMPs culminated into an extensive set of recommendations with the purpose of mitigating the impacts of flooding, covering structural, non-structural, nature based, and planning action categories. Table 4 provides a snapshot of these recommendations while section 5.4.3. of the Appendix contains the full accounting of proposed actions.

Table 4. Snapshot of Flood Resilience Investments (3.1.3.)

Plan	Investment	Type				Age	Maintenance	Ownership/ Management	Status & Barriers
		S	NS	NBS	P				
Cape Fear RHMP	Johnston County (Town of Smithfield)- Complete the Spring Branch Wetlands Restoration Project to improve the quality of stormwater runoff before it enters the Neuse River.			✓		2020	-	Director of Public Works	• 2025: In Progress • Wetland facility restored in 2019. • Applied to grant for additional work. • Received grant funding for a constructed wetland and stream bank restoration project along the Spring Branch to be continued (TBC) in 2022.
Eno-Haw RHMP	Alamance County (City of Mebane)- Expand the County's geographic information system (GIS) Capabilities to Include Maintaining Elevation Certificates		✓		✓		County maintains GIS but city maintains elevation certificates	County and City	2025
Neuse River RHMP	Greene County- Consider joining the Community Rating System (CRS). The county will assess the cost benefit of joining this program for county residents and property owners.		✓		✓	2020	-	County Admin.; Municipal Admins.	Not Started: 2-to-3-year
N.E.W. (Nash, Edgecombe,	Wilson County	✓	✓	✓	✓	2020		Engineering, Stormwater,	2025: seeking grant funding

Plan	Investment	Type				Age	Maintenance	Ownership/ Management	Status & Barriers
		S	NS	NBS	P				
Wilson) RHMP	(City of Wilson)- Restoration Program: Begin design and development of Hominy Creek Water Quality Park & Greenway Plan							Planning & Development Services	
Pamlico Sound RHMP	Pamlico County- Continue to monitor drainage conditions issues associated with drainage ditches and agricultural runoff canals. Once issues are identified, the county will work with municipal jurisdictions and state agencies to identify short- and long-term solutions to these issues	✓			✓	2020	-	County Admin.; County emergency services (ES); Municipal Admins.	Ongoing: in process
Tar River RHMP	Franklin County (Town of Youngsville)- Provide local real estate agents with handouts that will advise potential buyers to investigate the flood hazard for the property they are considering purchasing.		✓			2021	It is likely that the information needs to be updated	Town Clerk	2026 - In progress: Some handouts have been developed and passed to real estate agents, but not every agent has been reached.
Wake County Multi-Jurisdictional Hazard Mitigation Plan	Wake County- Partner with other governmental units and other interested parties to jointly identify and acquire 30,000 acres of open space lands.			✓	✓	2019	-	County Community Services	3-5 years

3.1.3.5 Resources

The following resources, hyperlinked as bullets below, include the seven-hazard mitigation plans that cover areas geographically relevant to the Neuse River Basin.

- Pamlico Sound: https://www.cravencountync.gov/DocumentCenter/View/870/Pamlico-Sound-Regional-Hazard-Mitigation-Plan-2020-PDF
- Nash, Edgecombe, and Wilson (N.E.W.): https://www.nashcountync.gov/DocumentCenter/View/7237/NEW-Regional-HMP-Final-Plan
- Cape Fear: https://www.chathamcountync.gov/home/showpublisheddocument/56417/637679232925770000
- Eno Haw: https://www.orangecountync.gov/DocumentCenter/View/19321/Eno-Haw-Final-Hazard-Mitigation-Plan-PDF
- Tar River: https://gis.aecomonline.net/irisk2/NCHMP.aspx?region=30
- Wake County: https://s3.us-west-1.amazonaws.com/wakegov.com.if-us-west-1/s3fs-

- Neuse River: https://www.rebuild.nc.gov/documents/neuse-river-regional-hazard-mitigation-plan/download?attachment
- public/documents/2021-06/2020%20MP%20Wake%20County%20Complete%20Revised.pdf

3.2 Technical Reports and Memos

This section includes two technical reports including the Neuse River Basin Flood Analysis and Mitigation Strategies Study and the Neuse River Basin Flood Risk Management, NC Technical Report. The reports were produced by NC state government entities and identify and evaluate Basin-wide flood mitigation strategies in the Neuse River Basin.

3.2.1 Neuse River Basin Flood Analysis and Mitigation Strategies Study

3.2.1.1 Background

In the wake of Hurricane Matthew in 2016, NCEM and the NC Department of Transportation (NCDOT) conducted a study on the Lumber, Neuse, and Tar River basins with the purpose of identifying sources of flooding and potential mitigation strategies to reduce future flood impacts. The Neuse River Basin Flood Analysis and Mitigation Strategies Study identifies the primary causes and magnitude of flooding, calculates the impacts of flooding on the built, living, and economic environments for multiple flood frequencies, and assesses mitigation strategies as well as their short- and long-term benefits to costs. The study primarily focuses on the main stem of the Neuse River including the Town of Smithfield, the City of Goldsboro, the Town of Seven Springs, the City of Kinston, the Town of Grifton, as well as unincorporated areas of Johnston, Wayne, Lenoir, and Craven Counties.

3.2.1.2 Summary of Flood Resiliency Efforts

The study has five primary components including a basin profile, flooding profile, engineering analysis, flood risk analysis, and mitigation strategies. Three public meetings informed these components where participants shared and discussed project details and progress. NCEM and NCDOT incorporated feedback from meetings into the document that resulted in additional analysis. Each component of the study has a high level of detail with the basin profile covering hydrologic, demographic, and rainfall - streamflow aspects of the basin along with trend analyses. The flooding profile covers significant historic flood events as well as a detailed review of Hurricane Matthew related rainfall and flood measurements and related impacts.

The engineering analysis details the development process of a new hydrologic model that takes volume and timing of floods into account. The analysis compares the new hydrologic model's calibration and results against observed and National Flood Insurance Program (NFIP) models. The flood risk analysis uses the new hydrologic model to estimate the location of and damage to buildings as well as the locations of roadway overtopping for varying flood recurrence intervals. NCEM evaluated 12 mitigation strategies to reduce flood risk identified in the basin profile, engineering analysis, and flood risk analysis. The strategies include the following:

1. New Detention (Dam) Structures
2. Retrofit of Existing Detention Structures
3. Offline Storage
4. Channel Modification
5. New Embankment Structures
6. Existing Levee Repair/Enhancement
7. Roadway Elevation/Clear Spanning
8. Large Scale Wet Flood-proofing
9. Acquisition/Elevation/Relocation
10. Land Use Strategies
11. River Corridor Greenspace
12. Wildlife Management

Planners created and modeled 16 mitigation scenarios using the strategies underlined in the list above (strategies 1-5, 7, and 9). The strategies include nine dam mitigation scenarios, four

acquisition/elevation/relocation scenarios, and one scenario per channel modification, embankment structure, and clear spanning strategy. The study includes maps of proposed scenario locations as well as benefit/cost ratio tables with a 30- and 50-year time horizon for each of the modeled scenarios.

3.2.1.3 Sources of Flooding Identified

The study primarily focuses on flood events related to Hurricane Matthew in 2016, which produced record rainfall totals in 17 Eastern North Carolina counties. The document's flooding profile section identifies sources of flooding in the Neuse by using peak stream flow data obtained from USGS stream gauges during Hurricane Matthew to estimate the magnitude (return period) of flooding across the study area (see Figure 3 in the Appendix). Wake County experienced the least amount of flooding by far in comparison to the other observed counties with a highest recorded return period flood of 33 years while Johnston and Greene Counties had the most severe recorded floods at return periods greater than 500 years (see Table 22 in the Appendix).

3.2.1.4 Investments in Flood Resilience

Table 5 provides a snapshot of proposed mitigation scenarios, covering structural and non-structural action categories, which received the highest benefit cost scores and considered high priority actions in the Neuse River Basin Flood Analysis and Mitigation Strategies Study. The document has not received an update or follow up since 2018 when NCEM published it, so the implementation status of the following "investments" is unknown. A comprehensive summary of high, medium, and low priority actions is in section 5.4.4. of the Appendix.

Table 5. Snapshot of Flood Resilience Investments (3.2.1.)

Scenario	Description	Type				Ownership/ Management	Maintenance (30-yr.)	Status & Barriers Proposed (2018)
		S	NS	NBS	P			
Scenario 3	Dry Dam at Wilson's Mills, Wet Dams at Beulahtown and Swift Creek	✓				NC Emergency Management (NCEM) & NC Department of Transportation (NCDOT)	$9.6M	Demand for new municipal water sources and existing wastewater treatment plant restraints may outweigh flood storage needs; TMDL rules; rare and endangered species
Scenario 9	Channel Dredging at Kinston	✓				NCEM & NCDOT	Dredging would be required approx. every four years ($12M)	Sedimentation and downstream water surface elevation concerns; public buy-in
Scenario 10	New Levee at Seven Springs	✓				NCEM & NCDOT	$150K	Risk associated with potential failure of the structure, and if overtopping occurs the consequence would be extreme flooding; public buy-in
Scenario 12b	Elevate Structures with Finished Floor Elevation Less Than Base Flood Elevation and 50-Year		✓			NCEM & NCDOT	-	Elevation does not remove structures from being at risk;

Scenario	Description	Type				Ownership/ Management	Maintenance (30-yr.)	Status & Barriers Proposed (2018)
		S	NS	NBS	P			
Scenario 12d	Acquire or Relocate Structures in Floodplain with 50-Year		✓			NCEM & NCDOT	-	There may be a gap between funds for buyouts and the money needed to acquire comparable living space outside of floodplain; stress to infrastructure in new communities

3.2.1.5 Resources

The following hyperlink, provided as a bullet below, includes the source of the resource covered in this section, which is housed on NCORR's website.

- Neuse River Basin Flood Analysis and Mitigation Strategies Study: https://www.rebuild.nc.gov/documents/files/neuse-mitigation-report/open

3.2.2 Neuse River Basin Flood Risk Management, North Carolina Technical Report

3.2.2.1 Background

The US Army Corps of Engineers (USACE) Wilmington District in partnership with the NC Department of Environmental Quality (NCDEQ) conducted the Neuse River Flood Risk Management Study between 2020 and 2023. Funded by the Disaster Relief Act in 2019, the study identifies flood risk within the river basin and evaluates potential alternative actions to reduce flood risk. The technical report covers separate focus areas characterized as population centers with notable flood risk across the river basin.

3.2.2.2 Summary of Flood Resiliency Efforts

The study's general strategy was to identify flood risk in specific focus areas and create tailored flood mitigation plans with both structural and nonstructural measures for each area. USACE then selected and combined viable plans from focus areas to create a basin wide plan. The initial basin wide recommended plan proposed the elevation or floodproofing of 768 structures located near Crabtree Creek, Raleigh; Hominy Swamp Creek, Wilson; Big Ditch, Goldsboro; and the Neuse River between Goldsboro and Smithfield, NC. However, USACE significantly reduced the scale and footprint of the recommendation plan to only 12 structures in the Raleigh focus area after public, agency, technical and policy reviews found many of the proposed actions neither implementable nor economically viable due to a variety of factors. USACE further screen the reduced plan at increasing levels of detail where it was then determined a recommended plan of "No Action" was the only option as the floodproofing of structures in Raleigh conflicted with federal and local regulations.

Ten stakeholder gathering events held in the Neuse River Basin study area with town, city, county, and state officials contributed to the study by providing existing information on past flood risk studies, mapping, and other technical data. The study held three public involvement meetings individually focused on discussing potential actions that the study could evaluate for flood risk reduction in either the eastern, central, or western portions of the basin.

3.2.2.3 Sources of Flooding Identified

The report attributes thunderstorms, northeasters, and hurricanes as the primary causes of flooding. Tropical hurricanes in the late summer and autumn season bring the heaviest and most prolonged rainfalls in the Neuse River Basin, producing the largest floods. The spatial extent of hurricanes can cause compound flooding where two or more floods occur in a given area at generally the same time. The report indicates the upper portion of the river basin, which has comparatively more high-density urban land use cover, experiences a higher risk of flash flooding due to poor infiltration from impervious surfaces and streams typically characterized by steep gradients with high, narrow banks. The middle and lower portions of the river basin are significantly more exposed to severe storm occurrences and have a substantial percentage of their floodplain areas used for agriculture. Flooding of major tributaries in these areas, caused by temporary debris and historically undersized bridge spans or culvert openings, can constrict flows, lead to prolonged flood stages, and increase overall damages. The lower portion of the river basin has the greatest risk of experiencing extreme storms that can cause coastal flood hazards, exacerbated by climate change and sea level rise, in the form of storm surge, waves, wind, rainfall, compound coastal-inland flooding, seiche, and extreme tides.

3.2.2.4 Investments in Flood Resilience

The technical report concludes with a recommendation of "No Action" as every proposed alternative action was neither implementable or economically viable under federal, state, and local regulations, policy and/or guidelines. The one recommendation in Table 6 below was the only economically feasible alternative action, however, it did not meet planning screening acceptability criteria due to conflicts with federal and local regulations. It is important to note that federal agencies use different cost-benefit analyses when evaluating potential projects and the USACE used a specific cost-benefit analysis method (2020-2021) that does not consider the full suite of ecosystem services some projects offer (at this time).

Table 6. Snapshot of Flood Resilience Investments (3.2.2.)

Investment	Type				Age	Maintenance	Ownership/ Management	Status & Barriers
	S	NS	NBS	P				
Dry floodproofing of 12 structures, ten of which are multi-family residential apartment buildings, located adjacent to Crabtree Creek in Raleigh, NC		✓			Proposed (2023)		USACE Wilmington District	Conflicts with the Federal Emergency Management Agency National Flood Insurance Program Technical Bulletin 3 dated January 2021 Requirements for the design and certification of Dry Floodproofing Non-Residential and Mixed-Use Buildings (Section 1.3) and City of Raleigh Stormwater Design Manual, dated 22 July 2022, (Chapter 7, Section 7.7)

3.2.2.5 Resources

The following hyperlink, provided as a bullet below, includes the source of the Technical Report, which is housed on USACE's website.

- Neuse River Basin Flood Risk Management North Carolina Technical Report: https://www.saw.usace.army.mil/Portals/59/siteimages/Flood%20risk%20management/NRB/FINAL_Neuse_River_Basin-Technical_Report-02212023_508%20v1_1.pdf?ver=e6vLMewgY2OYkt6n871hrA%3d%3d

3.3 Research Projects and Studies

This section of the Review and Inventory includes four major flood resiliency research projects and studies conducted in the Neuse River Basin covering a wide range of topics and geographical scales. The resources provide recommendations and strategies for flood mitigation and resiliency across several topics including transportation infrastructure, natural infrastructure implementation, the distribution of flood hazard related financial risk, and strengthening coastal communities by support environmental justice through a regional community collaborative science approach.

3.3.1 Flood Abatement Assessment for Neuse River Basin

3.3.1.1 Background

The NC Sea Grant and North Carolina State University (NCSU) Department of Biological and Agricultural Engineering Department, in partnership with NCDOT, conducted the Flood Abatement Assessment for Neuse River Basin in 2020. The study focuses on flooding in the Middle Neuse and Upper Neuse portions the Neuse River Basin (specifically Goldsboro, Smithfield, and Kinston) as it relates to transportation with the purpose of understanding the sources and nature of riverine flooding, testing potential measures to mitigate flooding, improving early warning systems for transportation-related infrastructure, evaluating future storm severity, and identifying potential improvements to local floodplain ordinances. Researchers worked towards these goals by performing hydrologic, hydraulic, and engineering analyses as well as coordinating technical and community outreach meetings focused on flood mitigation.

3.3.1.2 Summary of Flood Resiliency Efforts

Community and stakeholder workshops served as the base of the study's design. At the beginning of the project in April of 2019, the research partnership held three workshops in Smithfield, Goldsboro, and Kinston to accumulate information on community concerns, impacts, and perceived ideas about flooding causes and solution to inform the study's geographic and mitigation focus area. A fourth meeting, held in August of 2019, with federal and state agencies, academic researchers and private consulting firms informed the study's approach to storm and disaster warning, flood modeling, hydraulic infrastructure design, and transportation flood alert systems.

To improve methods of early warning for flood-related transportation impacts, researchers identified spatial gaps in USGS gages that are the only the only available source of real time flood data for early warning systems. The study found many of these gages were in the upper portion of the basin and recommended the installation of two high, ten medium, and six low priority gages in the middle and lower portions of the basin based on critical transportation infrastructure and historical and modeled flood events.

During stakeholder workshops, participants shared concerns over the impact of bridge and road crossing embankments restricting floodplain conveyance areas resulting in an increase in upstream flooding. In response, researchers used hydraulic models to assess the impact ten crossing modifications would have on water surface elevations over several flood return period events. The

models found that for a Hurricane Matthew scale event, increasing bridge spans or elevation combined with a removal of existing floodplain embankments would only decrease river levels by less than a foot, and often less than half a foot, for four of the seven bridges analyzed. Three modeled bridge modifications in Smithfield had a more substantial rise level reduction impact of 1.4 to 2.0 feet.

Stakeholder workshops identified flash flooding in tributaries of the Neuse River that overtop roads and bridges as a major challenge. The study incorporates these concerns though the hydraulic modeling of 78 crossings (culverts and bridges) along eight tributaries of the Neuse River Basin. Researchers found many of the modeled crossings were undersized and vulnerable to overtopping for events much less than a 100-year flood, with 45 crossings overtopping during 10-year events and 17 overtopping during 25-year events. The high expense of replacing all vulnerable crossings led the study to prioritize potential projects as low, medium, or high based on their condition, overtopping vulnerability, road functional class, relative replacement cost, and critical transportation importance. Researchers also used the modeling results to develop an initial framework for regional resilient routes that identify roads with the least chance of flooding that would remain open during extreme events, allowing transportation to critical access points.

University of North Carolina (UNC)-Chapel Hill Department of City and Regional Planning in partnership with NCSU conducted a review of floodplain ordinances in Goldsboro, Smithfield, and Kinston to better understand local impact in comparison to other ordinances in the state and country and develop recommendations for improvement. The review resulted in 13 recommended strategies for improving floodplain ordinances in the municipalities, comparing recommendations based on municipal versus individual investment levels to account for local capacity restraints. These recommendations included the following:

Table 7. Strategies for Improving Floodplain Ordinances in the Neuse River Basin (3.3.1)

		Municipal Investment		
		Low	**Moderate**	**High**
Individual Investment	**Low**	• Improve municipality website design. Flood maps and Flood Ordinances should be easy to locate on a municipality's website so that residents can better understand their own risk. Municipalities can leverage state resources, such as the FIMAN or FRIS webpages, and link to them from their websites.	• Clean up ordinances • Contact individuals in floodplains	• Expand floodplain • City water retention strategies • Develop buyout strategy
	Moderate	• Increase freeboard (an additional amount of height above the Base Flood Elevation used as a factor of safety (e.g., 2 feet above the Base Flood) in determining the level at which a structure's lowest floor must be elevated or floodproofed to be in accordance with state or community floodplain management regulations.)	• Require Dryland Access • Encourage greater participation in the National Flood Insurance Program	• Establish base flood elevation (BFE) for all properties
	High	• Implement a stormwater tax	• Lot-level water retention strategies	• Expand applicability of sections

3.3.1.3 Sources of Flooding Identified

The study characterizes land use conditions in the Neuse River Basin to better understand existing sources of flooding through data and geospatial analyses of spatial land use, subbasin, floodplain development, precipitation, and discharge trends. During the stakeholder workshops, participants voiced concerns over water released from the Falls Lake reservoir that exacerbates downstream flooding. These concerns resulted in a detailed overview of historical flood events, downstream flood stages, flood durations, and long-term annual peak discharges related to waters released from the Falls Lake reservoir. The Neuse River Basin Flood Analysis and Mitigation Strategies Study, previously covered in this report, informed this study by providing details on land use changes and analyses of historical extreme events, precipitation, and discharge records in the Neuse River Basin between 2001-2011. The analysis of Falls Lake found, in contrast to stakeholder concerns, that discharge gage data indicated that the reservoir reduces downstream flooding by retaining and slowly releasing upstream runoff. The study references the NCEM study's findings in the report while expanding on them to include more recent 2016 land use data. The study found that in the portion of Neuse River Basin that drains to Kinston the following occurs:

- Developed area increased from 13.6 percent to 16 percent and forest and agricultural land decreased from 30.7 percent to 29.5 percent between 2001 and 2016
- The upper basin saw higher development growth rates, greater than 25 percent, while the middle basin saw rates between 4-25 percent
- That 75 percent of all developed area in the Neuse River Basin was located upstream of Smithfield with the largest changes in the Swift, Middle, and Crabtree Creek subbasins

- Goldsboro had the greatest increase in floodplain development between 2001-2016 from 22 percent to 25 percent, Kinston increased from 18 percent to 20 percent, and Smithfield only increased from 4 percent to 5 percent
- Six stations in the basin showed no increasing precipitation trends from the early 1900s to 2016 while two stations in Kinston and Greenville showed an increase of approximately 0.05 inches per year.

To better understand changes in future flood events, researchers recalibrated the HEC-HMS model, developed by USACE, to create multiple scenarios for increased development in three southern Wake County sub watersheds (Swift, Middle, and Black Creeks) and precipitation predictions related to climate change scenarios to evaluate future peak flood elevations. The model assumed all currently undeveloped land in the three sub watersheds would be developed and used precipitation predictions from managed (low-carbon) and "business as usual" (high-carbon) climate change scenarios. The scenario results show the following:

- Residential development of all previously undeveloped land in the Swift, Middle, and Black Creek sub watersheds would result in a 6.2 percent increase in the peak discharge of the Neuse at Goldsboro.
- The low/managed carbon scenario resulted in a peak discharge increase of 30-42 percent for a storm event like Hurricane Matthew.
- The two high carbon scenarios resulted in a peak discharge increase of 58-102 percent for a storm event like Hurricane Matthew.
- The two high carbon scenarios indicate that peak discharges for a 100-year storm may be similar to the peak of the current 500-year with the peak discharges of both the 100- and 500-year peak flood elevations increasing by more than 2 feet.

3.3.1.4 Investments in Flood Resilience

The assessment culminated with a set of transportation related flood mitigation recommendations covering structural, non-structural, and planning action categories. Table 8 provides a snapshot of these recommendations while section 5.4.5. of the Appendix contains the full accounting of proposed actions.

Table 8. Snapshot of Flood Resilience Investments (3.3.1.)

Investment	Type				Age	Maintenance	Ownership/ Management	Status & Barriers
	S	NS	NBS	P				
Identify community level and regional resilient transportation routes using a geospatial and systems/network analysis process considering existing infrastructure flood vulnerability; infrastructure upgrade costs and the location of industry, commerce, communities, military bases, and evacuation routes.				✓	2020	-	NC Department of Transportation (NCDOT)	-

Investment	Type				Age	Maintenance	Ownership/ Management	Status & Barriers
	S	NS	NBS	P				
Identify, evaluate, and compare costs of new design standards for all roads, bridges, and culverts along the resilient route corridors.	✓	✓		✓	2020	-	NCDOT	-
Work with NCEM and USGS to install new flow, stage, and rainfall gages in basin with a focus on improving early warning systems and hydrology model validation.		✓		✓	2020	-	NCDOT	-
Develop a pilot project that combines hydrologic modeling with machine learning to predict where road overtopping and washout are at risk of occurring based on predicted rainfall and resulting discharge and flooding.				✓	2020	-	NCDOT	-

3.3.1.5 Resources

The following resources, hyperlinked as bullets below, include the direct source of the Assessment (housed on NCDOT's website), as well as NC Sea Grant's overview webpage for the effort.

- Flood Abatement Assessment for Neuse River Basin: https://connect.ncdot.gov/projects/research/RNAProjDocs/Final%20Report%20RP2018-32.pdf
- Study Web Page: https://ncseagrant.ncsu.edu/program-areas/coastal-hazards/n-c-coastal-rivers-flood-mitigation/

3.3.2 Improving North Carolina's Resilience to Coastal Riverine Flooding

3.3.2.1 Background

A multidisciplinary team of university faculty, staff, and student researchers from NCSU and UNC-Chapel Hill, in partnership with representatives from NC Sea Grant, NC Foundation for Soil and Water Conservation, NC Association of Soil and Water Conservation Districts (SWCDs), US Geological Survey, Environmental Defense Fund, and NC Farm Bureau Federation, conducted a 16-month study to evaluate the potential for natural infrastructure (NI) to mitigate riverine flooding in eastern North Carolina. The Middle Neuse River Basin from Johnston to Lenoir County, an area heavily impacted by recent riverine flooding events from Hurricanes Floyd (1999), Matthew (2016), and Florence (2018), was the focus area of the study. The research team prepared and presented the results and recommendations of the *Improving North Carolina's Resilience to Coastal Riverine Flooding* study to the NC Policy Collaboratory, an organization established in 2016 by the North Carolina General Assembly for the purpose of facilitating the dissemination of the policy and research expertise of the

UNC System and other institutions of higher learning cross the state for practical use by state and local government.

3.3.2.2 Summary of Flood Resiliency Efforts

The study team used seven distinct methods of analysis to develop a comprehensive evaluation of natural infrastructure's potential to mitigation riverine flooding including:

- A literature review and exploration of 18 conservation, restoration, and land management measures
    - The study identifies several key NI measures with the greatest potential to mitigate flooding in the study area including cover crops and no-till; hardpan breakup; agroforestry; wetland restoration; natural stream channel restoration; dry dams and berms; and land drainage controls.
- The resource uses geospatial mapping analyses in combination with hydrologic, hydraulic, and water quality modeling to evaluate three sub watersheds (Little River, Bear Creek, and Nahunta Swamp) and the larger Middle Neuse River Basin. These analyses found:
    - The study assessed three NI measures for their potential implementation (area in acres) in the Middle Neuse River Basin and found 5,157 acres of wetland restoration, 10,530 acres of water farming (the practice of constructing a berm or terrace along the edge of a field with an outlet structure designed to temporarily retain runoff water on a cropland field and slowly release it during and following an extreme rainfall event), and 97,050 acres of reforestation potential. Estimated peak flow, peak discharge, and river water level reductions as well as water quality improvements along the Neuse River and several tributaries resulting from the implementation of the three NI measures
    - Estimated number of structures that would experience less flooding along the Neuse River with a focus on the communities of Kinston and Goldsboro
- Landowner and community outreach focusing on:
    - A focus group workshop of 20 innovative farmers, early program adopters, and landowners in Wayne County to explore the feasibility of NI measures and processes necessary to implement a conservation-based flood mitigation program
    - A detailed survey of more than 50 landowners across six counties within the study area to estimate the costs of leasing and buying land for NI practices
- Economic analyses for establishing identified NI measures including:
    - Property leasing and purchase agreements
    - Economic assessment for the costs of installing and maintaining NI measures, rate of return for NI measures, the breakeven point for landowner's expenses when offering annual payments at a given discount rate, and a comparison of NI measures against landowner's current business as usual practices
    - Costs and spending analysis of wetland and stream restoration
    - The value of structural flooding damage reductions
    - The direct costs (total upfront project costs) and cost per unit volume of water stored of wetland restoration, water-farming, and reforestation measures

- The economic impact (measure of net changes in economic activity because of funding for projects) of the wetland restoration, water farming, and reforestation construction and monitoring-maintenance phases.

3.3.2.3 Sources of Flooding Identified

The study primarily focuses on riverine, rain, and urban & stormwater flooding within the middle of the Neuse River Basin study area. The research team selected three sub watersheds (Little River, Bear Creek, and Nahunta Swamp), which represent the two physiographic regions of the basin (Piedmont and Coastal Plain) for detailed hydrologic modeling. The three sub watershed models estimate peak discharge and total runoff volume for US Soil Conservation Service type two storms at 25-, 50-, 100-, and 500-year return periods. A complete summary table of the modeling results is in Table 51 of the Appendix.

3.3.2.4 Investments in Flood Resilience

The study's detailed and comprehensive analyses culminated into a total estimate of reforestation/agroforestry, water farming, and wetland restoration implementation potential in the middle of the Neuse River Basin study area as well as ten recommendations to improve coastal riverine flooding in eastern North Carolina covering structural, non-structural, nature based, and planning action categories. Table 9 provides a snapshot of NI potential and overall recommendations while a full accounting of the study's recommendations is in section 5.4.6. of the Appendix.

Table 9. Snapshot of Flood Resilience Investments (3.3.2.)

Investment	Type				Age	Maintenance	Ownership/ Management	Status & Barriers
	S	NS	NBS	P				
Reforestation/Agroforestry Potential • **Neuse River Basin: 97,050 ac.** • **Little River: 2,327 ac.** • **Nahunta Swamp: 885 ac.** • **Bear Creek (HUC10): 3,975 ac.**			✓		2021	-	To Be Determined	-
Water Farming Potential • **Neuse River Basin: 10,530 ac.** • **Nahunta Swamp: 2,505 ac.** • **Bear Creek: 1,995 ac.**			✓		2021	-	To Be Determined	-
Wetland Restoration Potential • **Neuse River Basin: 5,157 ac.** • **Little River: 55 ac.** • **Nahunta Swamp: 605 ac.** • **Bear Creek: 798 ac.**			✓		2021	-	To Be Determined	-
Invest in research to develop and monitor a pilot water farming project. The research should focus on evaluating water management systems, storage, and peak flow reductions, impacts to soils and crops and other agricultural management processes, and associated economic factors.			✓	✓	2021	-	To Be Determined	-
Develop a pilot flood mitigation program for a targeted sub watershed with			✓	✓	2021	-	To Be Determined	-

Investment	Type				Age	Maintenance	Ownership/ Management	Status & Barriers
	S	NS	NBS	P				
documented flooding issues. The program would allow the ecological restoration industry to implement flood mitigation projects.								

3.3.2.5 Resources

The following hyperlink, provided as a bullet below, includes the source for the study, which is located on NOAAs website where the full report and executive summary can be downloaded.

- Improving North Carolina's Resilience to Coastal Riverine Flooding: https://repository.library.noaa.gov/view/noaa/49651

3.3.3 Financial Risk of Flood Events in Eastern North Carolina

3.3.3.1 Background

Researchers conducted the Financial Risk of Flood Events in Eastern North Carolina study in 2021 as a part of the NC Flood Resilience Study administered by the NC Policy Collaboratory. The study evaluates the distribution of flood related financial risk across the federal government (through the NFIP), property owners (residential only), mortgage lenders, and local government (county and municipal).

3.3.3.2 Summary of Resiliency Efforts

The study uses Hurricane Florence (2018) as a case study to examine environmental, financial, and built environment systems in the 17 counties that lie within the Neuse River Basin. Researchers used several unique and highly resolved datasets to model financial risk including:

- Financial: parcel level information on property sales, flood insurance policies and claims; census tract level mortgage information.
- Built environment: first-flood elevation; square footage
- Environmental: soil characteristics, heigh above nearest drainage site, and other elements that affect local flood wave routing

The risk modeling effort considered changes in property values, uninsured damages, and equity (outstanding mortgage balances) when determining overall financial risk distribution for the four study groups. The results of the risk modeling show property owners retain a majority of flood related financial risk across the entire Neuse River Basin (in the context of a Hurricane Florence like event) at 43 percent with subsequent groups carrying the remainder including the federal government (25 percent), local governments (23 percent), and mortgage lenders (9 percent). The study also found that Craven ($720.72 million) and Pamlico ($423.53 million) Counties have significantly more total flood related financial risk in comparison to the other nine modeled counties, which have a combined risk total of only $141.7 million . A complete summary of flood risk profiles for modeled counties and the Neuse River Basin are in Table 52 of the Appendix.

3.3.3.3 Sources of Flooding Identified

The study does not directly identify sources of flooding in the Neuse River Basin. However, the document does generally attribute flood related damages to coastal, flash, rain, riverine, and urban and stormwater flooding.

3.3.3.4 Investments in Flood Resilience

Table 10 provides a summary of the study's six primary flood mitigation and resilience recommendations informed by highly resolved information on who holds financial risk. The recommendations cover structural, non-structural, and planning action categories and include two high priority, three medium priority, and one low priority action.

Table 10. Snapshot of Flood Resilience Investments (3.3.3)

Investment/Proposed Action	Type				Age	Maintenance	Ownership/ Management	Status & Barriers
	S	NS	NBS	P				
The state should target communities at risk to encourage insurance uptake through both education and provision of incentives, such as funding to assist property owners in paying National Flood Insurance Program premiums to cover future damages.		✓			2021	-	-	High Priority: 1-2 years
The state should renew efforts to develop pre-disaster mitigation plans via a "portfolio" approach that includes multiple strategies, including infrastructure (e.g., flood control, property elevation), buyouts of at-risk properties, zoning policy and financial instruments (e.g., flood insurance, disaster-based reinsurance).	✓	✓		✓	2021	-	-	High Priority: 1-2 years
A rigorous and detailed assessment of neighborhoods at highest risk of flood-related mortgage default should be conducted to identify which areas and lenders are most threated, and to inform actions designed to mitigate this risk (e.g., property buyouts, lines of credit to vulnerable banks).		✓		✓	2021	-	-	Medium Priority: 3-5 Years
Planning efforts that reduce development in areas most at risk of flooding (e.g., flood plains), which decrease the financial risk of these events, should be pursued at the local, county, and state level.		✓		✓	2021	-	-	Medium Priority: 3-5 Years
The state should increase efforts to identify areas and parties at greatest risk from flooding and set up systems to collect and rapidly disseminate post-flood damage information to inform targeted resiliency efforts.		✓		✓	2021	-	-	Medium Priority: 3-5 Years

Investment/Proposed Action	Type				Age	Maintenance	Ownership/ Management	Status & Barriers
	S	NS	NBS	P				
A comprehensive assessment of statewide flood risk and the attendant financial risk, especially in urban areas and communities in some western parts of the state, would give state agencies a better understanding of risk and improved ability to assess the feasibility of a range of risk management actions. Additionally, greater specificity with respect to who holds flood-related financial risk should be identified to inform preparation and mitigation strategies.				✓	2021	-	-	Low Priority: 5-10 years

3.3.3.5 Resources

The following hyperlink, provided as a bullet below, includes the source for the study, which is housed on the NC Collaboratory's website.

- Financial Risk of Flood Events in Eastern North Carolina: https://collaboratory.unc.edu/wp-content/uploads/sites/476/2021/05/financial-risk-of-flood-events-in-eastern-north-carolina.pdf

3.3.4 Supporting Environmental Justice in Connected Coastal Communities Through a Regional Approach to Collaborative Community Science

3.3.4.1 Background

The Albemarle-Pamlico Estuary system, including portions of the Pasquotank, Chowan, Roanoke, Tar-Pamlico, White Oak, and Neuse River basins, has been impacted by poor water quality that threatens ecosystems and economic activities important to coastal communities. In 2021, the National Science Foundation awarded a grant to East Carolina University (ECU) in partnership with NC Central University, and other research institutions to conduct this project over five years with the purpose of strengthening coastal resilience in communities along the Albemarle-Pamlico Estuary system of coastal North Carolina.

3.3.4.2 Summary of Resiliency Efforts

The project partnership's ongoing efforts include the creation of a research hub to investigate how the co-production of scientific knowledge, between community members, regional stakeholders, and academic researchers contributes to our understanding of socioenvironmental drivers that impact coastal hazard resilience. A key goal of the project is to create a Hub that serves as the central coordinating unit to catalyze connections within the community, coordinate internships (high school and college students) embedded with partners and communicate with community stakeholders. Relationships built through the Hub will help facilitate the integration a broad coalition of academic, community, non-governmental organizations, and local/state government stakeholders to develop mitigation strategies and understand tradeoffs in adaptation and management plans. This research will inform the adoption of solutions to coastal hazard impacts, particularly for marginalized populations that are disproportionately affected by poor water quality, hurricanes, floods, droughts, and sea level rise.

3.3.4.3 Sources of Flooding Identified

While the projects efforts have not been directly published as of August 2023, the project's abstract indicates the regional effort will address coastal, rainfall, and riverine flooding sources including hurricanes and sea level rise.

3.3.4.4 Investments in Flood Resilience

The five-year, collaborative, and transdisciplinary project includes four primary objectives to address regional scale coastal resilience that fall into non-structural and planning action categories including:

- Mapping key natural, built, and socioeconomic resources and interdependencies that define the regional socio-engineered- environmental system
- Understanding how coastal hazards enhance vulnerabilities in the region
- Identifying opportunities for locally appropriate adaptation and mitigation strategies to build community and regional resilience
- Establishing a Coastal Environmental Justice Institute as a long-term mechanism to promote and support collaboration among stakeholder groups from diverse communities throughout the region and beyond

3.3.4.5 Resources

The following hyperlinks, provided as bullets below, include ECU's project overview and an ECU news article that includes interviews with project leads, as well as the project award page housed on the National Science Foundation's website. As the project is still ongoing, a full report on the progress and results of the effort is not available.

- National Science Foundation - https://www.nsf.gov/awardsearch/showAward?AWD_ID=2052889&HistoricalAwards=false#:~:text=Our%20team%20of%20academic%20researchers%20takes%20a%20transdisciplinary,from%20diverse%20communities%20throughout%20the%20region%20and%20beyond.
- Project Overview: https://scholars.ecu.edu/display/G236769962
- ECU News Article: https://news.ecu.edu/2021/10/13/building-resiliency/

3.4 Programs

3.4.1 North Carolina Floodplain Mapping Program

3.4.1.1 Background

Hurricane Floyd, which caused widespread damage across eastern North Carolina in 1999, highlighted the need for accurate, up-to-date flood related data and mapping to better address the state's vulnerabilities. In response, FEMA designated North Carolina as a Cooperating Technical State in conjunction with the federal flood map modernization program in 2000. The state government created the North Carolina Floodplain Mapping Program (NCFMP) to fulfill its' responsibility as a Cooperating Technical State. Administered by NCEM, NCFMP updates North Carolina's flood hazard data and creates studies and maps to identify areas of the state at risk of flooding.

3.4.1.2 Summary of Flood Resiliency Efforts

The NCFMP provides services to the entirety of North Carolina including a wealth of Neuse River Basin specific information. The program administers five key programs including the…

- Flood Inundation Mapping and Alert Network (FIMAN)
    - FIMAN provides rain and stage gage data on stream elevation, rainfall, and weather parameters from over 550 gages across the state that provide real-time alerts to support risk-based decisions regarding flooding. The website also provides flood inundation and risk maps for selected sites and across entire river basins with impacts to buildings, roads, and infrastructure identified by water depth in each building and estimated damage costs.
- NC Flood Inundation Mapping and Alert Network for Transportation (FIMAN-T)
    - Like FIMAN, FIMAN-T provides real time and forecasted, where available, flooding impacts to roads, bridges and other NCDOT assets in support of risk-based decision-making during flood events. FIMAN-T uses real-time, 3D inundation mapping coupled with LiDAR derived roadway elevation layers to estimate flooding depths over roadways for current, modeled, and forecasted conditions. The tool also includes stream elevation, an interactive stage hydrograph, forecasted peak flow, summary tables of impacted roads, bridge hydraulic performance, and bridge freeboard status.
- NC Digital Flood Risk Information System (DFRIS)
    - A web-based mapping and data portal that provides digital flood insurance rate maps that are composites of base data, topographic data, and flood layers that can be viewed in combination with local parcel information or other data to more easily determine if a house or other property is, or will be, located in a Special Flood Hazard Area (SFHA) or floodway. Information accessible through this resource includes geospatial base map data, imagery, light detecting and ranging (LiDAR) data, along with hydraulic and hydrologic models that is available for download and use.
- NC Coordinated Needs Management Strategy (NCCNMS)
    - The NCCNMS allows communities to see areas the State is currently studying and will study in the future as well as base level engineering analyses that are outside of the regulatory flood hazard area and are no longer considered unmapped by FEMA's Coordinated Needs Management Strategy protocols. The tool allows communities to make future flood study update requests or needs as a point or area through the website and access an inventory of stream centerlines and associated verification status.
- Advisory Flood Program
    - NCFMP's Advisory Flood Data Website provides flood mapping visualizations and flood risk analyses in non-regulated Advisory Flood areas where these products were previously unavailable. The web viewer offers flood hazard information, risk assessments, and mitigation strategies as a tool to help create more resilient communities and reduce future losses due to flooding. In addition, the program identifies and communicates areas of mitigation interests' data as a part of a study wide "hot spot" grid to pinpoint areas of concentrated Advisory Flood risk and potential locations for future mitigation actions.

3.4.1.3 Sources of Flooding Identified

As a comprehensive database and webtool for the entire State of North Carolina, NCFMP identifies and evaluates all flood source categories considered in this report. Neuse specific sources of flooding are accessible through the program links listed in Section 3.4.1.5, Resources below.

3.4.1.4 Investments in Flood Resilience

Table 11 covers the five primary services NCFMP provides to the State of North Carolina, covering non-structural and planning related action categories.

Table 11. Flood Resilience Investments (3.4.1.)

Investment	Type				Age	Maintenance	Ownership/ Management	Status & Barriers
	S	NS	NBS	P				
Flood Inundation Mapping and Alert Network (FIMAN)		✓		✓	FIMAN v1.0 – 2003 FIMAN v2.0 - 2016	Ongoing	NC Floodplain Mapping Program (NCFMP)	Ongoing
NC Flood Inundation Mapping and Alert Network for Transportation (FIMAN-T)		✓		✓	2020	Ongoing	NC Department of Transportation (NCDOT); NCFMP	Ongoing
NC Digital Flood Risk Information System (DFRIS)		✓		✓	2012	Ongoing	NCFMP	Ongoing
NC Coordinated Needs Management Strategy (NCCNMS)		✓		✓	1994	Ongoing	NCFMP	Ongoing
Advisory Flood Program		✓		✓	-	Ongoing	NCFMP	Ongoing

3.4.1.5 Resources

The following hyperlinks, provided as bullets below, include the NCFMP's main webpage as well as individual links to each of the program's individual products and efforts covered in this section.

- NC Floodplain Mapping Program (Main Webpage): https://flood.nc.gov/ncflood/
- FIMAN: https://fiman.nc.gov/
- FIMAN-T: https://fimant.nc.gov/About.aspx#:~:text=In%202020%2C%20NCDOT%20and%20NCEM%20partnered%20to%20develop,in%20support%20of%20risk-based%20decision-making%20during%20flooding%20events.
- DFRIS: https://fris.nc.gov/fris/Home.aspx?ST=NC
- NCCNMS: https://flood.nc.gov/nccnms/
- Advisory Flood Program: https://flood.nc.gov/AdvisoryFlood/Home/Index

3.4.2 Natural Infrastructure Flood Mitigation Program

3.4.2.1 Background

In 2020, the NC General Assembly created the Natural Infrastructure Flood Mitigation Program (NIFMP) within the NC Division of Mitigation Services (NCDMS), incorporating flood storage capacity enhancement projects into the division's activities. The 2021 Appropriations Act further supported this mission by setting aside $3.5 million to create pilot projects addressing chronic flooding in the Stoney Creek watershed. NCDMS also received funding through the NC Office of Recovery and Resilience from HUD's CDBG for program development.

3.4.2.2 Summary of Flood Resiliency Efforts

The Stoney Creek pilot project will target flooding which impacts businesses, roadways, and access to emergency services in Wayne County and Goldsboro. The pilot project, and the Natural Infrastructure Program at large, seek to mitigate flooding using natural infrastructure, constructed systems which mimic natural processes. These systems can include strategies like building wetlands and restoring streams which help store water and reduce flooding. The Stoney Creek pilot program will also serve as the basis for expanding natural infrastructure flood mitigation projects to additional watersheds. Lessons learned through the Stoney Creek pilot project will help develop scaling solutions to enhance community flood resilience across North Carolina.

3.4.2.3 Sources of Flooding Identified

The NIFMP pilot project addresses chronic flash, rain, riverine, and urban and stormwater related flooding within the Stoney Creek watershed, a sub watershed of the Neuse River Basin, encompassing a significant portion of the City of Goldsboro in Wayne County, NC.

3.4.2.4 Investments in Flood Resilience

Table 12 includes the NIFMP's pilot project that is currently underway. The pilot project covers structural and nature-based action categories.

Table 12. Flood Resilience Investments (3.4.2.)

Investment	Type				Age	Maintenance	Ownership/ Management	Status & Barriers
	S	NS	NBS	P				
Stoney Creek Pilot Project: will target flooding which impacts businesses, roadways, and access to emergency services in Wayne County and Goldsboro. These systems can include strategies like building wetlands and restoring streams and floodplains which help store water and attenuate flooding.	✓		✓		2023	-	NC Division of Mitigation Services (NCDMS)	December 2022 - NCDMS executes a contract, awarded to Ecosystem Planning & Restoration, LLC for project. Work is ongoing.

3.4.2.5 Resources

The following hyperlinks, provided as bullets below, include NCDMS's main webpage for the NIFMP, the award announcement from the private contractor working with NCDMS on the Stoney Creek Pilot

Project, and an overview article of Stoney Creek published the NC Coastal Federation's that provides context to the selection of the pilot project.

- NCDMS Natural Infrastructure Flood Mitigation Program: https://www.deq.nc.gov/about/divisions/mitigation-services/natural-infrastructure-program#:~:text=In%202020%2C%20the%20NC%20General%20Assembly%20created%20the,storage%20capacity%20enhancement%20projects%20into%20the%20division%27s%20activities.
- Ecosystem Planning & Restoration Project Announcement: https://www.eprusa.net/articles/epr-team-awarded-pivotal-project-implementing-natural-infrastructure-flood-mitigation-in-north-carolina/
- NC Coastal Federation Stoney Creek Project Overview: https://coastalreview.org/2021/06/flood-resilience-study-reveals-solutions-big-challenges/

3.4.3 Triangle J Council of Government Water Resources Program

3.4.3.1 Background

The Central Pines Regional Council (CPRC), which was previously named the Triangle J Council of Government, administers a regional water resource program for portions of the Neuse and Cape Fear River Basins. The program facilitates intergovernmental partnerships across jurisdictional lines and provides technical assistance to sustainably manage water supply and water quality through watershed planning and stormwater infrastructure mapping, management, and education.

3.4.3.2 Summary of Flood Resiliency Efforts

CPRC's Water Resources Program works through three primary efforts including the Water Infrastructure and Watershed Protection Programs as well as the Jordan Lake One Water Coalition. The Water Infrastructure effort is led by CPRC, in partnership with NCDEQ, the UNC Environmental Finance Center, and other stakeholders with the purpose of working with communities to assess current infrastructure, examine and assess potential regionalization of opportunities, and recommend next steps.

The Watershed Protection Program is administered by CPRC in collaboration with the cities of Raleigh and Durham, and local land trusts including the Eno River Association, the Ellerbe Creek Watershed Association, the Tar River Land Conservancy, and the Triangle Land Conservancy. The program evaluates and funds high priority watershed protection projects that protect source waters.

The Jordan Lake One Water (JLOW) Coalition, which recently became a nonprofit in 2022, is a regional effort led by a variety of stakeholders including local governments, conservation groups, universities, water utilities, agriculture, state agencies, and private industry stakeholders that is working to produce and implement integrated watershed management recommendations for the Jordan Lake Watershed. While the primary objective of these efforts is to restore water quality and address water supply challenges in the watershed, the planning efforts incorporate and intersect aspects of flood mitigation to ensure a wholistic approach is taken.

3.4.3.3 Sources of Flooding Identified

CPRC's Water Resources Program identifies and addresses several sources of flooding through the three efforts detailed in the previous section including flash, riverine, rain, urban and stormwater, and agricultural flooding.

3.4.3.4 Investments in Flood Resilience

Recent efforts led by CPRC include a Stormwater Infrastructure Mapping and Assessment Project for Siler City (2019-2020), a Wastewater Merger & Regionalization Feasibility Study in Johnston County (2019), and the Jordan Lake One Water Vision and Recommendations Document (2017-present) (see Table 13). The Siler City Stormwater Infrastructure project (2019-2020) helped the town and the NCDOT staff locate, manage, and maintain stormwater infrastructure and prioritize maintenance to help alleviate flooding concerns and improve water quality. Both a town-owned and NCDOT-owned streets "Lookbook" were created to identify highest-priority stormwater infrastructure maintenance needs in the city. A final report was also published that includes a comprehensive overview of the methods used in and results of the efforts as well as lessons learned and next steps. In early 2019, CPRC worked with the towns of towns of Kenly, Micro, Pine Level, Princeton, Selma, and Smithfield, and Johnston County to study potential collaboration opportunities among wastewater utility system. This effort was undertaken in response to recent flooding caused by Hurricane Florence and Matthew that resulted in overburdened and damaged wastewater facilities in Johnston County. The project is assessing feasible options to expand the capacity of these systems while making them more resilient to future flood events. Recent efforts by the JLOW have resulted in several key investments including a Strategic Conservation Strategy (2018-2019) and a unified vision for the Watershed (2021). The conservation strategy was incorporated into the Coalition's geographic information system (GIS) based Watershed Protection Model that spatially identifies prioritized locations to invest in land conservation. The watershed vision resulted in two primary recommendations including the formation of a Transitional JLOW Organization as a nonprofit and to co-develop a framework for collaboration between the Coalition and NCDEQ to address regulatory concerns, including nutrient requirements.

Table 13. Flood Resilience Investments (3.4.3.)

Investment	Type				Age	Maintenance	Ownership/ Management	Status & Barriers
	S	NS	NBS	P				
Jordan Lake One Water		✓	✓	✓	2017-Present		Jordan Lake One Water Coalition	The vision's first goal of becoming a registered nonprofit was reached in July of 2022.
Siler City Stormwater Infrastructure Mapping and Assessment Project		✓		✓	2019-2020		Siler City, NC Department of Transportation, CPRC	Lookbooks and Final Report published in 2020
Wastewater Merger & Regionalization Feasibility Study – Johnston County	✓			✓	2019		CPRC, UNC Environmental Finance Center, Towns of Kenly, Micro, Pine Level, Princeton, Selma, Smithfield, and Johnston County	Funded through the NC Department of Environmental Quality's (NCDEQ's) Merger/Regionalization Feasibility Grant

3.4.3.5 Resources

The following hyperlinks, provided as bullets below, include the sources to each program and document described in the previous sections, all of which are housed on Central Pines COG website.

- Central Pines COG Water Resources Program Website: https://www.centralpinesnc.gov/environment-resilience/water-resource-management
- Jordan Lake One Water Vision and Recommendations Document: https://www.centralpinesnc.gov/sites/default/files/uploads/jlowonewatervisionfinalsept2021.pdf
- Wastewater Merger & Regionalization Feasibility Study – Johnston County: https://www.centralpinesnc.gov/news/wastewater-merger-regionalization-feasibility-awarded-eastern-johnston-county-communities
- Siler City Stormwater Infrastructure Lookbook: Town-Owned Streets: https://www.centralpinesnc.gov/sites/default/files/uploads/lookbooktownonly.pdf
- Siler City Stormwater Infrastructure: NCDOT-Owned Streets: https://www.centralpinesnc.gov/sites/default/files/uploads/lookbookstateonly.pdf
- Final Report: Siler City Stormwater Infrastructure Mapping and Assessment Project: https://www.centralpinesnc.gov/sites/default/files/uploads/silerreport_fortown.pdf

3.4.4 Resilient Coastal Communities Program

3.4.4.1 Background

The NCDEQ's Division of Coastal Management in partnership with NCORR administer the Resilient Coastal Communities Program (RCCP) with the goal of providing technical and financial assistance to advance coastal resilience efforts in 20 North Carolina counties. The program addresses barriers such as economic and capacity constraints that limit communities' abilities to develop coastal resilience by providing both a planning framework and funding source for eligible and prioritized projects.

3.4.4.2 Summary of Flood Resiliency Efforts

RCCP facilitates a community-driven process for setting coastal resilience goals, assessing existing and needed local capacity, and identifying and prioritizing "shovel ready" projects. Communities in all 20 eligible coastal counties can apply for direct technical assistance to complete a process like the Regional Resilience Portfolio process detailed in section 3.1.2. of this report. This process includes four primary phases including:

1. Community engagement process and risk vulnerability assessment
2. Planning, project selection, and prioritization
3. Engineering and design
4. Implementation.

Phases 1 and 2 were completed between 2020-2022 while phase 3 (engineering and design) was completed in 2023. Phase 4 (implementation) began in 2023 and is currently ongoing. Participating communities follow a step-by-step planning guide created by RCCP called the "North Carolina Resilient Coastal Communities Program Planning" that provides information on program requirements, existing data, tools, and resources to help communities through the process to ultimately obtain funding.

3.4.4.3 Sources of Flooding Identified

Sources of flooding identified include coastal, flash, rainfall, riverine, and urban & stormwater flooding.

3.4.4.4 Investments in Flood Resilience

While the RCCP program extends beyond the borders of the Neuse River Basin, participating communities located in the basin and their prioritized/funded projects can be found in Table 14 below. These projects are currently in the engineering and design phase and are expected to begin implementation between 2023-2024.

Table 14. Flood Resilience Investments (3.4.4.)

Investment	Type				Age	Maintenance	Ownership/ Management	Status & Barriers
	S	NS	NBS	P				
Phase 1-2 - Craven County: Resilience Strategy				✓	2022	-	County and NC Division of Coastal Management (NCDCM)	Document Complete
Phase 1-2 - Pamlico County: Resilience Strategy				✓	2022	-	County and NCDCM	Document Complete
Phase 1-2 - Vandemere: Resilience Strategy				✓	2022	-	Town and NCDCM	Document Complete
Phase 3 - Craven County: Living Shoreline Prioritization and Engineering Design	✓		✓	✓	2023	-	County and NCDCM	Ongoing
Phase 3 - New Bern: Duffyfield Community Resilience Improvement-Basin Restoration and Enhancement	✓		✓	✓	2023	-	City and NCDCM	Complete
Phase 3 - Vandemere: Improving Stormwater Culverts and Drainage	✓			✓	2023	-	Town and NCDCM	Ongoing
Phase 4 – New Bern: Duffyfield Community Resilience-Rose Street Basin Restoration	✓		✓		2023-2024	-	City and NCDCM	Ongoing

3.4.4.5 Resources

The following hyperlinks, provided as bullets below, include a link to main RCCP website as well as three county specific resilience strategies geographically relevant to the Neuse River Basin, as well as a link to the City of New Bern's public engagement website for the Duffyfield Community Resilience Improvement Project.

- NC Resilient Coastal Communities Program Website: https://www.deq.nc.gov/about/divisions/coastal-management/coastal-adaptation-and-resiliency/nc-resilient-coastal-communities-program#Phase3Awards2022-2023-11442

- Craven County Resilience Strategy: https://www.deq.nc.gov/craven-county-resilience-strategypdf/open
- Pamlico County Resilience Strategy: https://www.deq.nc.gov/pamlico-county-resilience-strategypdf/open
- Vandemere Resilience Strategy: https://www.deq.nc.gov/vandemere-resilience-strategypdf/open
- New Bern Duffyfield Community Resilience Improvement Website: https://www.publicinput.com/project/?id=76312#:~:text=The%20City%20of%20New%20Bern%20is%20launching%20a,Hazard%20Mitigation%20Plan%20that%20was%20adopted%20last%20year.

3.5 Barriers to Implementation

Identifying and evaluating barriers to implementing flood resiliency in the Neuse River Basin is a critical component of formulating a flood mitigation strategy with the most effective and efficient actions. Staying within the scope of this expanded literature review, the following section evaluates barriers to implementation through the lens of capability self-assessments conducted during the hazard mitigation process that every county within the Neuse River Basin participates in. These assessments consider a variety of factors including current regional and local resilience staffing levels and resources as well as relative levels and types of expertise.

3.5.1 Capability Assessments: Regional Hazard Mitigation Plans

Capability self-assessments are a critical component of the regional hazard mitigation planning process. The assessments help regional, county, and local jurisdictions understand their ability to implement a comprehensive mitigation action strategy as well as identify barriers to implementation. The results assist jurisdictions in forming a mitigation plan with feasible actions within their own context, increasing the likelihood of implementation over time. Identifying existing and potential barriers to implementation encourages participants to prioritize resource allocations to areas of weakness and further develop their capabilities for the next regional HMP update. Like HMP participants, NC Flood Resiliency Blueprint will benefit from an evaluation of the Neuse River Basin's capacity to implement flood mitigation actions by incorporating the following findings into the Neuse Action Strategy. There are seven regional HMPs encompassing 17 counties and 83 towns and cities relevant (i.e., within or significantly intersecting) to the Neuse River Basin that incorporated capability self-assessments. The capability assessments conducted during the planning processes provide a comprehensive evaluation of the basin's capacity to implement flood related mitigation actions at the regional, county, and local level.

Assessments had two main components 1) an inventory of a jurisdiction's relevant and existing plans, ordinances, and programs and 2) a self-administered implementation capacity analysis by all participating planning committee representatives. There were six capability categories analyzed during this process including planning/regulatory, administrative/technical, fiscal, education and outreach, mitigation, and political. Participants responded to several prompts within each category and indicated whether their jurisdiction had existing, developing or no capacity/resources for a given capability indicator. A scoring system assigned points to responses based on their relevance to hazard mitigation as well as jurisdictions self-assessments of their own capabilities. Regional, county, local governments received a total score and an overall capability rating of "high," "moderate," or "low."

Table 15 below highlights the overall capability rating (high = green, moderate = yellow, low = red) for HMP regions and subsequent counties that are within or significantly intersect the Neuse River Basin (regardless of contrasting regional groupings for hazard mitigation plans). A table detailing the overall capability rating for individual towns and cities within or intersecting the Neuse River Basin is located Table 17 of the Appendix. The two capability tables exclude counties, cities, and towns found to be in a different river basin. There is an even split among highly (eight counties) and moderately (eight) capable counties in the Neuse. The one outlier that received a low rating is Wayne County in the Neuse HMP region. Out of the 76 Neuse relevant cities and towns covered in regional HMPs 39 percent received a "low" overall capability rating, 47 percent received a "moderate" rating, and only 13 percent received "high."

Table 15. Regional and County Overall Capability (3.5.1)

Region	County	Overall Capability
Cape Fear	Johnston	High
Eno - Haw	Durham	High
	Orange	High
	Person	Moderate
Neuse	Greene	Moderate
	Jones	Moderate
	Lenoir	Moderate
	Pitt	High
	Wayne	Low
N.E.W.	Nash	Moderate
	Wilson	High
Pamlico Sound	Carteret	High
	Craven	Moderate
	Pamlico	Moderate
Tar River	Franklin	High
	Granville	High
Wake County	Wake	Moderate

4 Concluding Remarks

AECOM provided the first draft of this Neuse River Basin literature review expansion in August 2023. This living document may be updated as reports, plans, studies, and other relevant resources are published and with input from the TAGs. The next section includes an index with links to all resources reviewed in the literature review and a subsequent Appendix with more adjacent resources for awareness and reference.

The Neuse River Basin literature review expansion provides a robust inventory of existing and proposed flood mitigation and resilience efforts from 32 of the most current, basin-specific, and credible sources. The results of these efforts reveal several key gaps in our current understanding concerning completed and ongoing efforts in the Neuse River Basin that future Blueprint tasks should consider.

- While many resources provide an estimated project timeline for planned and recommended actions, very few resources receive updates on a regular basis if at all. The lack of updated resources leaves the implementation status of many resilience efforts unknown within the basin.
- Like implementation status, the reviewed resources provide some estimated maintenance costs for planned and recommended actions but little to no information on future maintenance needs.
- Some resources, specifically Hurricane Matthew Resilient Redevelopment Plans and most research projects, studies, technical reports, and memos, provide only generalized ownership/management information for existing and proposed efforts (e.g., county and NCDOT). This may complicate any future efforts to confirm action and recommendation statuses or collect other relevant project information.

5 Appendix

The sources included in the Neuse River Basin Literature Review Expansion met the resource inclusion criteria and were reviewed to focus efforts on Neuse River Basin resources of highest applicability, relevance, ease of use, and foundational nature to NC Flood Resiliency Blueprint. However, there are other resources that may be valuable for awareness and reference.

This appendix displays more adjacent resources (organized in analogous categories, with the addition of "webpages" that may hold a collection of other nested materials, tools, studies, etc.).

5.1 Adjacent Resources

Table 16 Literature Review Adjacent Resources (5.1)

Title and Link	Year	Lead Agency	Notes (if applicable)
Plans and Strategies			
Upper Neuse Conservation Action Strategy 2015-2045 https://issuu.com/rebeccahankins/docs/2015-2045_conservation_strategy#:~:text=The%20Upper%20Neuse%20Clean%20Water%20Initiative%202015-2045%20Conservation,the%20Upper%20Neuse%20watershed%20in%20central%20North%20Carolina	2015	Conservation Trust for North Carolina; Ellerbe Creek Watershed Association; Eno River Association; Tar River Land Conservancy; Triangle Greenways Council; Triangle Land Conservancy; The Conservation Fund	Provides a framework for protecting drinking water supply resources through land protection, which is one key element of a comprehensive strategy of green and gray infrastructure investments that can help ensure clean water for the communities that receive drinking water from the Upper Neuse watershed in central North Carolina.
Walnut Creek Watershed Action Plan https://www.arcgis.com/apps/MapSeries/index.html?appid=6f81e3b1ed114d9c91c91e0bf379cbeb	2020	NC Water Resources Research Institute; Partners for Environmental Justice; and Walnut Creek Wetlands Community Partnership	An online watershed plan tool that helps in identifying and prioritizing areas for improvement projects, developing implementation plans and tracking water resource improvements across the entire Walnut Creek Watershed. The Action Plan goals are to reduce flows in Walnut Creek and restore stream health, while addressing social and economic goals. Improvement efforts are concentrated into focus areas, small sections within the watershed that contribute to the overall health of Walnut Creek.
Black Creek Watershed Management Plan https://www.deq.nc.gov/water-quality/planning/npu/319/watershedmgtplans-9element/black-creek-watershed-final-report-ew06065/download	2009	N.C. State University	The Black Creek watershed planning initiative was intended as a highly visible effort that could serve as a model for restoring other urbanized watersheds in the Town of Cary and the Triangle area. The goals of the project are to (1) work with the community to cultivate a vision for the watershed, and then collaboratively develop community supported recommendations (2) provide a watershed management and restoration plan that makes recommendations for BMP implementation, community education, and evaluation of the success of plan implementation (3) conduct a watershed assessment and implement a monitoring program that will more specifically determine the causes and sources of Black Creek's

Title and Link	Year	Lead Agency	Notes (if applicable)
			impairment; and (4) develop a demonstration model of cutting edge, robust technology for watershed assessment, monitoring, stressor amelioration assessment, and geodatabase implementation.
Eno River 9-Element Plan Checklist https://www.deq.nc.gov/water-quality/planning/npu/319/watershedmgtplans-9element/eno-9-element-checklist/download	2016	Upper Neuse River Basin Association, Triangle J COG (now Central Pines Regional Council), Tetratech, U.S. Environmental Protection Agency, N.C. Division of Water Resources, N.C. Division of Mitigation Services, Piedmont Triad Regional Council, and the N.C. Division of Energy, Mineral, and Land Resources	-
Knap of Reeds Watershed 9-Element Plan Checklist https://www.deq.nc.gov/water-quality/planning/npu/319/watershedmgtplans-9element/knap-reeds-9-element-checklist/download	2016	Upper Neuse River Basin Association, Triangle J COG (now Central Pines Regional Council), Tetratech, U.S. Environmental Protection Agency, N.C. Division of Water Resources, N.C. Division of Mitigation Services, Piedmont Triad Regional Council, and the N.C. Division of Energy, Mineral, and Land Resources	-
Lick Creek Watershed Restoration Plan https://www.deq.nc.gov/water-quality/planning/npu/319/watershedmgtplans-9element/lick-crk-final-wrp-ew07026-neubsn/download	2009	City of Durham and the Upper Neuse River Basin Association	The Lick Creek Watershed Restoration Plan encompasses a suite of activities aimed at addressing the impairment of Lick Creek by improving water quality and habitat conditions. The Goals of this plan were to (1) Develop a hypothesis about the causes of impairment in Lick Creek and recommend approaches to address impairment status (2) Identify pollutants and their sources that may be impairing aquatic habitat and water quality in Lick Creek (water quality is not impaired currently). Suspected pollutants include dissolved oxygen and biochemical oxygen demand), fecal coliform bacteria, and turbidity (3) Develop strategies for reducing, and maintaining at levels meeting water quality standards, the pollutants identified in Goal two and (4) Mitigate future changes to watershed hydrology and water quality.

Title and Link	Year	Lead Agency	Notes (if applicable)
Upper Barton Creek Watershed 9-Element Plan Checklist https://www.deq.nc.gov/water-quality/planning/npu/319/watershedmgtplans-9element/upper-barton-9-element-checklist/download	2016	Upper Neuse River Basin Association, Triangle J COG (now Central Pines Regional Council), Tetratech, U.S. Environmental Protection Agency, N.C. Division of Water Resources, N.C. Division of Mitigation Services, Piedmont Triad Regional Council, and the N.C. Division of Energy, Mineral, and Land Resources	-
Upper Swift Creek Watershed 9-Element Plan Checklist https://www.deq.nc.gov/water-quality/planning/npu/319/watershedmgtplans-9element/9elementchecklist-tjcog-submittal-upperswift-26feb2015/download	2015	Triangle J COG (now Central Pines Regional Council)	-
Little Lick Creek Watershed Improvement Plan https://www.deq.nc.gov/water-quality/planning/npu/319/watershedmgtplans-9element/little-lick-cr-watershed-assessment-report/download	2015	City of Durham	The purpose of the plan is to protect and improve the water quality of streams, ponds, and small lakes in the city's watersheds and to comply with water quality regulations instituted by the State of North Carolina and the Federal Clean Water Act to improve and protect the rivers and water supply reservoirs to which they flow.
Smith Creek Watershed Restoration Plan (Wake and Franklin Counties) https://www.deq.nc.gov/water-quality/planning/npu/319/watershedmgtplans-9element/smith-creek-wake-forest/download	2015	Town of Wake Forest	The plan's purpose is to provide a foundation for addressing non-point source pollution sources in the Smith Creek Watershed, to provide the community and Town staff with recommendations of how to monitor the progress of impairments over time and to provide information for implementing the restoration and monitoring efforts.
Upper Middle Creek Watershed Action Plan https://www.deq.nc.gov/water-resources/planning-section/nonpoint/319-upper-middle-creek-watershed-action-plan/download?attachment	2022	Wake Soil and Water Conservation District and local governments	The overall goal of this document is to identify pollution sources which have degraded water quality and watershed habitat resulting in benthic community declines and provide a roadmap for project partners and other stakeholders to improve conditions, with the ultimate result of "impaired" stream segments removal from the impaired water list
Ellerbe Creek Watershed management Improvement Plan https://edocs.deq.nc.gov/WaterResources/DocView.aspx?dbid=0&id=2409971&cr=1	2010	City of Durham	The city launched the Ellerbe Creek Watershed Management Improvement Plan at the end of 2007 to proactively address changes the city is making to comply with water quality regulations, to improve the health of the Ellerbe Creek, and create value for neighborhoods in the watershed.
Hominy Swamp Restoration Plan	2018	City of Wilson	The plan's purpose is to identify and select pollution control strategies to deliver progress towards reducing

Title and Link	Year	Lead Agency	Notes (if applicable)
https://edocs.deq.nc.gov/WaterResources/DocView.aspx?dbid=0&id=2409994			sources of pollution, managing runoff in a way to treat pollution prior to entering the water body, and improving the resiliency of the riparian corridor and watershed landscape in mitigating the effects of pollution.
Neuse 01 Regional Watershed Plan Phase II https://files.nc.gov/ncdeq/Mitigation%20Services/Watershed_Planning/Neuse_River_Basin/Neuse01_RWP/Final%20NS01%20Phase%20II%20Report%20To%20Post.pdf	2015	NC Division of Mitigation Services (NCDMS)	The Regional Watershed Plan (RWP) effort provides project implementation recommendations, including various types of projects prioritized for implementation. DMS worked with the Interagency Review Team to examine and prescribe both traditional and non-tradition mitigation project opportunities (Nutrient offset; stream, wetland, and riparian buffer restoration, enhancement, reestablishment, and preservation) within the RWP, thus maximizing ecological uplift to the region's water quality, hydrology, and habitat.
Seven Springs Recovery Plan https://coastalresiliencecenter.unc.edu/wp-content/uploads/sites/845/2018/12/Seven-Springs-Recovery-Plan-1.pdf	2018	Town of Seven Springs, UNC-Chapel Hill, and NC State University (NCSU)	This plan is focused on the steps needed to facilitate the recovery from Hurricane Matthew. Proposed actions fall into infrastructure, public facilities, housing, environment, land use, administration and finance, and economic development categories.
Pollocksville Community Floodprint https://static1.squarespace.com/static/5ae3403b5ffd20f29c3730d4/t/614347f7df9f560ffced275f/1631799295403/Pollocksville+Floodprint_Final_SPREADS_web_compressed.pdf	2021	Town of Pollocksville and NCSU	The Floodprint was created in response to flooding caused by Hurricane Florence and acts as an integrated portfolio of proposed resilience projects including dry proofing of structures, structural elevations, voluntary buyouts, and open space conversion
Triangle Land Conservancy Strategic Action Plan 2018-2025 https://triangleland.org/about/annual-report	2018	Triangle Land Conservancy	The plan sets a land conservation goal of 7.000 acres by 2025 and increased community engagement, with a focus on safeguarding clean drinking water.
Research Projects and Studies			
Estimating Changes in Peak Flow and Associated Reductions in Flooding Resulting from Implementing Natural Infrastructure in the Neuse River Basin, North Carolina, USA https://www.mdpi.com/2073-4441/14/9/1479	2022	NCSU's Dept. of Biological and Agricultural Engineering, College of Design, and NC Sea Grant	-
A Framework for Planning and Evaluating the Role of Urban Stream Restoration for Improving Transportation Resilience to Extreme Rainfall Events https://www.mdpi.com/2073-4441/12/6/1620/htm	2020	NCSU's Dept. of Biological and Agricultural Engineering and NC Sea Grant	Proposes a framework for systematically evaluating stream restoration in combination with engineered improvements to culvert and bridge crossings to identify and optimize options for mitigating extreme events in urban areas (Goldsboro, NC Case Study)
Evaluating Nature Based Solutions for Mitigating Riverine Flooding in Eastern North Carolina (Video Seminar)	2022	NCSU's Center for Marine Sciences & Technology and Coastal Resilience	-

Title and Link	Year	Lead Agency	Notes (if applicable)
https://www.youtube.com/watch?v=fNUqYmwEHcQ		and Sustainability Initiative	
Assessing Operational Flooding Risks for Substations and the Wider North Carolina Power Grid https://collaboratory.unc.edu/wp-content/uploads/sites/476/2021/05/assessing-operational-flooding-risks-for-substations-and-the-wider-north-carolina-power-grid.pdf	2021	NCSU's Dept. of Forestry and Environmental Resources & Dept. of Civil, Construction and Environmental Engineering	Study has three main components: preliminary geospatial flood risk assessment for Eastern NC grid; dynamic flood depth analysis during historical Hurricanes and grid impacts; operational modeling of the NC grid under recreated historical flooding conditions.
Flood Resilience and NC Water and Wastewater Utilities: A case study approach to understanding utility vulnerability and resilience https://collaboratory.unc.edu/wp-content/uploads/sites/476/2021/05/flood-resilience-and-nc-water-and-wastewater-utilities.pdf	2021	The Environmental Finance Center at UNC-Chapel Hill	Research included an investigation of water and wastewater utility flood resilience, and the research utilized a mixed methods approach, including mapping vulnerable infrastructure, assessing financial condition via benchmarks, investigating recovery spending, a focus group style group discussion at a School of Government workshop, and conducting qualitative interviews and case studies at four utilities across the Lumber, Neuse, and Cape Fear River basins
Falls Lake Nutrient Management Study ***Primary Website*:** https://nutrients.web.unc.edu/about/ ***2023 Falls Lake Nutrient Management Study Research Symposium:*** https://nutrients.web.unc.edu/2023-falls-lake-research-symposium/ ***Latest (2022) Interim Update to the NC General Assembly:*** https://nutrients.web.unc.edu/wp-content/uploads/sites/19393/2023/01/2022-Collaboratory-Falls-Lake-Nutrient-Management-Study-Interim-Update.pdf	2016-Present	UNC-Chapel Hill and NCSU	• Cataloguing and reviewing water quality data sets collected throughout the Jordan Lake watershed to identify discernible trends and conducting additional water quality sampling to address data gaps. • Evaluating reservoir vulnerability to eutrophication, including harmful algal blooms, relative to nutrient and sediment loads, streamflow patterns, and climate, for both current conditions and future scenarios. • Identifying major sources of nutrients and sediments to Jordan Lake and the timing of loading. • Evaluating likelihood of nutrient mitigation through the implementation of best management practices, regulatory measures, and restoration efforts. • Evaluating innovative financing mechanisms for stormwater controls and analysis of costs and benefits of water quality improvement. • Reviewing nutrient strategies from other states, including the Chesapeake Bay Program, and analyzing the impact those strategies have had on water quality. • Engaging with communities and stakeholders throughout the watershed through listening sessions, focus groups, etc.
Programs			
Conservation Stewardship Program https://www.nrcs.usda.gov/programs-initiatives/csp-conservation-stewardship-program/north-carolina/conservation-stewardship	Ongoing	NC Natural Resources Conservation Service and the N.C. Agriculture Development Farmland Preservation Trust Funds	Preserving Upriver Farms to Reduce Flooding in NC-Phase II: The project should result in the permanent protection of over 4,000 acres of working farms and forests in the Neuse River Basin. In addition to protection of working farms, these conservation easements will provide additional benefits of reduced erosion and improved water quality in the eight county project area.

Title and Link	Year	Lead Agency	Notes (if applicable)
Data Tools			
Neuse River Basin Model https://www.deq.nc.gov/about/divisions/water-resources/water-planning/basin-planning/neuse-river-basin-model	2008-2009	NC Department of Environmental Quality -Division of Water Resources	For long term surface water management planning, the State can use the model in making regulatory decisions by evaluating potential impacts of proposed projects with significant water withdrawals within the basin and inter-basin transfer permit application, planning for increased water use due to continuous growth, and in real time in managing the basin having challenges of resources, and operational and regulatory constraints during a drought condition. OASIS, a patented, mass balance, water resources simulation/optimization model will be developed for the Neuse River basin. This basin wide model will use the finest practical geographic resolution and timestep

5.2 Barriers to Implementation

5.2.1 Capability Assessments: Regional Hazard Mitigation Plans

Table 17. Overall Mitigation Capability Ratings for Cities and Towns in the Neuse River Basin (5.2.1)

HMP Region	County	Cities and Towns	Overall Capability Rating
Cape Fear	Johnston	Benson	Moderate
		Four Oaks	Moderate
		Micro	Low
		Pine Level	Moderate
		Wilson's Mills	Moderate
		Smithfield	Moderate
		Clayton	Moderate
		Kenly	Moderate
		Archer Lodge	Moderate
		Selma	Moderate
		Princeton	Moderate

HMP Region	County	Cities and Towns	Overall Capability Rating
Eno-Haw	Durham	Durham	High
	Orange	Hillsborough	Moderate
	Person	Roxboro	Moderate
N.E. W	Nash	Bailey	Low
		Middlesex	Low
	Wilson	Black Creek	Low
		Stantonsburg	Low
		Wilson	High
		Sims	Low
		Saratoga	Moderate
		Lucama town	Low
Neuse	Greene	Snow Hill	Moderate
		Walstonburg	Low
		Hookerton	Low
	Jones	Pollocksville	Low
		Trenton	Low
	Lenoir	Kinston	Moderate
		Pink Hill	Low
		La Grange	Moderate
	Pitt	Grifton	Moderate
		Farmville	Moderate
		Fountain	Low
		Greenville	High
		Ayden	Moderate
		Winterville	Moderate
	Wayne	Fremont	Low
		Pikeville	Low
		Seven Springs	Low
		Walnut Creek	Low

HMP Region	County	Cities and Towns	Overall Capability Rating
		Goldsboro	High
		Mount Olive	Low
		Eureka	Low
Pamlico Sound	Craven	Cove City	Low
		Havelock	Moderate
		Bridgeton	Low
		Dover	Low
		New Bern	Moderate
		Trent Woods	Moderate
		Vanceboro	Low
		River Bend	Moderate
	Pamlico	Alliance	Low
		Vandemere	Moderate
		Arapahoe	Low
		Bayboro	Low
		Grantsboro	Low
		Mesic	Low
		Minnesott Beach	Low
		Oriental	Moderate
		Stonewall	Low
Tar River	Franklin	Youngsville	Moderate
	Granville	Stem	Moderate
		Butner	High
		Creedmoor	Moderate
Wake County	Wake	Morrisville	Moderate
		Wake Forest	Moderate
		Fuquay-Varina	High
		Garner	Moderate
		Zebulon	Moderate

HMP Region	County	Cities and Towns	Overall Capability Rating
		Raleigh	High
		Apex	High
		Knightdale	Moderate
		Rolesville	Moderate
		Wendell	Moderate
		Holly Springs	High
		Cary	High

5.3 Sources of Flooding

5.3.1 Hurricane Matthew Resilient Redevelopment Plan

Table 18. Riverine Sources of Flooding: Hurricane Matthew Resilient Redevelopment Plan (5.3.1.)

USGS Gage	County	River Name and Location	Drainage Area (sq mi)	Peak Matthew Elevation (ft)	Previous Record (ft)
0209205053	Craven	Swift Creek at HWY 43 Near Streets Ferry, NC	269.0	8.67	12.28
02092500	Jones	Trent River near Trenton, NC	168.0	18.48	22.33
02092554	Jones	Trent River at Pollocksville, NC	370.0	8.5	16.29
02091814	Craven	Neuse River Near Fort Barnwell, NC	3,900	20.51	22.7529
02081747	Franklin	Tar River near Louisburg, NC	427.0	23.25	26.05
02081500	Granville	Tar River near Tar River, NC	167.0	17.56	24.06
02091500	Greene	Contentnea Creek at Hookerton, NC	733.0	24.15	28.28
02091000	Greene	Nahunta Swamp near Shine, NC	80.4	17.92	21.00
02087500	Johnston	Neuse River near Clayton	1,150	127.4	125.7
02087570	Johnston	Neuse River at Smithfield	1,206	71.6	70.8
02089500	Lenoir	Neuse River at Kinston, NC	2692.0	28.31	27.71

USGS Gage	County	River Name and Location	Drainage Area (sq mi)	Peak Matthew Elevation (ft)	Previous Record (ft)
02082770	Nash	Swift Creek at Hilliardston, NC	166.0	15.34	21.30
02081942	Nash	Tar River at NC 581 near Spring Hope, NC	670.7	23.88	18.11
0208250410	Nash	Tar River below dam near Langley Crossroads	775.0	19.58	12.81
02084472	Beaufort	Pamlico River at Washington, NC	3,200.0	5.18	7.53
02084000	Pitt	Tar River at Greenville, NC	2660.0	24.46	29.72
0208706575	Wake	Beaverdam Creek at Dam near Creedmore, NC	52.5	258.93	259.89
02087182	Wake	Falls Lake above Dam near Falls, NC	771.0	258.94	264.34
0208726005	Wake	Crabtree Creek at Ebenezer Church Road, NC	76.0	19.96	22.40
02087275	Wake	Crabtree Creek at Hwy 70 at Raleigh, NC	97.6	22.7	27.69
0208731190	Wake	Crabtree Creek at Anderson Drive, Raleigh, NC	110.0	21.3	21.22
02087322	Wake	Crabtree Creek at Old Wake Forest Road, Raleigh, NC	119.0	20.12	19.93
02087324	Wake	Crabtree Creek at US 1, Raleigh, NC	121.0	17.49	18.23
0208732534	Wake	Pigeon house Creek at Cameron Village, Raleigh NC	0.3	4.91	8.65
0208732885	Wake	Marsh Creek near New Hope, NC	6.8	11.68	13.33
0208735012	Wake	Rocky Branch below Pullen Drive, Raleigh NC	1.2	9.07	9.23
02087359	Wake	Walnut Creek at Sunnybrook Drive, Raleigh, NC	29.8	16.1	17.03
0209782609	Wake	White Oak Creek at mouth near Green Level, NC	11.9	10.94	13.50
02087580	Wake	Swift Creek near Apex, NC	21.0	12.22	13.86
0208758850	Wake	Swift Creek near McCullars Crossroads, NC	35.8	14.31	14.15
02088383	Wake	Little River near Zebulon, NC	55.0	5.47	3.62
02089000	Wayne	Neuse River near Goldsboro, NC	2399.0	29.74	28.85
02090380	Wilson	Contentnea Creek near Lucama, NC	161.0	19.46	24.82
0209050750	Wilson	Hominy Swamp at Forest Hill Rd	1.8	12.91	-

Table 19. Coastal Sources of Flooding: Hurricane Matthew Resilient Redevelopment Plan (5.3.1.)

County	Site Description	Body of Water	Estimated Peak Surge (ft)	Estimated Recurrence Interval (years)
Carteret	Bogue Inlet Pier	Open Coast	5.8	1-2
Carteret	Oceanana Fishing Pier	Open Coast	4.8	1-2
Carteret	Emerald Isle Coast Guard Station	Sound	4.2	1-2
Carteret	Blown Kiteboarding at Broad Creek	Sound	4.1	1-2
Carteret	US Coast Guard Station Fort Macon	Sound	4	1-2
Carteret	Tradewinds Marina	Sound	3.9	1-2
Carteret	Duke Marine Lab	Sound	3.6	1-2
Carteret	North River at US Hwy 70	Sound	3.4	1-2
Carteret	Cape Lookout National Seashore Visitor Center at Harkers Island	Sound	2.9	1-2
Carteret	Cape Lookout Cabins & Camps Ferry	Sound	2.7	1-2
Craven	Trent River @ US HWY 70 @ New Bern, NC	Sound	3.3	<10
Craven	Cherry Branch Ferry Terminal	Sound	2.9	<10
Pamlico	R.E. Mayo Seafood	Sound	3.1	25
Pamlico	Neuse River at Oriental Town Pier	Sound	3.1	25
Pamlico	Minnesott Beach Ferry Terminal	Sound	2.8	25
Pamlico	River Dunes Marina	Sound	2.1	25

5.3.2 Regional Hazard Mitigation Plans

Table 20. Riverine Sources of Flooding: Regional Hazard Mitigation Plans (5.3.2.)

HMP Region	Counties	Types of Flooding	Local Riverine Flood Sources	Historical Events
Pamlico Sound	Carteret, Craven and Pamlico	Coastal; Dam & Levee; Flash; Rain; Riverine; Urban and Stormwater	Carteret County: Deep Creek and Little Deep Creek. Craven County: Clubfoot Creek, East Prong Slocum Creek and Tributary, Jimmies Creek, Maple Cypress, Mauls Swamp, Mills Branch, Mills Branch Tributary, Morris Branch, Mosley Creek into Neuse River, Mosley Creek Tributary, Samuels Creek/Rocky Run, Scotts Creek, Snake Branch, Southwest Prong Slocum Creek, Swift	Between 1999-2018 there were (17) coastal floods, (44) flash floods, (26) riverine floods and (9) heavy rain floods in the three identified counties.

HMP Region	Counties	Types of Flooding	Local Riverine Flood Sources	Historical Events
			Creek, Trent River Tributary, Tucker Creek, Village Creek, and Wilson Creek. Pamlico County: Greens Creek, Kershaw Creek, Morris Creek, North Prong Bay River, Smith Creek, South Prong Bay River, Thomas Creek, and Trent Creek.	
Eno-Haw	Durham, Orange, and Person	Dam (Levee not included); Flash; Rain; Riverine; Urban & Stormwater	Durham County: The County is more prone to flooding by small streams than flooding by a major river. The principal flood problems occur on the smaller tributaries, where, due to urban development pressures, there has been commercial and residential construction in the floodplains of these tributaries. However, local flooding from the Eno River has also occurred. Orange County: Eno River, North and South Forks Little River, New Hope Creek, Morgan Creek, Bolin Creek, and other streams. Person County: Flat River, the North Flat River, the South Flat River, Marlowes Creek and smaller creeks and tributaries.	Between 1999-2018 there were 99 flash floods and 7 riverine floods in the three identified counties.
Neuse River	Green, Jones, Lenoir, Pitt, and Wayne	Coastal; Dam (Levee not included); Flash; Rain; Riverine; Urban & Stormwater	Greene County: Contentnea Creek, Little Contentnea Creek, Nahunta Swamp, Rainbow Creek, and other streams. Jones County: Trent River. Lenoir County: Neuse River, Adkin Branch, Briery Run, and other streams. Pitt County: Tar River, Green Mill Run, Contentnea Creek, and Little Contentnea Creek and their tributaries. Wayne County: Neuse River, Northeast Cape Fear River, Thunder Swamp, Lee Branch, Little River, Nahunta Swamp, Stoney Creek, the Slough, Walnut Creek, Walnut Creek Tributary B, and other streams	Between 1999-2018 there were 118 flash floods, 33 riverine floods and 16 heavy rain floods in the five identified counties.
Wake County	Wake	Dam (Levee not included); Flash; Riverine; Urban & Stormwater	Wake County: Black River, Contentnea River, Haw River, Cape Fear River, and Neuse River, according to the 2015 Preliminary Flood Insurance Study for Wake County. These rivers and their tributaries are susceptible to overflowing their banks during and following excessive precipitation events.	Between 2007-2018 there were 82 flash floods and 5 riverine floods in the county.
N.E.W.	Nash and Wilson	Dam & Levee; Flash; Rain; Riverine; Urban & Stormwater	Nash County: Fishing Creek, Swift Creek, Compass Creek, Pig Basket Creek, Stony Creek, Maple Creek, Sapony Creek, Turkey Creek, and the Tar River. Wilson County: Black Creek, Contentnea Creek, Hominy Swamp, Bloomery Swamp, Marsh Swamp, Toisnot Swamp, and other streams.	Between 1999-2018 there were 52 flash floods and 2 riverine floods in the two identified counties.
Tar River	Franklin and Granville	Dam & Levee; Flash; Rain; Riverine; Urban & Stormwater	Not Available - provides many flood hazard area maps but no flood source summary	Between 2005-2020 there were 16 flash floods and 1 riverine flood in the two identified counties.

HMP Region	Counties	Types of Flooding	Local Riverine Flood Sources	Historical Events
Cape Fear	Johnston	Dam (Levee not included); Flash; Rain; Riverine; Urban & Stormwater	Not Available - provides many flood hazard area maps but no flood source summary	Between 2005-2019 there were 26 flash floods and 2 riverine floods in the county.

Table 21. Coastal Sources of Flooding: Pamlico Sound Regional Hazard Mitigation Plan (5.3.2.)

County	Source of Coastal Flooding
Carteret County	Surge propagates into Bogue Inlet, Bogue Sound, Core Sound, Goose Bay, the Intracoastal Waterway, Pamlico Sound, Shackleford Slue, the Straits, and further into Adams Creek, the Neuse River, the Newport River, and the White Oak River.
Craven County	Surge extends from Pamlico Sound into the Neuse River, Hancock Creek, Jack Smith Creek, Lawson Creek, Pamlico River, downstream portions of Rocky Run/Samuels Creek, Slocum Creek, Southwest Prong Slocum Creek, and the Trent River.
Pamlico County	Surge moves from Pamlico Sound further into Bay River, Big Porpoise Bay, Jones Bay, Kershaw Creek, Middle Bay, Morris Creek, Pamlico River, Smith Creek, Thomas Creek, Trent Creek, Whittaker Creek, and Raccoon Creek.

5.3.3 Neuse River Basin Flood Analysis and Mitigation Strategies Study

Table 22. Peak Discharges Recorded During Hurricane Matthew (5.3.3.)

Site Location	County	Peak Discharge (cfs)	Return Period (years)
Crabtree Creek at Ebenezer Church Rd.	Wake	5,740	12
Crabtree Ck. at Hwy 70	Wake	6,350	6
Walnut Creek at Sunnybrook Drive	Wake	5,960	33
Middle Creek near Clayton	Johnston	20,600	>500
Little River near Princeton	Johnston	9,960	99
Neuse River at Goldsboro	Wayne	54,300	222
Neuse River at Kinston	Lenoir	38,200	125
Contentnea Creek near Lucama	Wilson	12,000	244

Site Location	County	Peak Discharge (cfs)	Return Period (years)
Nahunta Swamp near Shine	Greene	13,600	>500
Contentnea Creek at Hookerton	Greene	25,000	270

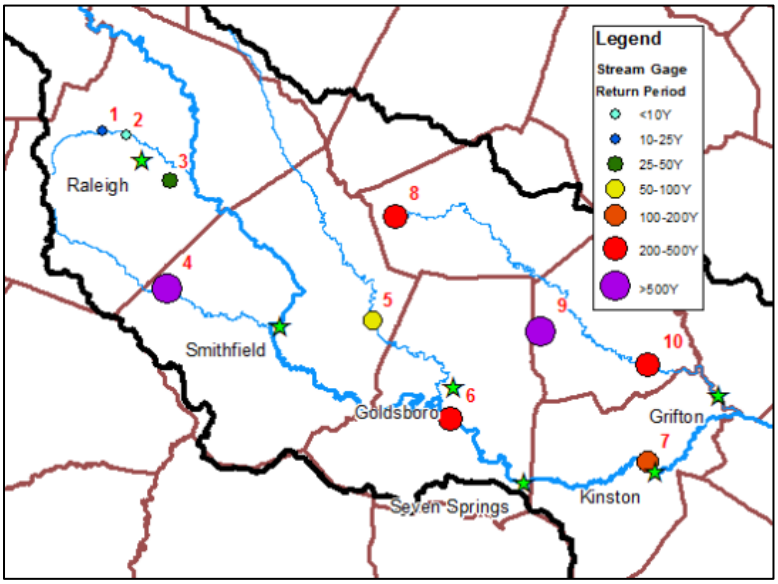

Figure 3. Location of Peak Discharges Recorded During Hurricane Matthew (5.3.3.)

5.3.4 Improving North Carolina's Resilience to Coastal Riverine Flooding

Table 23. Observed and Modeled Peak Discharge and Runoff Volume (5.3.4)

Study Watershed	Data	Peak Q (cfs)	Volume (ac-ft)	Time of Peak
Nahunta Swamp (Hurricane Matthew 10/7/16 to 10/15/16)	Observed	13,600	36,709	10/9 4:00
	Modeled	13,621	36,103	10/9 3:30
Little River (Hurricane Matthew 10/7/16 to 10/15/16)	Observed	9,370	26,018	10/9 4:00
	Modeled	9,350	26,590	10/9 0:10
Bear Creek (Hurricane Floyd 9/14/99 to 9/20/99)	Observed	11,000	28,528	9/16 12:00
	Modeled	10,975	30,817	9/16 12:20

5.4 Existing and Proposed Investments

5.4.1 Hurricane Matthew Resilient Redevelopment Plans (2017)

Table 24. HMRRP – Carteret County (5.4.1.)

County	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
Carteret	Acquisitions: The Carteret County Planning Dept. has a list of repetitive loss properties and potential candidates for elevation.	NS	Green space management post buyout and demolition	County Planning Dept., NC Office of Recovery and Resiliency (NCORR)	1-2 years
Carteret	Education and Outreach Programs: 1) Work directly with local church and faith-based organizations in isolated or underserved areas to identify and reach out to residents that may be unaware of current risks, funding opportunities and public service programs such as Coastal Carolina Action. 2) Place flood protection, sheltering and other hazard education materials in all branches of the Carteret County public library system. 3) Support residents throughout the grant solicitation process by assisting with the necessary forms and paperwork."	NS	-	Carteret County	1-2 years
Carteret	Collaboration between research institutions and local government: strategy consists of obtaining funding for increased collaboration between the academic research institutions (University of North Carolina System Universities, North Carolina State University, Duke, Edgecombe Community College, Central Carolina Community College) and the county science-based depts. such as Emergency Services, GIS Services, Environmental Health, Shore Protection, and Soil and Water Conservation Districts (SWCD), etc.	NS, P	-	Carteret County emergency services (ES), GIS Services, Environmental Health, Shoreline Protection, SWCD	1-2 years
Carteret	Critical Facilities and Emergency Equipment: 1) Evaluation of the current shelter inventory. Determine which facilities are currently at risk. What is the current demand and the infrastructure needed to meet it? Consider the construction of new schools that could double as shelters. 2) A critical need is a new facility to	S, NS, P	-	Carteret County	6 months - 1 year

County	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
	host an alternate Emergency Operating Center and Public Safety & 911 Center for the County. The current facility is vulnerable to flooding and alternate locations are problematic. Construction of a new site in the Town of Newport would enhance the ability for emergency operators to provide services, provide a safe location for emergency response personnel to store equipment. 3) Floodproofing of critical facilities such as the South River, Marshallberg, and Stacy Fire Depts. This action involves an evaluation of the current risks, recommendations, and implementation of flood mitigation measures.				
Carteret	Countywide Drainage Improvements: A comprehensive stormwater study, assessing current infrastructure needs. Much of the counties drainage system needs repair, and pipe resizing. A study is required to identify appropriate locations for improvement and sizing for capacity. Collaborating with local leadership (town mayor, town manager, town administrator, etc.) to identify areas of chronic flooding; Ditches along main roads are property of NC Department of Transportation (NCDOT) and therefore, cannot be maintained by the localities.	S, P	-	Carteret County	6 months - 1 year
Carteret	Revise Flood Studies: A new study for Carteret County is required to protect areas of vulnerability and relieve residents in areas of less vulnerability.	P	-	Carteret County	1-2 years
Carteret	Ordinance Development: Adoption of improved requirements for new developments, which include the mandatory use of green solutions as a determined percentage of the overall project.	NS, NBS	-	Carteret County	1-2 years
Carteret	Increased Funding for Preserves: The goal of this action is to implement Low Impact Development strategies such as wetland restoration and natural water retention facilities to slow down erosion damages in Rachel Carson Reserve and other areas located on the Eastern side of the County. A comprehensive study to inform prime locations and ideal strategies would be part of this project.	NS, NBS, P	-	Carteret County	1-2 years

County	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
Carteret	A Comprehensive Plan: Preservation of Natural Resources: The goal of this strategy is to obtain funding for personnel to work with the Wildlife Resources Commission to use this toolbox, which would in turn be instrumental in developing a comprehensive, priority-based plan for the preservation of natural resource.	NBS, P	-	Carteret County	1-2 years

Table 25. HMRRP – Craven County (5.4.1.)

County	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
Craven	Mitigation reconstruction of residential properties: Demolishing and reconstructing elevated homes to the Design Flood Elevation (DFE = Base Flood Elevation (BFE) +2ft) reduces the risk of flood damages occurring from the 100-yr flood event. Reconstruct homes identified by the county to the DFE. Anchor propane tanks that cannot be elevated.	NS	-	Craven County, NC Office of Recovery and Resiliency (NCORR)	1-3 years
Craven	Elevate residential properties: Elevating Properties to the Design Flood Elevation (DFE = BFE +2ft) reduces the risk of flood damages occurring from the 100-yr flood event. Elevate homes identified by the county to the DFE. Anchor propane tanks that cannot be elevated.	NS	-	Craven County, NCORR	1-3 years
Craven	Develop emergency shelter in Dover: Construct a new shelter on an elevated pad on the parking lot of the existing community center site. After the shelter is constructed, demolish the community center, which is outdated and decrepit, and convert that part of the site to a parking lot that is elevated out of the floodplain.	S, NS	-	Craven County (Town of Dover)	1-3 years
Craven	Acquire residential properties, particularly in and around Vanceboro.	NS	-	Craven County (Town of Vanceboro), NCORR	1-3 years
Craven	Develop a citizen emergency preparedness guidebook: prepare a guidebook for citizens that explains best practices for being self-sufficient for up to 72 hours after a significant storm event. The guidebook should identify what should be included in an emergency kit, including food, water, and supplies, and where it	NS	-	Craven County	1 year

County	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
	should be stored. It should also address preparedness for pet owners, parents with babies, and people with functional needs.				
Craven	Complete floodproofing of Mills Country Store: Mills County Store is an information hub for this part of the county and was flooded during Hurricane Matthew. Construct a berm/bulkhead around the store to protect it from flooding. Elevate utilities to the BFE + 2 feet wherever possible, otherwise elevate utilities as high as possible. Elevate shelves above the BFE and/or construct platforms that can be raised and lowered using pulleys suspended from the ceiling. Develop a storm preparedness plan, which will include strategies for storing hard and electronic copies of critical records at a floodproof location and/or on the cloud.	NS, P	-	Craven County (Town of Vanceboro)	1-3 years
Craven	Complete floodproofing of A&J Canvas: A&J Canvas serves the boating industry and was flooded during Hurricane Matthew. Construct a berm/bulkhead around the store to protect it from flooding. Elevate utilities to the BFE + 2 feet wherever possible, otherwise elevate utilities as high as possible. Elevate shelves above the BFE and/or construct platforms that can be raised and lowered using pulleys suspended from the ceiling. Develop a storm preparedness plan, which will include strategies for storing hard and electronic copies of critical records at a floodproof location and/or on the Cloud.	NS, P	-	Craven County (Town of Vanceboro)	1-3 years
Craven	Adams Creek Rd: Portions of the roadway that are below the 100-year flood elevation should be raised above this level. Drainage ditches should be cleared and maintained. Culverts should be upsized to accommodate 100-year flood flows.	S	-	Craven County (Town of Havelock)	1-3 years
Craven	Weyerhaeuser Road Near River Road and Elevated Train Tracks: A hydrologic and hydraulic (H&H) Study should be completed as part of the project to ensure that removing the bridges, which act as bottlenecks to Swift Creek, will not adversely impact downstream areas such as New Bern.	S, P	-	Craven County (Town of Vanceboro)	1-3 years
Craven	Emergency Shelter Retrofits: Design and construct upgrades to shelters as recommended in the study; some upgrades might include but are not limited to installing roof straps and ties, adding fasteners, anchoring rooftop equipment, replacing the roof, installing hurricane shutters, and replacing windows and doors.	NS	-	Craven County	1-2 years

County	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
Craven	Generators: Identify which critical facilities require generators, particularly well pumps, communications towers, and emergency shelters. Determine power needs for generator sizing. Procure and install an appropriately sized generator, fuel tank, and fuel pump at each location. Include an alternate power source such as a solar panel and/or backup battery. Establish and implement a regular testing and maintenance program.	NS	-	Craven County	1-2 years
Craven	Town of River Bend Water and Wastewater Treatment Plant (WWTP): install backflow preventers to stop tidal surge backflows into the pipes. Elevate utilities, computers, and other sensitive equipment out of the floodplain to protect wastewater system assets. Ensure system pumps have backup generators with sustainable fuel sources such as solar panels/batteries.	S, NS	-	Craven County (Town of River Bend)	1-3 years
Craven	Fuel depot for emergency services (ES): When flooding to the west, such as what occurred during Hurricane Matthew, cuts off access to the county, additional fuel cannot be trucked in, and the county's ES Dept. runs out of fuel. Construct a fuel depot that has sufficient capacity for a 10-day supply of fuel for ES vehicles.	NS	-	Craven County, Craven County ES Dept.	3 years
Craven	Jack Smith Creek area/Duffyfield Canal: The City of New Bern undertook a hazard mitigation project to alleviate some of the flooding in the area. However, the area still floods. Complete additional studies to determine how Craven County can augment the City of New Bern's wetland mitigation project near Jack Smith Creek to further alleviate flooding in the area. Evaluate the sufficiency of the pipe sizes along the Duffyfield Canal. Implement the measures recommended by the study, such as increasing wetland area and increasing the pipe sizes along the canal.	S, NBS, P	-	Craven County (City of New Bern)	1-2 years
Craven	Microgrid: Overall, backup, supplemental, and redundant power is needed to create better energy assurance post-disaster and to make sure that critical facilities have sufficient power to maintain operations. Determine if critical facilities could be connected to a microgrid. Coordinate with power companies on the status of power feeds. Design and construct a microgrid to accommodate critical facilities identified for connection.	NS	-	Craven County	1-3 years
Craven	Alternate fuel sources for redundant power: Many backup generators could not be refueled because they were inaccessible due to road flooding. Identify sustainable sources such as solar	NS	-	Craven County	1-2 years

County	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
	panels for power generation and evaluate feasibility of use for generators, communications towers, and well pumps. Procure and install renewable backup power source to generators.				
Craven	Flood Barrier at 411 Craven Street: The subterranean level of 411 Craven Street, where the Emergency Operations Center is housed, can flood and experienced minor flooding during Hurricane Matthew. Install automatic flip-up flood barriers with uninterrupted power supply and manual backups in the sidewalk in front of the entrances to this level to seal the building against flooding.	S	-	Craven County	1-2 years
Craven	West Craven High School: The school floods. It was flooded by Hurricane Matthew and closed for one week. Construct a berm/bulkhead around the school campus to protect the facilities. Elevate the utilities above the BFE + 2 feet wherever possible. Otherwise, elevate utilities as high as possible.	S, NS	-	Craven County (Town of Vanceboro)	1-2 years
Craven	Stream Gauges- Weyerhaeuser Rd, Maple Cypress Rd: Existing stream gages in Craven County do not predict river crest heights or timing. Install predictive river gages at river crossings on Swift Creek at the Weyerhaeuser Road crossing and the Neuse River at the Maple Cypress Road crossing and tie them to the county's Code Red warning system.	NS	-	Craven County (Town of Vanceboro, Town of Grifton)	1-3 years
Craven	Vanceboro: An area bounded by Streets Ferry Rd., River Rd., Bear Hole Rd., and Piney Neck Rd. gets cut off due to flooding. Parts of it flooded during Hurricane Matthew. Conduct an H&H study to identify effective ways of redirecting flows away from the area and/or directing the flows to facilities that can convey them away from the area. Construct the measures that are found to be effective. Likely projects include road and culvert improvements and the construction of bioswales, wetlands, and rain gardens.	S, NBS, P	-	Craven County (Town of Vanceboro)	2-4 years
Craven	Crop buying facility, local farms: The one crop buying location in the county, which is in Vanceboro, becomes inaccessible to farmers and distributors due to flooding of access roads. Farmers are not able to take harvested crops to the storage facility, and the storage facility is not able to get stored crops out to distributors. Elevate access roads leading to the facility out of the 100-year floodplain. Identify a location outside of the Special Flood Hazard Area (SFHA) where an alternate facility could be constructed and construct an alternate	NS, P	-	Craven County (Town of Vanceboro)	1-3 years

County	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
	facility. Determine the feasibility of constructing on-site storage at farms and construct facilities at feasible locations.				
Craven	Animal Services Craven/Pamlico: Facility has backup generator but cannot be refueled if road access is cut off due to flooding. While access was not affected by Hurricane Matthew, it has been affected by other hurricanes and severe storms. The road in front of the facility needs to be elevated out of the 100-year floodplain and/or the culverts need to be upsized to handle 100-year flood flows.	S, NS	-	Craven County (City of New Bern), NC Department of Transportation (NCDOT)	-
Craven	Belangia Rd: The road floods and cuts off the community. Portions of the road need to be elevated out of the 100-year floodplain, and culverts should be upsized to handle the flood flows.	S, NS	-	Craven County (Town of Havelock), NCDOT	1-3 years
Craven	Fire Dept. on Belangia Rd: The fire Dept. cannot respond to emergencies because the road floods and cuts off access to the fire station. This area flooded during Hurricane Matthew. Need to elevate the roadway at the intersection of Adams Creek Rd. and Belangia Rd. out of the 100-year floodplain and/or enlarge the culverts to facilitate drainage of the area so that the fire station remains accessible.	S, NS	-	Craven County (Town of Havelock), NCDOT	1-3 years
Craven	Broad Creek Rd: This road is the only means of ingress and egress to Fairfield Harbour. A ¾-mile stretch floods frequently during severe storms and cuts off access to the community, which is primarily retirees. Elevate the stretch of roadway above the 100-year floodplain and upsize culverts to handle the flood flows.	S, NS	-	Craven County (City of New Bern), NCDOT	3-5 years
Craven	New Liberty Rd: When Route 70 was improved, New Liberty Rd. was cut in half and turned into cul-de-sacs. When New Liberty Rd. floods during hurricanes, access for people in this area is cut off. Elevate the roadway out of the floodplain and upsize culverts to handle the flood flows.	S, NS	-	Craven County (City of New Bern), NCDOT	1-3 years
Craven	Route 55 at Core Creek: Core Creek floods across Route 55, which is a major thoroughfare across the county. This area flooded during Matthew. Elevate this portion of the roadway above the 100-year flood elevation. Upsize culverts to handle the flood flows.	S, NS	-	Craven County (Town of Dover), NCDOT	1-3 years
Craven	Jeremy Street/Justin Street: Jeremy Street/Justin Street floods frequently, including after hurricanes, isolating the residents along	S, NS	-	Craven County (Cove City), NCDOT	1-3 years

County	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
	the road. Elevate the road out of the floodplain. Upsize culverts to handle flood flows.				
Craven	River Rd. from Streets Ferry Rd. to State Camp Rd: Flooded during Hurricane Matthew. Floods frequently, sometimes due to significant rain/hurricane events, sometimes due to seepage. Residents say that flooding has become more frequent since construction of the canal. Elevate roadway out of the 100-year floodplain and upsize culverts to handle flood flows.	S, NS	-	Craven County (Town of Vanceboro), NCDOT	1-3 years
Craven	Wintergreen Rd. at Mills Branch: Mills Branch floods Wintergreen Road and cuts off access to part of the community. Elevate the road out of the 100-year floodplain. Upsize culverts to handle the flood flows.	S, NS	-	Craven County (Cove City), NCDOT	1-3 years
Craven	WTP on Lewis Farm Rd: The facility is located on the edge of the 100-year floodplain. While it remained accessible during Hurricane Matthew, flood waters during other hurricanes and severe storms have inundated the roadway and cut off access to the plant. Need to ensure access, sufficient backup power capabilities to keep the plant running, as it is a major source of potable water for the county. Upsize culverts to ensure they can handle 100-year flood flows. Provide a backup generator with an alternative fuel source such as a solar panel with battery.	S, NS	-	Craven County (City of New Bern), NCDOT	1-3 years
Craven	Shoreline Dr: When the canal overflows due to inundation from severe rainstorms such as Hurricanes Matthew and Irene, Shoreline Drive floods, isolating about 80 percent of the community, as Shoreline Drive is the primary means of ingress/egress for the community. Construct a road above the 100-year floodplain that connects Old Pollocksville Road and the west end of Plantation Drive to provide another means of access to the community.	NS	-	Craven County (Town of River Bend), NCDOT	2-4 years
Craven	Town of River Bend drainage swales (Esp. Channel Dr): Drainage swales and ditches overflowed during Hurricane Mathew, inundating private property. The drainage swales and ditches should be regarded/reconstructed to direct water away from private property into the stormwater conveyance system.	S	-	Craven County (Town of River Bend)	2-4 years
Craven	Cherry Branch-Minnesott Beach Ferry Terminal: The ferry terminal at Cherry Point needs to be resilient to elevated water levels so that it can remain open. Reconfigure the docks to allow the ramps to	NS	-	Craven County (Town of Minnesott Beach)	3-5 years

County	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
	extend sufficiently during times of high water such that the ramp angle between the ferry and the dock accommodates vehicle entry and exit.				
Craven	Animal rescue and distribution facility at Fairgrounds (Route 70 near Audrey Lane): Large animals are evacuated to this location during emergencies. Flooding of Route 70 can cut off access during hurricanes and severe storms. Need to ensure access along Route 70 is not cut off by elevating the roadway between Audrey Lane and Taberna Way above the 100-year floodplain and/or upsizing culverts to handle the flood flows.	S, NS	-	Craven Count (City of New Bern)	1-3 years
Craven	Hog waste lagoons near Quinn Rd., Craven Farms Rd., and Neuse Farms: Several hog farms are in or within 100 feet of the SFHA. The waste lagoons on these farms have been inundated by flood waters and could become breached, releasing their contents into the Neuse River. One of the lagoons was inundated during Hurricane Matthew. This contamination would affect residents and businesses downstream, including those in New Bern. Buyout lagoon operating permits if feasible and if farmers are willing to sell. Otherwise, cover lagoons to prevent water from accumulating in the lagoons and/or pump lagoon contents to slurry holding tanks.	NS	-	Craven County (Town of Cove City, Town of Vanceboro)	1-3 years

Table 26. HMRRP – Franklin County (5.4.1.)

County	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
Franklin	Mitigate Public Facilities Against Future Damages: This action involves work on two different county buildings located in Louisburg adjacent to the Tar River (1) Repair or replace the drainage system between buildings housing the County Administrative Offices and flood proof lower-level walls (2) Relocate electrical service panels from the basement and flood proof the basement of the Planning and Inspections building.	S, NS	-	Franklin County	1 year
Franklin	Mitigate Public Utility Infrastructure Against Future Damages: The Youngsville Pump Station, South Nassau Pump Station, and Franklinton Pump Station overflowed during Hurricane Matthew due to excessive stormwater infiltration overwhelming pump station capacity. This action will repair infiltration issues to restore pump station capacity and their ability to operate as designed during storm events.	S	-	Franklin County (Town of Youngsville)	2 years

County	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
Franklin	Install/Improve Flood Warning System: Franklin County currently has one gage active in the Flood Inundation Mapping and Alert Network (FIMAN) system. Installation of additional gages will better prepare the County during flood events and help protect lives by monitoring flood hazards real-time. Four locations have been identified. These locations will monitor flooding sources within the county upstream of populated and commonly flooded areas providing a good understanding of timing of flooding throughout the county during an event.	NS	-	Franklin County	1-2 years
Franklin	Emergency Generators for Critical Facilities: Franklin County currently has one 75KW mobile generator to power critical facilities during emergency situations. The county has identified the need for four additional 150KW generators to power the following facilities: Franklin County Emergency Shelter, Franklin County Administration Building, Franklin County Emergency Operations Center, Franklin County Senior Center.	NS	-	Franklin County	1-2 years

Table 27. HMRRP – Greene County (5.4.1.)

County	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
Greene	Backup Generators: Install backup generators at pump stations and government facilities to limit service disruptions during power loss. Four back-up generators are needed in Hookerton for the three lift stations and for the water tower. One 150kw generator needed in Snow Hill for an additional well site. Five 75kw generators needed for sewer pump stations in Snow Hill. Other backup generators may be needed in the county.	NS	-	Greene County	1 year
Greene	Relocate Generator for Greene County Courthouse: Relocate generator at the Greene County Courthouse: The Greene County ES needs the 175 KVW generator at the Greene County Courthouse moved to higher ground, in Hurricane Matthew the flood waters were about two inches from breaching the generator. If a breach had occurred, Greene County would have lost all emergency communications for fire/emergency medical services (EMS), 911 communication center, Sheriff/Highway Patrol, justice center, clerk of court, Register of Deeds, and the detention center which houses about 75 inmates. This generator is the lifeline for ES in the county. Neighboring counties rent jail space from Greene County.	NS	-	Greene County	0-12 Months
Greene	Implement Flood Warning System on Contentnea Creek: Implement Flood Warning System on Contentnea Creek. Three additional flood monitoring/warning stations are needed.	NS	-	Greene County	1 year
Greene	Develop Blueway Plan for Contentnea Creek: This project would fund development of a Blueway Plan for Contentnea Creek to identify needed infrastructure and improvements to the creek for recreation. These improvements would support canoeing and kayaking between	P, NS, NBS, S	-	Greene County	5-10 years

County	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
	Snow Hill and Hookerton, providing recreation and economic benefits. This project has the potential to help reduce flooding by the development of greenways and assisting with the long-term maintenance of the Contentnea Creek and the clearing of debris that contributes to flooding.				
Greene	Create Stormwater Management Plans for Hookerton and Snow Hill.	P	-	Greene County (Hookerton, Snow Hill)	1-2 years
Greene	Sewer Line Elevation and Pedestrian Bridge: Pedestrian bridge over Contentnea Creek near 4th Street to connect to the park facilities and campground on the north side of Contentnea Creek. In addition, this will provide an opportunity to elevate the sewer line that runs from the south side of Contentnea Creek to the wastewater treatment plant on the north side of Contentnea Creek. The elevation of the wastewater pipe will help prevent future damage to the wastewater pipe during flooding events.	NS	-	Greene County	5-10 years
Greene	Stormwater Retrofits: Implement stormwater retrofits such as larger culverts to address roadway flooding.	S	-	Greene County (Hookerton)	1-2 years
Greene	Harden Hookerton Wastewater Treatment Plant: This project would provide funding to harden the Hookerton Wastewater Treatment Plant to prevent sewage spills during future flood events. Following Hurricane Matthew, representatives from the Federal Emergency Management Agency (FEMA) recommended that the three berms for the three lagoons be armored. Action items required for this project is an engineering study on the technical approach and design and construction.	NS, P	-	Greene County (Hookerton)	1-2 years
Greene	Expand capacity/holding space of the Greene County Animal Control: Following Hurricane Matthew, the Animal Control was responsible for rescuing domesticated animals that were impacted by the flooding. They have limited shelter space/kennels that are available for evacuated animals. This project would help address that situation by providing them with additional kennels and space to operate from.	NS	-	Greene County	2-3 years
Greene	Repair damaged storm water infrastructure throughout the county. Coordination with NCDOT to determine their plans will be needed.	S	-	Greene County, NCDOT	2-5 years
Greene	Greenways in Hookerton. This project would construct several proposed greenways in the Town of Hookerton, including near the historic cemetery, near the Hookerton Town Park, and along Contentnea Creek. Key steps in this project would be to conduct a feasibility study, develop final designs, and construct the project.	NS, NBS, P	-	Greene County (Hookerton)	5-10 years

County	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
Greene	Transportation Infrastructure Assessment: This project would provide funding for the county to assess roadways that were flooded during Hurricane Matthew to determine if elevating roadways or stormwater improvement projects are needed.	P	-	Greene County	1 year
Greene	Assess expansion of sewer service to encourage development outside of floodplain. This project would identify land area to expand sewer service to, which would assist in the development of land for residences and businesses outside of the floodplain.	NS,P	-	Greene County	1-2 years
Greene	Stream and Drainage Clean Up: Partner with the NC Dept. of Agriculture and Consumer Services (NCDACS) Division of Soil and Water Conservation District's (SWCD's) Stream Debris Removal Project to remove storm debris blocking streams and drainage systems. This project would involve collaboration with statewide Big Sweep cleanup to remove debris, provide funding for necessary tools and equipment.	S	-	Greene County, NCDA&CS SWCD's Stream Debris Removal Project	1 year
Greene	Expand Beaver Management Program: Currently Greene County only funds a part-time employee for beaver management and this project would expand this to a full-time employee dedicated to beaver management.	NS	-	Greene County	2 years
Greene	Parks, Open Space, and Rural Lands System Plan: This project would provide funding to develop and open space plan to create a county-wide plan for developing parks/recreation facilities. The plan would include a study to identify and select strategic properties for reuse as public spaces, parks, passive recreational areas, and community gardens, as well as identify rural lands in need of protection. The project would also establish funds to create parks and recreation facilities. Planned open spaces will provide recreational opportunities as well as preserve natural and beneficial functions of floodplains which will alleviate flooding from future storms like Hurricane Matthew.	NS, NBS, P	-	Greene County	2-3 years
Greene	Implement Riparian Buffers: This project would provide funding for the county to implement riparian buffers along waterways. Riparian buffers improve water quality by filtering runoff and nutrients and provide a larger buffer for flooding.	NBS	-	Greene County	5-10 years
Greene	Turn Swine Lagoon Waste into Methane Gas: This project would work with local hog farmers to design anaerobic bio-digesters that create biogas from hog waste, which is 65 percent methane. The gas would be pumped to a centralized facility, where it will be upgraded to pipeline quality. The carbon-neutral gas (compared to non-captured lagoon emissions) will then flow into a major gas pipeline feeding into an energy utility company that would operate a combined-cycle power plant. It will help create jobs clean energy and reduce impacts from flooding of swine operations.	NS	-	Greene County	2-3 years

Table 28. HMRRP – Johnston County (5.4.1.)

County	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
Johnston	Acquisition/Mitigation Reconstruction/Elevation of Damaged Homes: Approximately 53 affected property owners have expressed interest in participating in acquisition (42), mitigation reconstruction (2), and elevation activities (9).	NS	-	Johnston County	1-3 years (varies among mitigation type)
Johnston	Emergency Response Shelter/Coordination Facility Construction: (1) Johnston County proposes to purchase land and construct an easily accessible centrally located large-scale dedicated shelter facility that also serves as a warehouse that could be used for storage and a shelter during emergencies such as hurricanes. The facility would include bays for trailers so stored supplies can be easily deployed to serve evacuees in transit or for other shelter locations, as well as meeting space that could be used for remote emergency operations and coordination as needed by coastal county officials during an evacuation. A facility of this nature located in the I-40/I-95 crossroads area would also be beneficial for NC Emergency Management (NCEM) and other disaster response agencies for staging or other coordination (2) The Town of Benson proposes to designate an Emergency Shelter for our community where we can offer food, water, and a safe place to ride out the storm. Currently the generator at the Town Hall is undersized and has been used as the standby generator. To provide emergency shelter, the town will need to purchase a commercial backup generator (3) Johnston County also proposes to purchase two 175-watt generators for existing school shelters.	NS	-	Johnston County	2-3 years
Johnston	Agriculture Recovery Grant Project Technical Assistance: Following Hurricane Matthew, the NC General Assembly allocated funding for agriculture industry to assist with repairs to farm ponds, roads, etc. The state agency overseeing these funds requires that Natural Resources Conservation Service (NRCS) standards be met to be eligible to receive the funds; however, NRCS does not have enough staff to assist farmers in proper design of projects, so the farmers are not getting the assistance they so desperately need. Rather than continuing to wait for NRCS assistance, enlist contracted engineering support to assist 30 farmers with developing NRCS-compliant projects so they may access the available funding.	NS, P	-	-	Less than 1 year
Johnston	Johnston County Public Utilities Mitigation: (1) Raise the flood protection dike and access road at the Central Johnston County Regional Wastewater Treatment Facility. Conduct a hydrologic and hydraulic study to determine adequate flood level to base future design on for raising the dike at the Water and Wastewater Treatment Plants (WWTP) (2) Relocate the Southeast Lowgrounds Water Booster Station (3) Relocate the electrical service for the raw water pumps at the Johnston County Water Treatment Plant (4) Add additional stormwater controls at various wastewater pump stations to prevent future flooding from rain waters (5) Implement water main relocations where existing water mains cross over culverts in the right-of-way at creek crossing that are being replaced by NCDOT after Matthew (6) Raise the control building at Selma Equalization and wastewater pump station (7) Re-locate the Buffalo Creek Wastewater Pump Station (8) Implement improvements to the Four Oaks	S, NS	-	Johnston County	1-5 years

County	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
	water system to mitigate damaged lines and equipment. Potential water quality issues may impact residential and business customers in the town.				
Johnston	Town of Smithfield Public Utility Mitigation: (1) Spring Branch Stormwater improvement project to increase capacity and properly handle flow in this area (2) Create a Comprehensive Stormwater Action Plan and Stormwater Implementation Plan, include inspection of drainage ponds to identify maintenance needs (3) Water Plant: "Harden" the barrier around the raw water pump chamber at the reservoir; Raise the electric panels at the reservoir; Install a lid at the water inlet vault on the southwest of the plant; Elevate the step-down transformer in the generator building at the reservoir; Elevate the switch gear in the generator building at the reservoir; Elevate the diesel fuel day tank in the generator building at the reservoir; Small boat with 5-hp motor is needed to access areas during inundation to keep system online (4) Collection System: Elevate panels, controls, fuel tank and generator at Lift Station #1; Elevate panels, controls and generator at Lift Station #7; Elevate panels, controls and generator at Lift Station #2; Elevate panels, controls and generator at Lift Station #18; Generator at Lift station #5; Winches (2) installed on town vehicles/trucks.	S, NS, P	-	Johnston County (Town of Smithfield)	1-3 years
Johnston	Town of Benson Public Utility Mitigation: (1) Public Works building relocation: This proposed project (potential new location is at 525 Market St in Benson) will purchase the property and to complete the rehab work needed to the building so that it can provide garage space for trucks and vehicles, equipment storage, as well as a heated office and restroom space. The old Public Works property will be demolished and maintained as open space in perpetuity (2) Elevate and replace/resurface entrance roadway to the damaged Benson Wastewater Treatment Facility. The flooding from Hurricane Matthew had caused the asphalt to lift and get carried away. Repairs will add eight inches of reinforced concrete with rebar in the affected areas affected, and additional damaged roadway areas will add eight inches of compacted bedrock and concrete to prevent further erosion (3) Complete a Comprehensive Stormwater Drainage study to detail where there is a need for replacement/improvement because of Hurricane Matthew and estimate costs for feasible projects. This is needed so that repairs consider the entire system rather than only fixing parts and inadvertently creating other issues (4) Elevate the Benson I-40 Lift Station and replace the generator (5) Repair damaged culvert areas where flooding caused sinkholes and culvert failures (6) Construct a dike around WWTP to capture overflow water in the event of another hurricane and flooding (7) Install a cap on the storm drain lines to prevent flood from the creek backing up into the WWTP	S, NS, P	-	Johnston County (Town of Benson)	6 months to 3 years
Johnston	Kenly Stormwater Drainage Improvements: (1) Replace tile at 407 S Alford – tile has a hole in it and collapsed (2) Ditch and tile problem by railroad @ Ethco requires replacement of tile under parking lot (3) Restore ditches, remove vegetative debris and repair/replace tile: First St @ Darden; Rose Lane @ Oakmont; Entrance to K Park on Princeton/Kenly Road; N Maple @ Third St and Fourth St; Ditch at Chevy Dealership on Seventh St – coordinate with Wilson County at the shared county line area; Dogwood; Ditch behind Rose St houses; Goldsboro to Chelsea; Fourth St @ Branch.	S	-	Johnston County (Town of Kenly)	1 year

County	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
Johnston	Power supply switch upgrade/obtain generators: (1) The Buffalo Road Delivery Point in Smithfield needs interconnecting wires and switches so if one delivery feed goes out then could switch the whole town to the other source temporarily. Purchase 10 pad-mounted step-down transformers to be placed at strategic points in the Town system and conduct extensive electrical wiring conversion done at both substation/delivery points (2) The Town of Benson's electric switchover box is located near Public Works which experienced flood damage during Hurricane Matthew. The switchover must be elevated to prevent future damage and loss of power during flood events (3) Purchase mobile generators and complete electrical conversions at critical intersections that need equipment converted to add a switch so can power by generator.	NS	-	Johnston County (Town of Benson)	6 months to 1 year
Johnston	Purchase Critical Emergency Response Equipment for Johnston County: (1) Install new barricades and signage for the CSX railroad crossing in downtown Smithfield that can be deployed wirelessly (2) Purchase barricades and emergency signage/equipment for road closures for Johnston County ES, Town of Smithfield and Town of Benson (3) Purchase equipment for Town of Smithfield to use in ditch maintenance that also could assist during emergencies as well as preparedness activities such as: A 60HP 15,000lb. mini excavator to help in tight areas such as blue-line ditches; 20ft heavy duty equipment trailer to transport equipment; Winches for trucks (17,500lb) waterproof wireless to remove large obstructions from culverts etc.; Large pull behind diesel trash water pumps 30HP or higher. (Minimum 1,000 gallons per minute); Jumping jacks and plate tamps for erosion control; Erosion control fabrics and mattings; Safety equipment (e.g., trench box, gloves, ladders, ropes, safety glasses, traffic cones).	S, NS	-	Johnston County (Towns of Benson and Smithfield)	6 months to 1 year
Johnston	Natural Gas Storage Facility Pump Replacement and Switch Elevation: purchase and install a submersible pump for the site to remove rainwater, as well as elevating the electrical switch panel to protect the components from rising water.	NS	-	Johnston County	6 months to 1 year
Johnston	Create Johnston County ES Building/Emergency Operations Center (EOC): create a dedicated Johnston County ES facility away from the courthouse complex with state-of-the-art EOC space for the county, secure/hardened server storage, staff offices, and bay access for ES vehicles and equipment. This centralized location will allow the county to deploy resources and mange response more efficiently for all types of emergency situations.	NS	-	Johnston County	1-3 years
Johnston	Improve Johnston County Flood Hazard Data with mapping and gages: (1) Coordinate with USGS to install permanent river gauges on: Little River at Rains Crossroads Road in Selma; Hannah Creek; Middle Creek; Swift Creek (2) Need detailed flood hazard study and credible regulatory data for: Buffalo Creek and Moccasin Swamp in Smithfield; Hannah Creek in unincorporated Johnston County; Swift Creek Watershed; Middle Creek watershed; Town of Benson Highway 301 Corridor from J-Lee Rd to Hale St.	P, NS	-	-	1-5 years

County	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
Johnston	Johnston County Stream Restoration/ Debris Removal: remove large vegetative debris from these waterways and remove silt to restore the channel to its proper depth and allow proper flow. This effort will restore natural floodplain functions and protect water adjacent areas and infrastructure.	S, NBS	-	Johnston County	1-3 years
Johnston	Smithfield Greenway Stabilization/Repair: repair the Hurricane Matthew damage on the Smithfield Greenway and restore functionality as soon as possible, particularly in the area just south of Hwy 70 where bank has eroded and exposed a county sewer line.	S	-	Johnston County (Town of Smithfield)	6 months to 1 year

Table 29. HMRRP – Jones County (5.4.1.)

County	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
Jones	Acquisition of approximately 17 flood prone residential properties clustered in several flood prone areas of the county.	NS	-	Jones County, NC Office of Recovery and Resiliency (NCORR)	3 years
Jones	Elevation of three flood prone residential structures.	NS	-	Jones County, NCORR	3 years
Jones	Increase GIS Capacity and Capability for Emergency Response and Damage Assessment Functions through ARC GIS Training for Three Jones County Staff. Redundancy staff resources with GIS capability can use flood forecasting information to coordinate response & recovery efforts inc. damage assessment.	P	-	Jones County	1 year
Jones	Create an outreach program on private road and “lane” maintenance for property owners emphasizing maintenance responsibilities, culvert sizing and replacement, grading, ditch maintenance, use of stone, etc. disperse information through appropriate multi-media measures. Potentially sponsor "field day" demonstrations of proper road maintenance methods.	NS	-	Jones County	1-2 years

County	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
Jones	Development of insurance education materials to provide property owners and renters with accurate knowledge on available insurance coverage. Confusion persists on how insurance works especially hazard insurance for coverage of flood or wind damage. Many property owners without mortgages or those outside of the regulated floodplain are unaware that flood insurance is available to them often at a very low premium. Renters are generally unaware that insurance is available to cover their contents. This includes non-residential renters who can replace business goods and furnishings fixtures and equipment damaged by floods if insured. Materials customized to eastern NC hazards to include flood, fire, wind, land subsidence and other hazards is necessary along with standard messaging which can be deployed on local websites, through social media and in local preparedness workshops and events.	NS	-	Jones County	2 years
Jones	Acquisition of one non-residential structure.	NS	-	Jones County (Pink Hill), NCORR	3 years
Jones	Working with the NC Forest Service and NCSU, develop an economic bio-mass production program to create a sustainable income stream for private forest landowners. Farmers who own forest land or agricultural land which could be converted to biofuel production have experienced several recent consecutive low yield harvest years due to weather and market factors compounded by Hurricane Mathew losses, in some cases catastrophic. Creation of alternative crops which are eco-friendly and would provide a sustainable income stream would steady the county's rural economic base and maintain the rural character of the landscape. Could reduce agricultural erosion on abandoned lands (reducing flood risk) and improve wildlife habitat.	NS, NBS	-	Jones County, NC Forest Service, NCSU	5 years
Jones	Debris Removal and Stream maintenance: post-Hurricane Mathew the county received $300,000 of the requested $500,000 for stream and drainage debris removal and drainage improvements. The funds were likely provided through the USDA Natural Resources Conservation Service (NRCS) Disaster Emergency Watershed Protection Program, but a $200,000 funding gap remains in the tributaries to the Trent River.	S	-	Jones County	1 year
Jones	Support consolidation of three Town of Trenton-area county schools into a combined K-12 facility: Two essential county schools located in the county seat of Trenton, are accessed via Weber Street (Rt. 41) which floods preventing ingress and egress posing a risk to students, teachers, and staff. A new, consolidated school is planned outside of the 1 % and 0.2% regulated floodplain adjacent to the present high school in an area where road access will not be threatened by high waters. The new school has been designed and Jones County is awaiting comment from the NC Dept. of Public Instruction as well as approval from the Local Government Commission on the proposed	NS, P	-	Jones County (Trenton)	3 years once design and financing are approved

County	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
	bond funding plan. This project would add wiring and a permanent generator to allow the school complex to perform during periods of emergency as the county's primary emergency shelter and provide other disaster response and recovery services operating on redundant power.				
Jones	High water warning signage along priority flood prone highways and roads: County roads are becoming even more prone to flooding posing a high risk to residents and "pass-through" travelers. Warning signs displaying flood depths or warning messages are viewed as an effective deterrent to drivers entering flood impacted road.	NS	-	Jones County	2 years
Jones	Road Drainage Enhancement: Low lying roads throughout the county isolate settlement areas in this rural community preventing access by first responders during medical emergencies, structure fires, floods, and coastal storms. Risk of vehicular accidents and even fatalities is high and requests for aid strains limited volunteer first responders. This is a pervasive issue throughout eastern NC and would require state NCDOT financial and technical resources coordinated with local Department of Transportation (DOT) staff. Priority areas require technical evaluation by a transportation engineer and in some cases a hydrologist, development and design of a preferred solution, and implementation and maintenance. Some areas will require proper sizing and replacement of culverts, others drainage ditch maintenance, road elevation and bridge elevation.	S	-	Jones County, NCDOT	5 years
Jones	Flood Forecasting Technical Enhancement: The county has access to real-time flood gage data but does not have flood forecasting technical expertise to predict flood levels throughout the county to appropriately evacuate citizens at risk, deploy resources and respond safely. This project is intended to provide technical training to at least three county employees so that redundant technical skills are available during emergencies to analyze real-time flood data to advise emergency response and deployment of resources.	P	-	Jones County	6 months
Jones	Enhance non-state-maintained road drainage in priority high-water areas which impedes public safety-first responders requiring emergency swift water rescues. Many rural "lanes" and access roads are not state, or county maintained and are included in property deeds. Many lead to single residences or clusters of homes which become isolated during floods and coastal events, impeding access by public safety-first responders during medical emergencies and structure fires. Improved drainage could mean mitigation of culverts, ditch expansion and maintenance, etc. State created "best management practices" are needed for local landowners, many of whom have equipment and could better maintain their roads and lanes with technical support. This project would support rural road maintenance materials which could be available online, and potentially a field demonstration day.	S	-	Jones County	-

County	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
Jones	Relocate Jones County Courthouse Basement Magistrate's Office and Jail to higher, safer level of the building or alternate facility. The multi-story County Courthouse is located less than two blocks from the Brock Pond dam and old mill pond. The structure failed during Hurricane Floyd, flooding vast areas of the Town of Trenton, including the courthouse and municipal building which houses the County Commissioner's meetings and the local Soil and Water Conservation District (SWCD) offices. The County Jail and Magistrate's Office are in the basement of the courthouse building. The Magistrate high perishable records and computer equipment is also located in the basement. In the short-term, relocation of the Magistrate's Office to a higher location in the building would be beneficial, relocation of incarceration facilities to a higher, safer location should be considered to eliminate the need for dangerous prisoner evacuations during periods of flood threats.	NS	-	Jones County (Trenton)	Magistrate relocation, short-term; Jail relocation long-term
Jones	Hofmann Forest (NCSU resource facility) drainage system mitigation: Drainage has been enhanced throughout this 30,000-acre track to facilitate industrial forestry practices conducive to southern pine silviculture. Enhanced drainage throughout the 80,000-acre tract (30,000 acres in Jones County) creates high flood flows and downstream negative agricultural impacts within the Trent and White Oak River watersheds.	S	-	Jones County, NCSU	Long-term

Table 30. HMRRP – Lenoir County (5.4.1.)

County	Investment	Type	Maintenance	Ownership/ Management	Status & Barriers
Lenoir	Construct Housing at Sites previously prepped for Development after Hurricane Floyd: Hurricane Matthew resulted in flooding to homes farms businesses and infrastructure in Lenoir and adjacent counties and relocating and assisting displaced residents to areas outside of the floodplain will address the unmet need of housing residents in resilient areas not prone to flooding. This project will help fund a range of housing options at these sites that have already been prepared for development. This project would assess the status of these sites and determine the most suitable types and amount of housing for each site.	NS	-	Lenoir County, NC Office of Recovery and Resiliency (NCORR)	0-2 years
Lenoir	Business Relocation Program: This project would target businesses along US 70 that were impacted by the flood waters following Hurricane Matthew. This project would identify suitable/comparable commercial sites for businesses to relocate. In addition, the project would help create financial incentives that could include tax incentives, installation of infrastructure, and assistance with relocation costs. The project could utilize the state's tax increment financing program.	NS	-	Lenoir County	0-2 years

County	Investment	Type	Maintenance	Ownership/ Management	Status & Barriers
Lenoir	Stormwater Improvements in LaGrange: Currently, there is poor drainage along Washington Street in LaGrange, which results in high water on the road. This leads to road closures and property damage. This project would improve stormwater control measures along this roadway. Opportunities should also be evaluated for enhancements that would benefit pedestrians, cyclists, and aesthetics along this gateway. This project will design and construct mitigation measures to minimize or prevent future flooding.	S	-	Lenoir County (LaGrange)	2 years
Lenoir	Stormwater Improvements in Kinston: Following Hurricane Matthew, the City of Kinston was inundated with floodwater. Improving stormwater management in the city is important to protecting infrastructure and utilities, to prevent infiltration of stormwater into the sewer system. Projects to rectify the situation are needed throughout the city.	S	-	Lenoir County (Kinston)	2-3 years
Lenoir	Backup generators: Back-up generators can supply power to critical facilities during power outages. This project will purchase and install back-up generators for 31 critical facilities that lack back-up power supplies in Lenoir County. The locations in need of back-up generators include: ten pump stations in the Town of LaGrange, three emergency shelters (Kinston High School, North Lenoir High School, and South Lenoir High School), and eighteen volunteer fire Depts./EMS facilities. Note that two of the volunteer fire Depts. are in adjacent counties but serve portions of Lenoir County (Seven Springs VFD is in Wayne County and Wyse Fork VFD is in Jones County).	NS	-	Lenoir County (LaGrant, Kinston)	1 year
Lenoir	Develop Recreation Facilities on Hazard Mitigation Grant Program (HMGP) (FEMA) Properties: Fund the development of soccer fields, campground, amphitheater, greenway trails, restore natural wetlands, and recognize cultural heritage with markers that were previously identified in local plans on properties that were acquired as a part of HMGP (FEMA) because of previous storms. This project will implement these ideas by conducting a feasibility study, site selection, cost estimates, and construction of these facilities.	NBS, P	-	Lenoir County	2-3 years
Lenoir	Flood-proof Lenoir County Sheriff's Dept.: Flood Prevention Measures for the Lenoir County Sheriff's Dept.: This project will evaluate ways to keep the basement of the Lenoir County Sheriff's Office from flooding. Options for this project include hardening of the building, water proofing, and/or evaluating methods to direct stormwater away from the building.	NS	-	Lenoir County	1-2 years
Lenoir	Relocate Lenoir County Center for the NC Cooperative Extension: The Lenoir County Center for the NC Cooperative Extension Office was damaged by floodwaters from Hurricane Matthew. The staff of the Lenoir County Center has been operating out of temporary space in Kinston until a permanent solution can be found. This project will identify a new permanent location for the Lenoir County Center from which the NC Cooperative Extension can operate.	NS	-	Lenoir County, NC Cooperative Extension	12-18 months
Lenoir	Phase II of the Riverwalk: This project would construct the second phase of a greenway project along the Neuse River in the City of Kinston. Note that final designs have been completed for this project. Trails and greenways help improve air and water quality. By protecting land along rivers and streams greenways prevent soil erosion and filter pollution caused by agricultural and road runoff. Greenways also serve as natural floodplains. By	S, NBS	-	Lenoir County (Kinston)	1-2 years

County	Investment	Type	Maintenance	Ownership/ Management	Status & Barriers
	restoring developed floodplains to their natural state many riverside communities are preventing potential flood damage.				
Lenoir	Kinston Bypass Project: This project would construct the planned Kinston Bypass (STIP No. R-2553), which would be constructed outside of or above flood levels so that roadway would not have to be closed during future flooding events.	NS	-	Lenoir County (Kinston) NCDOT	5-7 years
Lenoir	Carey Road Extension Project: Following Hurricane Matthew, multiple roadways, including US 70 and other local roads, such as Vernon Avenue were closed due to flooding. This project would extend Carey Road from Hull Road to US 258. This project would provide an alternative east-west connection between Kinston and US 258.	NS	-	Lenoir County, NCDOT	3-5 years
Lenoir	Global TransPark Rail Spur Project: Businesses that rely on the existing NC Railroad to transport their goods were unable to do so for the several weeks that this railroad was closed during the storm. This project would provide alternative access to Class I railroad for the businesses in Lenoir County and the greater region during future flooding events.	NS	-	Lenoir County, NC Railroad	3-5 years
Lenoir	Neuse River Regional Plan: Prepare a Neuse River Basin Regional Plan to identify the causes of flooding and to identify preventive measures for flood prevention. The county recognizes that flooding in the area has increased over the last decade and there are many causes that need to be addressed regionally.	P	-	Lenoir County	5+ years
Lenoir	Stream and Drainage Clean Up: Partner with the NCDACS Division of Soil and Water Conservation District's (SWCD's) Stream Debris Removal Project to remove storm debris blocking streams and drainage systems This project would involve collaboration with statewide Big Sweep cleanup to remove debris, provide funding for necessary tools and equipment.	S	-	Lenoir County	0-1 years
Lenoir	Expand Beaver Management Program: Currently Lenoir County only funds a part-time employee for beaver management and this project would expand this to a full-time employee dedicated to beaver management.	P	-	Lenoir County	0-1 years
Lenoir	Management Plan for HMGP (FEMA) Properties: The county currently maintains over 800 such properties, and applications have been submitted for over 200 additional buyouts. The county is seeking funding to complete a management plan to evaluate potential uses for these vacant properties, particularly to further hazard mitigation for neighboring areas. The plan would include a study to identify and select strategic properties for reuse as public spaces, parks, passive recreational areas, and community gardens.	NS, P	-	Lenoir County	1 year
Lenoir	Implement Riparian Buffers: This project would provide funding for the county to implement riparian buffers and wetland restoration along waterways, including the Neuse River and Adkins Branch. Riparian buffers improve water quality by filtering runoff and nutrients and provide a larger buffer for flooding. This project would provide funding for a riparian buffer plan that would identify areas along rivers and streams in Lenoir County that could be	NBS, P	-	Lenoir County	5-10 years

County	Investment	Type	Maintenance	Ownership/ Management	Status & Barriers
	targeted for expanded riparian buffers. In addition, the project would provide funding to help implement the expanded riparian buffers.				

Table 31. HMRRP – Nash County (5.4.1.)

County	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
Nash	Homeowners' assistance to mitigate the impacts of flooding: This program would help homeowners to mitigate the impacts of flooding. The program could include housing elevation, installation of flood vents, the construction/improvement of drainage ditches, etc.	NS, S	-	Nash County	Could be implemented immediately upon being funded.
Nash	Increase crop loss reimbursement rates: This program would increase crop loss reimbursement rates for farmers who are negatively impacted by flooding. Currently crop and livestock agricultural losses because of hurricanes are reimbursed at 50%. This project would help producers with revenue assistance up to 85% of county yield and 100% of county price.	NS	-	Nash County	Could be implemented immediately upon being funded.
Nash	Hazard Mitigation Provisions for Commercial Properties: This project would elevate critical infrastructure and provide flood proofing at businesses in repetitive flood areas through financial and other assistance.	NS	-	Nash County	Could be implemented immediately upon being funded.
Nash	Repairs/replacements of farm paths, culverts, bridges, ponds, etc.: Assist producers/landowners with repairs/replacements of farm paths, culverts, bridges, ponds, etc. that are not covered under the federal Emergency Conservation Program up to 75% of costs.	S	-	Nash County	Could be implemented immediately upon being funded.
Nash	Public Services and Wastewater Facility Relocation: This project would relocate or flood proof critical public facilities out of flood prone areas and/or fund projects to flood proof these facilities. Facilities identified include animal control operations and public safety radio tower in Nashville, and sanitary sewer pump stations in Nashville and Rocky Mount.	NS	-	Nash County (Nashville and Rocky Mount)	Could be implemented immediately upon being funded.
Nash	Clearing and snagging of storm water conveyances: This program would provide funding for clearing and snagging of larger storm water conveyances in partnership with local, state, and federal partners.	S	-	Local Governments	Could be implemented immediately upon being funded.

County	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
Nash	Install generators and transfer switches at emergency shelters: Purchase and install generators and transfer switches for emergency shelters and other critical facilities within the County needed to support emergency response efforts. There are 35 critical facilities in Nash County.	NS	-	Nash County	Could be implemented immediately upon being funded.
Nash	Repair or replace undersized storm water infrastructure: Make drainage improvements in the county by identifying ageing and undersized storm water infrastructure within the county such as culverts/pipes, ditches and other drainage facilities, and repair or replace as needed.	S	-	Nash County	Could be implemented within 6 months of it being funded.
Nash	Improvement and conversion of private roads to public maintenance: provide funding for the improvement of unimproved roads and convert publicly dedicated, non-state maintained and non-municipal roads to public maintenance. Many of these roads experience erosion and other degradation after heavy rain events presenting challenges to EMS and potentially isolating residents many of whom live in low to moderate income housing.	NS	-	Nash County	Could be implemented immediately upon being funded.
Nash	Early flooding notification tool: develop an early notification tool that will warn individual property owners of pending flooding using USGS data, the Advanced Hydraulic Prediction Service, and NC Flood Inundation Mapping, and using a reverse 911 type of property owner notification.	NS	-	Nash County	0-12 months
Nash	Buyout property conversion program: convert properties bought-out after Hurricanes Floyd, Matthew and other hurricane events to recreational uses or natural areas. It would also provide funding for tree planting and other methods of returning the land to its natural state. It would allow local governments in Nash County to convert the land into open and recreational space to attract tourism.	NS, NBS	-	Nash County	6 months
Nash	Clearing and snagging Stony Creek Paddle Trail: Clearing and snagging Stony Creek of debris that prevents use of the paddle trail making it safe for recreational usage, while enhancing channel flow during storm events.	S	-	Nash County	7 months

Table 32. HMRRP – Pamlico County (5.4.1.)

County	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
Pamlico	Elevate homes: Properties located in the Special Flood Hazard Area (SFHA) are in constant danger of repetitive flooding. Elevating properties to the Design Flood Elevation (DFE = Base Flood Elevation (BFE) + 2 ft) reduces the risk of flood damages occurring from the 100-yr flood event. Elevate flood prone properties located within the County. Priority restoration (repair)	NS	-	Pamlico County, NC Office of Recovery and Resiliency (NCORR)	The County is concerned with new State flood maps that fail to

County	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
	properties (based on the level of exposure and access issues) will be identified through collaboration with the County Government. The County prefers to elevate homes whenever and wherever feasible. They have already elevated several homes through HMGP (FEMA) and have found this approach to be effective in protecting homes against flooding. The County has already identified and elevated few homes and is in the process of identifying others through a sequential process of prioritization to identify and secure funding for resilient rebuilding. It is important to ensure that all associated utilities, including air conditioning units, propane tanks, and other items, are elevated along with the housing itself. Additionally, propane tanks that cannot be elevated should be tied down to avoid floating away if ever inundated. The County is considering adopting comprehensive mitigation strategies by requiring higher elevation of new homes in areas that saw flooding during Hurricane Irene.				take into consideration flooding from Hurricane Irene and the levels shown are inadequate. Areas that are flood prone have been taken out of the flood zones.
Pamlico	Acquisition of Damaged Housing: The County has a significant problem of abandoned and blighted housing in many low-to-moderate income areas. Severe flooding from hurricanes, including Irene and Matthew, has led to various properties throughout the county being abandoned by the owners and subsequently condemned.	NS	-	Pamlico County, NCORR	-
Pamlico	Relocate Mobile Homes: Hurricane Matthew worsened damage to mobile homes in the county that sustained damage from previous storms. Multiple mobile homes in the County need to be relocated out of the floodplain as a cost-effective means of increasing community resilience. Issues regarding acquiring new property in flood resistant areas for the Mobile homes need to be considered. Most low to moderate income families cannot afford to acquire new property or to move their homes to more costly property.	NS	-	Pamlico County, NCORR	-
Pamlico	Emergency Preparedness Guidebook: During hurricanes such as Matthew and Irene, ES personnel had to respond to many more emergency calls than usual. Pamlico County, together with the Towns of Vandemere, Bayboro, Grantsboro, Alliance, Oriental, Mesic, Stonewall, Minnesott Beach, and Arapahoe, should prepare an emergency guidebook for distribution to all residents to educate them on what to do to remain self-sufficient for up to 72 hours after a natural hazard event. County prefers this guidebook to be available on the County and Chamber of Commerce websites as a download able pdf. The guidebook would be a good place to address tying down of propane tanks.	NS	-	Pamlico County (Vandemere, Bayboro, Grantsboro, Alliance, Oriental, Mesic, Stonewall, Minnesott Beach, and Arapahoe)	1-2 years
Pamlico	Ordinances for New Commercial Development: The County should establish and enforce building ordinances/standards that will increase resilience of new commercial development by elevating buildings, elevating contents, and enforcing freeboard requirements. The county is already doing this and will continue to try to make improvements. Economic Developer encourages new and existing businesses to build or modify to be more resilient to storm events. County also considers of placement of types of businesses and the impact of storms on business and community.	NS	-	Pamlico County	-
Pamlico	Relocate Business Development Corridor: Focus future development of and relocation of the existing business development corridor to outside of the 100- and 500-year floodplains. There	NS	-	Pamlico County	36-48 months

County	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
	are multiple high areas within the County (out of the SFHA) which could be considered for potential relocation during future discussions with the county.				
Pamlico	County Jail/Sherriff's Office: The facility experienced flooding during hurricanes Irene and Matthew, as well as frequent impacts from high tide events. The jail lost power during Hurricane Matthew, resulting in a food shortage, and nearly necessitating the evacuation of 108 inmates. The facility needs an emergency generator with backup power source to ensure uninterrupted power to refrigeration facilities. Adaptation strategies include elevating building systems (heat, ventilation, and air conditioning (HVAC), lighting and electrical breakers/controls, radios and communications, water/wastewater, and foodstuffs), installing backup generators with fuel storage, and considering the installation and use of solar panels with backup batteries to support the generators.	NS	-	Pamlico County	1 year
Pamlico	Pamlico County Middle School: Pamlico County Middle School is in or on the edge of the 100-year floodplain and is subject to inundation during flood events. Constructing berms around the facility and/or flood proofing can help reduce flooding risk and provide for continued operations during such events, providing critical services to citizens. Elevating essential building systems and records and providing offsite backup servers for school records are recommended. The county should also evaluate the possibility of constructing a new school facility outside of floodplain or converting the existing building to multi-story construction with open space on the ground floor. The county indicated that essential building records have already been elevated, HVAC and electric have been raised, and the building has been adapted to be as flood resilient as possible.	NS	-	Pamlico County (Bayboro)	3 years
Pamlico	Pamlico County Emergency Shelter: The County would like to upgrade the Community College shelter area to accommodate special needs individuals (including disabled access measures) and add shower facilities. The current generator capacity should be evaluated to determine its ability to meet the increased sheltering needs for both people and animals; if found insufficient, generator capacity should be increased. The county indicated that a new generator is needed for the college and are currently leasing one for $4,000 per month.	NS	-	Pamlico County (Grantsboro)	1-2 years
Pamlico	Route 304: Due to the topography and roadway layout, this area gets flooded quickly during a storm event. Flood depths of 2 feet-9 feet were observed during Irene and 7 feet during Isabel. Elevate roadway or reroute to avoid 100-year floodplain. Elevate roadway or reroute to avoid 100-year floodplain. Road would be difficult to reroute due to known wetland areas.	NS	-	Pamlico County, NCDOT	1-2 years
Pamlico	Near Callison Road Bridge: Elevate bridge and approaches out of 500-yr floodplain. Apart from elevating the bridge and approaches out of the flood plain, retrofit the drainage to Trent Creek by enlarging the culverts and dredging the creek.	S, NS	-	Pamlico County, NCDOT	1-2 years
Pamlico	3rd Street Bridge over Bay River: The bridge is the primary means of access to the state prison and floods during hurricane events such as Matthew and Irene. Elevate bridge and approaches out of 500-yr floodplain.	NS	-	Pamlico County, NCDOT	1-2 years

County	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
Pamlico	Florence Road: Gets flooded during hurricanes like Mathew, Irene and even wind driven smaller intensity/higher frequency events, cutting off access to parts of the community. Elevate the roadway out of the floodplain and/or upsize culverts to handle the flows. This project will prevent the roadway from cutting off connected communities, improve drainage capacity and alleviate flooding issues.	S, NS	-	Pamlico County, NCDOT	1-2 years
Pamlico	Lynches Beach Loop & Swan Point: Intersection of these two roads flooded during hurricanes like Matthew, Dennis, Floyd, Isabelle, and Irene. Even floods with normal wind driven smaller intensity/higher frequency events such as Northeasters, cutting off access to part of the community. Proposed strategies include elevating the roadway out of the floodplain and/or upsize culverts to accommodate the flows. The county indicated that intersection needs to be elevated to increase community access during and after any major storm event.	S, NS	-	Pamlico County, NCDOT	1-2 years
Pamlico	Griffin Road, Vandemere: High tide and Storm-based high water surface elevations in Log Pond Creek result in flooding of Griffin Road, which causes flooding and access issues to the area west of Griffin Road. Elevate or reroute Griffin Road out of 500yr floodplain if feasible. This project will prevent flooding impacts to the roadway, maintaining access to the connected communities, improving drainage capacity and alleviating flooding issues. Proposed strategies include elevating or rerouting Griffin Road out of 500yr floodplain if feasible.	NS	-	Pamlico County (Vandemere), NCDOT	1-2 years; The County indicated that it will be difficult to reroute Griffin Road due to known wetland areas in the vicinity.
Pamlico	Pamlico Road: Road experienced flooding impacts during hurricanes Matthew, Irene and during wind driven smaller intensity/higher frequency events, causing access to the community to be cut off. Elevate the roadway out of the floodplain and/or upsize culverts to accommodate the flows. This project will prevent flooding impacts to the roadway (maintaining road access to the community), improve drainage capacity and alleviate flooding issues.	S, NS	-	Pamlico County, NCDOT	1-2 years
Pamlico	Stormwater ditches: Develop and implement a drainage ditch maintenance program. Acquire necessary equipment to support the program.	S	-	Pamlico County	1-2 years
Pamlico	County Human Services Complex: The facility got flooded during hurricanes Irene and Mathew apart from high tide events. Adaptation strategies include elevating building systems (HVAC, lighting and electrical breakers/controls, radios and communications, water/wastewater, and foodstuffs), installing backup electricity storage and generation using generators with fuel storage, and considering the installation and use of solar panels with backup batteries to support the generators. It is also recommended that critical documents be elevated or relocated out of the FEMA-SFHA. Document storage and servers could be relocated to the Community College. Alternately, adding shelving and raising all documents above the base flood elevation at the current location will help mitigate against flood hazards, and electronic files could be backed up to public domain Cloud servers.	NS	-	Pamlico County (Bayboro)	1-2 years

County	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
Pamlico	Town Hall, Vandemere: The facility got flooded during hurricanes Irene and Mathew apart from high tide events. Adaptation strategies for the town hall include elevating building systems (HVAC, lighting and electrical breakers/controls, radios and communications, water/wastewater, and foodstuffs), installing backup electricity storage and generation using generators with fuel storage, and considering the installation and use of solar panels with backup batteries to support the generators. It is also recommended that the town's document storage facility be elevated or relocated out of the FEMA-SFHA. Document storage and servers could be relocated. Alternately, adding shelving and raising all documents above the base flood elevation at the current location will help mitigate against flood hazards, and electronic files could be backed up to public domain Cloud servers.	NS	-	Pamlico County (Vandemere), NCDOT	1-2 years
Pamlico	County Courthouse: The facility got flooded during hurricanes Irene and Mathew apart from high tide events. Adaptation strategies for the courthouse complex facilities include elevating building systems (HVAC, lighting and electrical breakers/controls, radios and communications, water/wastewater, and foodstuffs), installing backup electricity storage and generation using generators with fuel storage, and considering the installation and use of solar panels with backup batteries to support the generators. It is also recommended that the county's document storage facility be elevated or relocated out of the FEMA-SFHA. Document storage and servers in the courthouse complex could be relocated to the Community College. Alternately, adding shelving and raising all documents above the base flood elevation at the current location will help mitigate against flood hazards, and electronic files could be backed up to public domain Cloud servers. Evaluate the feasibility of constructing a berm or bulkhead around the complex. The county indicated that the document storage area now has raised shelving.	S, NS, P	-	Pamlico County (Bayboro)	1-2 years
Pamlico	Sanitary and storm sewers: Sanitary and storm sewers within the county require continuous operations of pump stations. During severe storm events such as Matthew, power outages coupled with access issues to the pump station facilities prevented the operation, monitoring and refueling operations. Provision of backup generators and backup power sources for pump stations, and evaluation of the feasibility of installing solar panels and/or backup batteries for each station are recommended strategies.	NS	-	Pamlico County	1-2 years
Pamlico	County Wastewater Treatment Plant: Plant becomes inaccessible due to severe storm events due to flooding of the roadway leading to the plant. The plant is equipped with an emergency generator but access issues from flooding prevent plant personnel from monitoring and refueling the generator. Adaptation strategies for the wastewater treatment plant include installation of alternate power source for the backup generator, such as solar panels and/or backup battery. The plant should also be evaluated to determine if backflow preventers should be installed in discharge pipes and, if appropriate, install the valves. The county indicated that the plant is elevated, but the access to the plant is not.	NS	-	Pamlico County	1-3 years
Pamlico	Kershaw Road Culverts: Increase culvert capacity and elevate roadway out of 500-yr floodplain, or alternatively reroute road out of floodplain where possible. Identify restoration hotspots to	S	-	Pamlico County, NCDOT	1-2 years

County	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
	determine proposed bridge and roadway elevations. Exact locations of the culverts should be identified through further discussions with the county.				
Pamlico	Janiero Road: Elevate roadway out of 500-yr floodplain to provide access to camping and conference center facilities.	NS	-	Pamlico County, NCDOT	1-2 years
Pamlico	Orchard Creek Road: Elevate or reroute roadway out of 500-yr floodplain.	NS	-	Pamlico County, NCDOT	1-2 years
Pamlico	Route 55 Corridor: Approximately 2 miles of this roadway is the site of numerous hydroplaning accidents. The roadway should be regraded to facilitate drainage and avoid ponding. Analyzing and upgrading culverts to handle increased flooding and establishing signage to communicate risk of hydroplaning could also decrease the risks posed by standing water on the roadway. Elevate Route 55 Corridor out of 500yr floodplain and upgrade culverts to handle increased flooding.	S, NS	-	Pamlico County, NCDOT	1-2 years
Pamlico	Griggs Road, Vandemere: Vandemere and Cedar Creeks experience occasional flooding due to high tide wind tides from the Bay River, causing inundation of Griggs Road and subsequently resulting in access issues. Reroute and elevate Griggs Road out of 500-yr floodplain. If deemed unfeasible, relocate isolated facilities. This project will prevent the roadway from cutting off connected communities, improve drainage capacity and alleviate flooding issues. Proposed strategies include rerouting and/or elevating Griggs Road out of 500yr floodplain. If deemed unfeasible, relocate isolated facilities. The county indicated that it will be difficult to reroute Griggs Road due to known wetland areas in the vicinity.	S, NS	-	Pamlico County (Vandemere), NCDOT	1-2 years
Pamlico	Jones Road and Pennsylvania Avenue, Vandemere: Areas bordered by Jones Road and Pennsylvania Avenue are in the FEMA-SFHA and are subject to frequent flooding. Elevate Jones Road and Pennsylvania Avenue out of FEMA-SFHA to ensure egress routes available when coastal flooding occurs. Proposed strategies including elevating Jones Road and Pennsylvania Avenue out of FEMA-SFHA to ensure egress routes available when coastal flooding occurs. This project will be useful to prevent roadway from cutting off connected communities, improve drainage capacity and alleviate flooding issues.	NS	-	Pamlico County (Vandemere), NCDOT	1-2 years
Pamlico	Paradise Shores: Gets flooded during hurricanes like Mathew, Irene and even wind driven smaller intensity/higher frequency events, cutting off access to the community. Elevate the roadway out of the floodplain and/or increase culvert sizes to handle the flows.	S, NS	-	Pamlico County, NCDOT	1-2 years
Pamlico	Meekins Road: gets flooded during hurricanes like Mathew, Irene and even wind driven smaller intensity/higher frequency events, cutting off access to the community. Elevate the roadway out of the floodplain and/or upsize culverts to handle the flows.	S, NS	-	Pamlico County, NCDOT	1-2 years
Pamlico	South Street: Elevate South Street out of 500yr floodplain, due to location improving drainage is going to be difficult if not impossible.	NS	-	Pamlico County, NCDOT	1-2 years
Pamlico	Straight Road: Road experienced flood impacts during hurricanes like Matthew, Irene and during wind driven smaller intensity/higher frequency events, cutting off access to part of the	S, NS	-	Pamlico County, NCDOT	1-2 years

County	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
	community. Elevate the road out of the floodplain and/or upsize culverts to accommodate the flows.				
Pamlico	Upper Neck Road: Gets flooded during hurricanes like Mathew, Irene and even wind driven smaller intensity/higher frequency events, cutting off part of the community. The roadway needs to be elevated out of the floodplain and/or culvert sizes should be increased to handle the flows.	S, NS	-	Pamlico County, NCDOT	1-2 years
Pamlico	Crop Storage Facilities Retrofits: Crop storage and processing facilities, fishponds, access roads, and related equipment on farms are subject to flooding during high tide and severe storm events including hurricanes Irene and Matthew. The facilities and related equipment should be elevated out of the floodplain.	NS	-	Pamlico County	-

Table 33. HMRRP – Pitt County (5.4.1.)

County	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
Pitt	Creation of Affordable Rental Housing: The county will explore options to purchase land outside of the flood zones and build affordable housing units; whether those will be single family or multifamily still needs to be determined. The new housing will keep and increase the population within the county and therefore will positively affect the economy.	NS	-	Pitt County	-
Pitt	Acquisition of Homes within Flood Hazard Area: Residents would need to accept acquisition of the property by the County to participate. The priority will be on repetitive loss properties as they reduce the most suffering to resident and are most likely to be cost effective. A requirement of participation is the relocation to another area that is not within a flood zone or flood way.	NS	-	Pitt County (Greenville)	-
Pitt	Debris Removal and Rehab of Stormwater Drainage, Waterways, and Watersheds: Many waterways throughout the county are so full of debris that boats, and water commerce cannot get in or out of the areas necessary to continue business. Additionally, areas of drainage ditch throughout the county are clogged with debris and therefore force water on to major roadways throughout the area. Drainage ditches, waterways, and watersheds will be dredged and cleared of debris and obstruction left in the wake of Hurricane Matthew.	S	-	Pitt County	1 year
Pitt	Construction of Gym/Emergency Shelter on Community Center Property on County Home Road: The community center and gym will serve as an emergency shelter out of the floodplain. The shelter will be more reliably accessible and available to stay open in times of disaster.	NS	-	Pitt County (Greenville)	0-2 years
Pitt	New Greenville Utilities Commission (GUC) Operations Center Phase II: The proposed new site takes it out of the floodway and flood zone reducing risk and improving efficiency during emergency response. GUC on plans to build a new Operations Center at its Hwy 43 West	NS	-	Pitt County (Greenville)	0-2 years

County	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
	property to facilitate day to day operations for electric, water, sewer, natura gas operations and support services (fleet maintenance, warehousing and storage, human resources, call center, information technology, and risk/facilities management). This development will include 220,000 covered square feet on 82 acres and will incorporate offices, training and assembly facilities, warehouses, fleet storage, maintenance shops, a garage and material lay down and storage yard.				
Pitt	Relocation of Grifton Police Dept.: The police Dept. is currently located within the floodplain and would be best suited in an area that did not flood during major flooding events. Would allow the police dept. to relocate out of the flood zone and free up three building locations on our Boulevard for new businesses that could bring jobs and income into the area.	NS	-	Pitt County (Grifton)	0-2 years
Pitt	Greenville 230kV West Substation Upgrade: Installing a supplemental 120 MVA transformer at the G230 West McGregor Down Road POD will increase redundancy and help the GUC to meet electric peak load capacity during flood events.	NS	-	Pitt County (Greenville)	7 months
Pitt	Pump Station Resiliency and Protection: This project addresses threats to the capacity and operation of remote regional pump stations for GUC. Components of the project include bar screen additions at Green Mill-Run Pump Station ($1M), Fork Swamp ($1M), Industrial Park ($1M); PLC replacement at Industrial Park, Green Mill Run and Fork Swamp regional pump stations ($180,000); and site erosion mitigation, seal water line install, and joint sealant/waterproofing at North Side pumping station ($113,000). Retrofitting and upgrading pump stations will prevent not only flood water intrusion but also contamination.	NS	-	Pitt County (Greenville)	12-18 months
Pitt	Natural Gas Bridge Attachment Relocation: This project would involve the relocation of approximately 1,600 LF of natural gas main that are currently attached to bridges over bodies of moving water. The project would involve burying the approximately 6,300 LF of pipe via horizontal directional drilling to replace the bridge attachments. This project will help reinforce Greenville Utility Commission's gas system by burying assets that could be damaged during a flood.	NS	-	Pitt County, Greenville Utility Commission	18 months
Pitt	Delineation of Environmentally Sensitive Areas with the County: Delineating environmentally sensitive areas will potentially allow the county to identify areas in which the Clean Water Management Trust Fund can be applied. Directing growth away from environmentally sensitive and high hazard areas, delineate environmentally sensitive areas both are either suitable or unsuitable for growth and development through land use planning.	NS, P	-	Pitt County	6 months

Table 34. HMRRP – Wake County (5.4.1.)

County	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
Wake	Acquisition or Elevation of Flood-Prone Properties: Use voluntary acquisition or elevation of flood-prone properties to remove or reduce risk in known high risk areas. These areas include the Brook Hill Townhouse Apartments along Walnut Creek and the Riverbend Subdivision along the Neuse River. Other areas of Repetitive Loss will be considered as well.	NS	-	Wake County	3-5 years
Wake	City of Raleigh Crabtree Lift Station Rehabilitation: the city is currently rehabilitating this pump station. During Hurricane Matthew this lift station overflowed in part due to heavy rainfall and flooding of Crabtree Creek. The city estimated lift station capacity was reduced by 20% due to Hurricane Matthew.	NS	-	Wake County (Raleigh)	In Progress (2017)
Wake	Wake County School System Un-Met Needs: Wake County Public School System has unmet needs for cost of debris removal at schools across the county and for repairs at the Vernon Malone College and Career Academy which experienced significant flood damage during Hurricane Matthew and again during the rainfall event in late April 2017. The school is not located in the floodplain per current maps.	S, NS	-	Wake County	Immediately (2017)
Wake	Upgrade Vulnerable Roads and Bridges: Roadway and bridge improvements to alleviate flooding. For Rose Lane (City of Raleigh owned and maintained), elevating the bridge will ensure emergency access to residents south of Walnut Creek. Hwy 64/264 is a major artery (NCDOT owned and maintained) into and out of Raleigh that has been flooded by Buffalo Creek in past events, closing this major highway into and out of Raleigh. Old Stage and Fannie Brown at Middle Creek. Another potential area for consideration includes Swift Creek at Old Stage Rd.	NS	-	Wake County (Raleigh, Walnut Creek), NCDOT	3-5 years
Wake	Zebulon Dam Repair: The historic Zebulon Dam was damaged during Hurricane Matthew which coincided with flood damage to NC Hwy 97 just south of the dam. The dam was partially breached.	S	-	Wake County (Zebulon)	2-3 years
Wake	Assess and mitigate areas of recurring flooding: Assess viable solutions to enhance existing strategies to mitigate the effects of recurring flooding at: Crabtree Valley Mall Area, Old wake Forest Road at Crabtree Creek, Capital Boulevard at Marsh Creek, Brook Hill Townhouse Apartments at Walnut Creek.	P	-	Wake County	2-5 years
Wake	Install/Improve Flood Warning System: Install five stream gages; three along the Neuse River, one on Walnut Creek, one on Swift Creek, one on Middle Creek and one on Crabtree Creek as part of Flood Inundation Mapping and Alert Network (FIMAN) network. Existing USGS gage stations that are not already in FIMAN should be considered for addition to the network. Additional areas for potential gage placement include Swift Creek at Highway 401 and Middle Creek at Highway 401 south of Wake Tech.	NS	-	Wake County, USGS	2-3 years
Wake	Crabtree Creek Greenway Bridge Reconstruction: Reconstruct the Crabtree Creek Greenway bridge near Capital Boulevard. This elevated portion of the greenway was damaged by Crabtree Creek flooding during Hurricane Matthew and again during April 2017 flooding.	S	-	Wake County (Raleigh)	0-1 year

County	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
Wake	Fuquay Varina Mineral Spring Park Streambank Restoration: Repair of streambank erosion and roadway curb and gutter due to heavy rain and flooding during Hurricane Matthew.	S, NBS	-	Wake County (Fuquay Varina)	1-2 years
Wake	Unmapped Stream Studies: Several areas of Wake County have stream systems that experienced flooding, but actual flood risk is unknown. There is a need for studies to map areas of frequent and nuisance flooding to better understand risk for future flood events. Approximately 66 miles of streams not currently mapped as FEMA- Special Flood Hazard Area (SFHA) may have experienced flooding during Hurricane Matthew.	P	-	Wake County	Immediately (2017)
Wake	Debris Removal from Streams and Watercourses: Remove trees, sediments, and other litter that have built-up in area waterways because of Hurricane Matthew. Debris removal can reduce the potential for clogged inlets, pipes, and culverts.	S	-	Wake County	3-5 years

Table 35. HMRRP – Wayne County (5.4.1.)

County	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
Wayne	Housing elevations, buyouts, and repairs (countywide): Fremont, Hood Drive, MacArthur Drive	NS	-	Wayne County (Fremont)	-
Wayne	Gap funding program: difference between value of the house in the floodplain and out of the floodplain— priority given to owner-occupied, and low-to-moderate income. $30,000 in interest free, forgivable mortgage loans. Submitted by City of Goldsboro but need is countywide.	NS	-	Wayne County (Goldsboro)	-
Wayne	Floodproofing for Businesses in Seven Springs: this project, in conjunction with business attraction incentives, will provide a pool of funds for Seven Spring businesses - both new and existing-to install flood proofing measures for the building and their operations, including contingency planning.	NS	-	Wayne County (Seven Springs)	-
Wayne	Countywide Business Mitigation: Many industries and businesses suffered losses due to flooding from Hurricane Matthew. This strategy would provide funds to mitigate some of these losses and defray from the total impact to businesses across the county, in all industries, enabling the businesses to direct their current operating budgets toward growth and jobs.	NS	-	Wayne County	Short Term
Wayne	Cooperative Business Response and Mitigation Strategy: To develop a plan that businesses and industries can use as a guide to make decisions and to continue to operate during a disaster. Funding would provide technical assistance from an outside consultant to prepare and coordinate the plan as well as funding to implement.	NS, P	-	Wayne County	Short to medium term
Wayne	Improvements to HV Brown Park in Goldsboro: HV Brown Park, located in the Little Washington Community (a low to moderate income area), serves as a community park attracting residents and visitors for large scale events as well as daily use. It is a part of The	P, NS	-	Wayne County (Goldsboro)	Short to medium term

County	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
	Mountains to the Sea Trail and hosts the nation's largest and longest running alumni weekend each Memorial Day. This strategy would enable Goldsboro to institute recommendations made in the 2015 Master Plan for the park and update many facilities that are in poor condition, a problem that was exacerbated by the flooding in the aftermath of Hurricane Matthew.				
Wayne	Tourism Development/RV Park in Seven Springs: Seven Springs is the oldest settlement in Wayne County and has historic significance as the location of a Civil War Battle and a resort town renowned for its spring waters. This project would utilize land acquired during buyouts, maintain its historic presence as a tourism destination in the state, and boost revenues for the town--is development of a campground to support campers/R/Vs.	NS	-	Wayne County (Seven Springs)	Short/medium term
Wayne	Neuse River Trail and Park Development: Regional development of river park. Countywide, with express interest with City of Goldsboro and Seven Springs. City of Goldsboro submitted the following request: "Project Description: Redevelopment as a passive recreation space with 'river proof' offerings like camping and trails are the amenities many citizens and visitors are seeking."	NBS, NS	-	Wayne County (Seven Springs, Goldsboro)	-
Wayne	Business Attraction/Incentives for Vacant Structures: this project would (1) Provide administrative resources to the town to assist in locating and administering a business attraction program (2) Provide a pool of funds to incentivize targeted businesses to locate in Seven Springs, with a guarantee of a set term of required operations. Emphasis to be placed on maintaining the historic exterior as much as possible, making necessary repairs, floodproofing the building/operations, and on businesses that support Seven Springs tourism development goals (e.g., restaurants, outfitters).	NS	-	Wayne County (Seven Springs)	Short term
Wayne	Seven Springs Town Hall, Historic Preservation, and Tourism Development: This project would identify, acquire, study the feasibility of, and move a historic structure to a new, less flood prone location to be used as a town hall/visitor center. Would also provide funds to assist in exhibit development for town hall display and historic/recreational wayfinding signage. This project would also look at retrofitting a vacant structure in the historic center for use as the campground shower/restroom/laundry facility (for example, the bank building) and feasibility of moving historic homes to the 500-year flood plain from the 100-year flood plain.	NS, P	-	Wayne County (Seven Springs)	Short term
Wayne	Seven Springs Fire Station: Relocate the Seven Springs Fire station to a site on higher ground, as the current station has flooded three times in the last 50+ years: once in 1964, once during Hurricane Floyd, and then during Hurricane Matthew. They had 4 feet7 inches of water in the station during Matthew. He said that they are trying to stay within a half mile of the current site to avoid redrawing any jurisdictional boundaries.	NS	-	Wayne County (Seven Springs)	1-3 years
Wayne	Repair flood damage to the Genoa lift station.	NS	-	Wayne County	0-12 months
Wayne	Fremont Stormwater assessment/repair: Clean and replace drains in Fremont as well as examine sizing needs and put new drains in areas that flood frequently.	S	-	Wayne County (Fremont)	0-12 months

County	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
Wayne	Mobile/Back Up Emergency Operations Center: Purchase and equip a mobile EOC/Forward Command Center for use during disasters and large events. This will also serve as a backup EOC in the event the primary EOC goes down.	NS	-	Wayne County	-
Wayne	New/Replacement EOC: 911 telecommunications and emergency operations center to improve resources to handle disasters by having better E-911 infrastructure in place. Improved EOC that is more accessible.	NS	-	Wayne County	-
Wayne	Dixie Trail and John Street Flooding/Stormwater: Areas that experienced flooding and stormwater issues during the storm that need to be examined/ fixed.	S	-	Wayne County	0-5 years
Wayne	Old Carver Elementary School Generator and Shelter Improvements: Provide generator and improvements so that the former elementary school can be used as a shelter in storm events for the surrounding communities.	NS	-	Wayne County	0-2 years
Wayne	Generator for Fremont Town Hall.	NS	-	Wayne County (Fremont)	1 month
Wayne	Three backup generators for use at shelters in Goldsboro.	NS	-	Wayne County (Goldsboro)	-
Wayne	Goldsboro Pump Station Hurricane Preparation: Multiple pump stations were submersed in water due to the flooding, including Big Cherry, Little Cherry, Westbrook, New Hope, 117 and the Water Reclamation Facility 714. This strategy would lift equipment and provide portable fuel storage containers and submersible equipment to allow these stations to operate during storm events.	NS	-	Wayne County (Goldsboro)	-
Wayne	Jail Annex Construction: The existing jail facility was flooded/inundated with sewage during Hurricane Matthew. This will allow the jail facility and Sheriff's office to move.	NS	-	Wayne County (Goldsboro)	-
Wayne	Goldsboro water treatment plant earthen berm and wall and elevation of infrastructure: During Hurricane Matthew, extensive efforts went into protecting Goldsboro water treatment plant's power system (commercial and emergency) and chemicals through sandbagging and dewatering. To be proactive, this strategy would assist the city to build a dike and raise equipment. The strategy would construct an earthen berm around the water treatment plant site to protect all existing infrastructure two feet above historical peaks. At specific locations, there is not sufficient room for an earthen berm; in this case, a concrete wall will be required.	S, NS	-	Wayne County (Goldsboro)	6-12 months
Wayne	Goldsboro water treatment plant intake relocation: During periods of low flow and when the river depth is over three feet, the diverted flow does not allow for scouring, and excessive sedimentation builds up in the original Neuse channel around the city's intake structure. This strategy would relocate the intake structure and pump station upstream to a deeper part of the river.	NS	-	Wayne County (Goldsboro)	-
Wayne	Walnut Creek Generator: This strategy would provide a generator for Walnut Creek Town Hall.	NS	-	Wayne County (Walnut Creek)	-
Wayne	Walnut Creek lift stations: This strategy would provide generators for three lift stations and elevate and floodproof additional lift station.	NS	-	Wayne County (Walnut Creek)	0-12 months

County	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
Wayne	Engineering study and mapping of existing stormwater system: From City Submission: "Hire outside contractor to map the city's stormwater infrastructure system. In conjunction with mapping, assess the current condition of the infrastructure and prioritize repairs."	P, S	-	Wayne County (Goldsboro)	-
Wayne	Water Reclamation Facility Equalization Basins #3, 4, 5: During Hurricane Matthew, Flow Equalization Basins #1, #2, #3, #4, and #5 were overwhelmed by storm surge and flooding. These basins were put in service in 1966 as wastewater lagoons to hold 197-million gallons of water. They currently serve as equalization protection for the Water Reclamation Facility and are no longer used to treat wastewater. The Equalization Basins are in the Critical and Accident Potential Zones for Seymour Johnson Air Force Base, a safety hazard due to their waterfowl attraction. In addition, they pose an environmental threat to downstream users if they were to be breached in another flooding event. This strategy would deactivate basins #3, #4, and #5 and use #1 and #2 for inflow and infiltration events and make operational enhancements necessary for safety and environmental protection.	NS	-	Wayne County (Goldsboro)	-
Wayne	Mt. Olive wastewater treatment plant: Elevate electrical infrastructure and pump station for flooded Water and Wastewater Treatment Plant (WWTP).	NS	-	Wayne County (Mt. Olive)	3-12 months
Wayne	Creation of County 211 Information Hotline: During Matthew and in the aftermath residents and businesses were not always sure where to turn for information. Having a central response location would create a coordinated response.	NS	-	Wayne County	0-2 years
Wayne	Emergency Website Portal: one stop location—in conjunction w/ Facebook—to improve communication.	NS	-	Wayne County	3-12 months
Wayne	Creek Debris Removal/Restoration: Remove debris from and restore natural functions to several creek locations including: Half mile Branch, Stoney Creek/Billy Branch, Stoney Creek Combs, Falling Creek—Neuse to Thoroughfare Swamp, Yellow Marsh Branch—Thoroughfare Swamp to First Congressional Church, Mt. Olive.	NS, NBS	-	Wayne County	-
Wayne	Fremont Lagoon Repair: The lagoon experienced damages and will be unstable if not repaired.	NS	-	Wayne County (Fremont)	2 years
Wayne	Goldsboro Mitigation of Sensitive Areas with Commercial Buyout: The City of Goldsboro seeks to mitigate three flood-prone areas: Grantham ("Little River") area, S. George Street and East Ash Street. These areas have seen two major floods with significant storm and water damage over the past twenty years. If redeveloped back into their natural state these areas would reduce our habitable footprint in the flood plain and could provide environmentally friendly public spaces for public recreation, bicycling, and nature trails.	NS, NBS	-	Wayne County (Goldsboro)	2-3 years
Wayne	Seven Springs Open Space Reuse Options - This project would examine ways and provide means to reuse vacant land--including planting Longleaf Pine and creating community gardens for the wider community.	NS, NBS	-	Wayne County (Seven Springs)	1 year
Wayne	Open space strategy--develop a strategy to maintain and reuse land made available via Buyouts.	P, NS	-	Wayne County	2 years

County	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
Wayne	Ditch rehabilitation projects: Big Ditch, UEC Theater Ditch, Mimosa Park Ditch, Royal Meadow Creek, Billy Branch, and Billy Bud. Within the city limits, there are six ditches that traverse through commercial and residential areas that can impact nearby properties during heavy rain events. The current conditions of these ditches compromise and affect the stormwater conveyance systems to the Neuse River. The strategy would involve clearing and grubbing existing overgrown vegetation, regrading and sloping banks along the ditch lines, reseeding with centipede grass and plant appropriate trees to hold embankment walls, installing and/or clearing appropriate rights-of-way where possible to provide accessibility for maintenance equipment, replacing fencing as needed	NS, S, NBS	-	Wayne County (Goldsboro)	2-3 years

Table 36. HMRRP – Wilson County (5.4.1.)

County	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
Wilson	Residential Units along Norris Blvd., Hyatt Drive, Starmount Circle, Poplar Street and Philips Street: The City of Wilson Housing Authority has submitted a hazard mitigation application with the City of Wilson to participate in a buyout program to permanently relocate about 40 properties out of the 100-year flood plain. The city would utilize these areas for flood retention ponds and greenways. The city would also like to receive any additional funding available and therefore this project is included as part of the Resilient Redevelopment Program.	NS	-	Wilson County (City of Wilson)	6-12 months
Wilson	Installation of Flood Vents: provide funding to homeowners to bring homes into compliance with Wilson County flood damage prevention ordinance by installing flood vents in enclosed crawl spaces that are no more than 12 inches above adjacent ground level. The proposed project will risk reduction by preventing structures from collapsing due to water pressure on walls that surround crawl spaces. This will improve the structural integrity of the homes and prevent flooding of structures.	NS	-	Wilson County	6-12 months
Wilson	Englewood Drive, Town of Kenly: The proposed action recommended is to clean the ditch at the intersection of Englewood Drive and Revell Road, remove the beavers in the area and raise the roadbed where necessary. This project includes the replacement of culverts that washed out during Hurricane Matthew plus erosion control measures and debris removal.	NS, S	-	Wilson County (Kenly)	3 months
Wilson	Main Street and Langley Road, Town of Elm City: Main Street/Langley Road is the east-west thoroughfare through the Town of Elm City. This entire stretch of the roadway experienced a lot of flooding and isolated the downtown areas from other areas of the town and the county. The proposed strategy to mitigate the flooding in a large area includes upgrading the stormwater system in the downtown areas, cleaning out certain ditches that are full of debris and raising the roadbed where necessary.	NS, S	-	Wilson County (Elm City)	6-12 months

County	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
Wilson	Beacon Street, City of Wilson: Four businesses located along Beacon Street experienced flooding following Hurricane Matthew. The businesses are near Hominy Swamp, and overbank flooding also contributes to the flooding of the businesses. Relocation of the business, cleaning of the ditches along Beacon Street and elevating some of the equipment at these businesses are potential solutions to mitigate the problem.	NS	-	Wilson County (City of Wilson)	1-2 years
Wilson	Flooding in Shannon Woods Subdivision: A portion of US-264 towards to the Shannon Woods subdivision gets flooded during heavy rains. After Hurricane Matthew, the road was flooded for 2-3 days. Two potential reasons for the flooding and ponding of water include the presence of clogged ditches along US 264 and the lower elevation of the road. Along with clearing of the ditches, raising of the roadbed are proposed strategies to mitigate this issue.	NS, S	-	Wilson County (Stantonsburg)	6-12 months
Wilson	Relocation of HQ Fire Station and EOC: The physical location of the fire station and surrounding topography result in the station being flooded as a result. The City of Wilson Emergency Operations is the main distribution point for the City of Wilson utility and heavy equipment mobile resources. The waterway adjacent to this address floods and causes access problems to and from this site. This location also serves as the City of Wilson Emergency Operations Center and the back up 911 Communications Center.	NS	-	Wilson County (City of Wilson)	1-2 years
Wilson	Hominy Creek: The City of Wilson has identified a stream corridor named Hominy Swamp Creek that is used for recreation and education. Opportunities exist along Hominy Creek to reduce flooding and improve water quality using best management practices, while also rehabilitating wildlife habitat.	NS, NBS	-	Wilson County (City of Wilson)	6-12 months

5.4.2 Regional Resilience Portfolio Program (2022)

Table 37. RRP – Eastern Carolina (5.4.2)

Region	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
Eastern Carolina	Regional Resilience funding: Establish a circuit rider program in the region to provide grant application services.	P	-	The Eastern Carolina Council	This project has a short implementation timeframe (less than 5 years) with startup expected within 1–2 years. Recruitment of funders for the local match resilience fund, as well as the first allocation of support, is likely to take several years.
Eastern Carolina	Regional Drainage Capacity Assessment: develop a regional drainage capacity assessment to identify blocked culverts, ditches, and natural systems within the region.	P, S	-	Local Floodplain Managers	This project would take place over the short term, within 5 years. If given high priority by all participating municipalities, gathering all essential municipal staff and community organizations would likely occur within several weeks.

Region	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
Eastern Carolina	Beneficial Reuse of Acquired Properties: prioritize "green" development of acquired flood-prone properties to support natural watershed functioning.	NS, NBS	-	Local Planning Depts.; Community Technical Assistance, Inc	If planners and supporting agencies can collaborate on design, responsibility, approval from emergency management (EM) officials, and implementation, green development of an acquired parcel could occur within a matter of months. This is possible because the proposed areas have already been acquired and there are several interested parties interested in being the lead implementor.
Eastern Carolina	Vegetated Swales in Urban Flooding Hotspots: Installing vegetated swales in urban flooding hotspots will prevent flood conditions from overwhelming critical infrastructure.	NBS	-	Local Public Works Depts.	This project could be implemented within a medium time frame, likely within 2–3 years. Identifying the best areas for green infrastructure projects will likely take several weeks.
Eastern Carolina	Regional Resilience Staff Position: A Regional Resilience Coordinator would work to support projects and secure resources for regional and local resilience initiatives.	P	-	The Eastern Carolina Council	The timeframe for this project is likely short-term (within the next five years). Identifying the long-term funding sources for the position, as well as the best possible candidate, will likely take several months. Conversations with local and county governments need to highlight the local benefit of the position to ensure contribution.

Table 38. RRP – Mid-East (5.4.2)

Region	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
Mid-East Region	Regional Drainage Capacity Assessment: develop a regional drainage capacity assessment to identify blocked culverts, ditches, and natural systems within the region.	P, S	-	The Mid-East Commission	5 years (2027/2028)
Mid-East Region	Prioritized Vulnerability Inventory of Bridges and Culverts: Create an inventory of bridges and culverts along most common evacuation routes for prioritized cleanup efforts.	P, S	-	Peanut Belt Rural Planning Organization and the Mid-East Rural Planning Organization	This project would be implemented over a medium-term timeframe. Taking inventory of all bridges and culverts along regional evacuation routes is a task that can be completed quickly. Determining the priority of each for expansion or retrofit will likely be more complicated due to competing priorities across jurisdictional lines.

Region	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
Mid-East Region	Upsizing Regional Stormwater Infrastructure: Inventory and create a map of most vulnerable infrastructure to prioritize projects that increase the capacity of stormwater infrastructure.	P, S	-	Local stormwater administrators and engineering staff	This project is expected to be completed over the long term, likely taking several years to complete the projects. It will take weeks to months to undertake the inventory and produce documentation.
Mid-East Region	Green Infrastructure in Urban Flooding Hotspots: Installing green infrastructure systems in urban flooding hotspots will prevent flood conditions from overwhelming critical infrastructure.	NBS	-	County or local public works Depts.	This project could be implemented within a medium time frame.
Mid-East Region	Regional Information-Sharing Partnership: Develop a Regional Hazard Information-Sharing Partnership to reduce the burden on local authorities to prepare and provide natural hazard focused information.	NS, P	-	The Mid-East Commission	The implementation timeframe for this project is short-term.

Table 39. RRP – Upper Coastal Plain (5.4.2)

Region	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
Upper Coastal Plain Region	Housing Needs Assessment: conduct a county-by-county or regional needs assessment, which is necessary to understand what existing housing stock can remain viable and serve low and middle-income families.	P	-	Land Development Dept., City of Wilson, Planning Director, Town of Tarboro	Large scale - structural inspections, ground truthing and field surveys take a lot of time to complete and require resources and capacity
Upper Coastal Plain Region	Regional Emergency Shelter Feasibility Analysis: conduct a feasibility analysis for identifying a large (400+ person) regional facility that could be used as a shelter during disasters and emergencies.	P, NS	-	Nash County Emergency Manager, Halifax County Emergency Manager.	-
Upper Coastal Plain Region	Electrical Assessment and Transfer Switches for Emergency Shelters.	P, NS	-	Nash and Halifax County Emergency Managers	Locations may require costly and time-intensive upgrades before a transfer switch can be installed
Upper Coastal Plain Region	Flood-Resilient Roadways for Critical Facilities: create a prioritized list of regionally significant critical facilities that are vulnerable to flooding. In addition, the project will apply for funding to prevent flooding in priority locations that experienced inundations in previous storms (e.g., Hurricanes Matthew, Florence, Floyd).	P, NS	-	Nash County Economic Development Administration and EM	Defining the categories of critical facilities and then subsequently prioritizing projects for funding

Region	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
Upper Coastal Plain Region	Comprehensive Plans and Zoning Ordinances Address Climate Change: 1) identify the status of all Upper Coastal Plain municipal comprehensive plans 2) conduct an audit of these plans for references to climate change 3) create a template for integrating climate change into existing or future comprehensive plan updates and 4) review and amend zoning and unified development ordinances to align with comprehensive plan objectives related to climate change.	P, NS	-	Upper Coastal Plain COG	5-15 years; large undertaking for locales that lack staff capacity and resources
Upper Coastal Plain Region	Inform Elected Officials about Climate Resilient Decision Making: present information about data and findings from the Upper Coastal Plain Region Vulnerability Assessment to city, town and county elected officials and staff. The goal is to clearly articulate climate hazards and vulnerabilities in each county to increase resilient decision-making.	P	-	Upper Coastal Plain COG	Willingness of local government staff to participate and level of effort to make changes to what is often the status quo

Table 40. RRP – Kerr-Tar (5.4.2)

Region	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
Kerr-Tar Region	Establish a regional inventory of buildings (businesses, offices, and industrial spaces) and identify opportunities to modify them with more sustainable elements.	NS, P	-	Several persons are available to support the project: Monique Wilkins (Economic Development Coordinator, Town of Louisburg), Lauren Johnson (Director of Planning, Person County), McKinley Perkinson (Director, Henderson Vance EDC), Michelle Burgess (President, Henderson Chamber of Commerce), Michael Kelly (Kerr-Tar COG), and Grace Lawrence (NC Dept. of Commerce).	Challenges that may arise for the project team include how many buildings to collect data for, and their attributes, given the numerous buildings in the region
Kerr-Tar Region	Develop a plan that addresses dam safety and mitigation actions across the region. The project would include inspection of existing structures and their appurtenant features, components of geotechnical and structural investigations to establish data for risk analysis, evaluation of the design life of a dam to ensure that it continues to perform effectively, and developing recommendations to address potential risks factors, repairs, and funding for repairs.	S, P	-	No implementers have been identified yet. However, John Boyer with the Town of Creedmoor could play an advisory role.	Identifying local technical leaders with dam safety experience and Emergency Action Plan knowledge; Coordination with private dam owners
Kerr-Tar Region	Emergency Shelters and Facilities Needs Assessment	NS, P	-	Several EM officials throughout the region have expressed interest in this project including Jason Reavis (Granville	Accessing the NCSPARTA shelter data system; obtaining data from county GIS departments, building

Region	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
				County EM Director), Nicholas Thorpe (Franklin County EM Director), Chris Tucker (Warren County EM Coordinator), Thom Schwalenberg (Person County Emergency Services (ES) Director), and others.	inspections, building permits, architectural plans, field surveys, and other documents for existing buildings being utilized as shelters
Kerr-Tar Region	Assessing private drinking water wells and water quality in environmental justice communities to develop a final report with findings and recommendations.	P	-	None identified yet	Access and entry to properties (and obtaining permission) to perform testing of private drinking water wells may be a likely challenge
Kerr-Tar Region	Recruitment of a diverse set of farmers (minority and small-scale operators) to participate in a regenerative farming program aimed at increasing soil health and reducing utilization of fertilizers.	NS, NBS	-	Working Landscapes, an organization based in Warren County, NC, has been identified to champion this project.	Knowledge gaps in cover crop methods

Table 41. RRP – Triangle J (5.4.2)

Region	Investment	Type	Maintenance	Ownership/Management	Status & Barriers
Triangle J Region	Develop a River Warning System	NS	-	Emily Sutton, Haw River Assembly Haw Riverkeeper	There is no template for developing the warning system
Triangle J Region	Plan and Prioritize Stream Restoration	NBS, P	-	Rick Savage, Carolina Wetlands Association Executive Director. Mr. Savage has indicated that he has the capacity to take on the project.	Sometimes the best practice is to leave the damage and debris alone
Triangle J Region	Install Backup and Redundant Power Sources	NS	-	Matt Britt, Lee County Emergency Management Director	Large number of sites and large fuel requirements
Triangle J Region	Establish a Locally Administered Repetitive Loss Program	NS	-	The lead implementer recommended for this project is Emily Barrett, Triangle J COG Environment and Resilience Program Manager.	Risk of duplication of benefits
Triangle J Region	Develop a Privately Owned Dam Inventory and Dam Ownership Guidebook	NS	-	The lead implementer for this project is Deborah McGuffin, Moore County Cooperative Extension Director.	May need assistance bringing in technical specialists.
Triangle J Region	Develop Regional Guidance for Coordinated Stormwater Infrastructure Improvements	S, NS, P	-	The lead implementer recommended for this project is Stephen Wensman, Town of Smithfield Planning Director	Timing and available funding for those improvements

5.4.3 Regional Hazard Mitigation Plans

Table 42. RHMP – Neuse Region (5.4.3)

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Neuse - Greene	In the event of a substantial flooding event, or other natural hazard occurrence, perform damage assessments in coordination with NC Emergency Management (NCEM). These assessments will assist the county in determining the extent of the damage caused by the respective disaster event. This data will be used as a tool for land use planning and future hazard mitigation plan updates.	P	2020	-	County emergency management (EM), Municipal Admins.	Ongoing – As Needed
Neuse - Greene	Request HMGP (Federal Emergency Management Agency [FEMA]) funding for the elevation and/or acquisition of structures substantially damaged during a natural hazard event. This funding may also be used to address infrastructure needs, if it is determined that facilities within the county or any of the participating jurisdictions are adversely impacted by flood events.	NS	2020	-	County Admin., County EM, Municipal Admins.	Ongoing – As Needed
Neuse - Greene	Work to educate and inform local real estate agents, contractors, developers and citizens about issues associated with development in the floodplain by Ensuring that a range of materials related to flood insurance, flood protection, floodplain management, information on floodplains, and listings of qualified contractors familiar with floodproofing and elevation techniques, are available through various avenues including: Placing materials in the local library; Maintaining documents at the County Planning and Economic Development Office; Disseminating information to local contractors	NS	2020	-	County Planning and Admin., Municipal Admins.	Not Started - 1 year Implementation
Neuse - Greene	Ensure information is available on the county's website regarding hazards and development regulations within floodplains, including a link to FEMA and National Flood Insurance Program (NFIP) resources relating to emergency preparedness, flood protection, wind proofing, and proper evacuation procedures.	NS	2020	-	County Admin., Municipal Admins.	Not Started - 1 year Implementation
Neuse - Greene	Consider joining the Community Rating System (CRS). The county will assess the cost benefit of joining this program for county residents and property owners.	NS	2020	-	County Admin., Municipal Admins.	Not Started - 2-to-3-year implementation
Neuse - Greene	Continue to work with the NC Department of Environmental Quality (NCDEQ) to enforce standards outlined within the statewide stormwater management program. Currently, this program generally addresses stormwater management for projects disturbing an area equal to or greater than one acre. In addition, the county will monitor localized flooding issues,	S, NS	2020	-	County Admin., Municipal Admins.	Ongoing – Over Next Five Years

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
	and where feasible address these issues through the installation of stormwater best management practices (BMPs).					
Neuse - Greene	Pursue all avenues available to secure grant funding to address improvements to the Town of Hookerton' s Water and Wastewater Treatment Plant (WWTP). Currently, Contentnea Creek is encroaching upon the plant's lagoon dike wall. NCDEQ has stated that the integrity of the lagoon structure is at imminent risk.	NS	2020	-	County Admin., Town of Hookerton Elected Board	Not Started - 3 to 5 years
Neuse - Greene	Continue to expand upon the county's Code Red Emergency Notification System available to all residents. Greene County emergency services (ES) will coordinate with all municipal jurisdictions regarding registration through the Greene County Emergency Notification Registration Portal.	NS	2020	Review annually	County EM, Municipal Admins.	Ongoing
Neuse - Greene	Consider establishing a program to establish Community Emergency Response Teams (CERT) teams within the county. This effort will involve both the recruitment and training of potential team members.	NS	2020	-	County EM, Municipal Admins.	Not Started - 2 to 3 years
Neuse - Greene	Work closely with local media outlets to disseminate timely and accurate information relating to natural hazard events. This task will involve reporting on weather, evacuations, sheltering and facility closures.	NS	2020	-	County EM, Local Media Outlets, Municipal Admins.	Ongoing – As the need arises
Neuse - Greene	Work to expand upon the county's Special Medical Needs Registry (SMNR). The SMNR is available to all county residents. Effective participation will require close cooperation between county EM and local government staff members. All jurisdictions will work to advertise the availability of this service within their respective communities.	NS	2020	-	County EM, Municipal Admins.	Ongoing – Next Five years
Neuse - Greene	Actively work with federal, state, local and private partners to identify mitigation measures and secure funding via grants to alleviate flooding. These efforts should focus on the following areas: Develop a Blueway Plan for Contentnea Creek, county-wide stream snagging and cleanout, expand beaver management program, expand greenways in Hookerton, develop a riparian buffer program	S, NS, NBS	2020	-	County Board of Commissioners, Municipal Admins.	3 to 5 years
Neuse - Greene	Work closely with the American Red Cross to establish a site for the development of a local animal shelter to be utilized in the event of a natural disaster.	NS	2020	-	County EM, American Red Cross	2 to 3 years

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Neuse - Greene	Continue to support and participate in the directives of the county Emergency Operations Plan (EOP).	NS	2020	The County will review and update the EOP annually to ensure that it coordinates with the most recent NC Department of Public Safety (NCDPS) and NC Office of Emergency Medical Services (NCOEMS) directives.	County ES, Municipal Admins.	Ongoing
Neuse - Jones	Consider establishing a program to establish CERT teams within the county. This effort will involve both the recruitment and training of potential team members.	NS	2020	-	County ES	Not started - 2 to 3 years
Neuse - Jones	Continue working towards a long-term solution to maintaining emergency backup generators at all facilities deemed critical in the event of a natural disaster. At a minimum, the county will aim to establish a permanent backup generator at the following locations: County Admin. Building, Town of Maysville Town Hall, Comfort Volunteer Fire Dept..	NS	2020	Annually	County ES, Municipal Admins.	Ongoing
Neuse - Jones	Work to expand upon the County's Special Medical Needs Registry (SMNR). The SMNR is available to all County residents. Effective participation will require close cooperation between county EM and local government staff members. All jurisdictions will work to advertise the availability of this service within their respective communities.	NS	2020	Annually	County ES, Municipal Admins.	Ongoing
Neuse - Jones	Continue to improve upon capabilities available through the Nixle Based Emergency Notification System. These efforts will involve educating the public, municipal partners, and elected officials about the system's capabilities and registration requirements.	NS	2020	Annually	County EM, Municipal Admins.	Ongoing
Neuse - Jones	Update the county's Comprehensive Land Use Plan to ensure that the Future Land Use Map adequately delineates portions of the county deemed unsuitable for development due to existing environmental conditions resulting in potential impacts from natural disasters. All municipal jurisdictions will also take this plan into consideration when amending or developing land use plans and/or land development regulations.	NS, P	2020	-	County Admin., Municipal Admins.	Not Started - 2 to 3 years

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Neuse - Jones	Continue to participate in the Beaver Control Program (BCP) offered through NCDEQ. Additionally, the county will continue to support the Town of Trenton in its efforts to conduct its own BCP.	NS	2020	-	County Admin., NCDEQ	2 to 3 years
Neuse - Jones	Continue to proactively seek out grant funding through NCEM and FEMA for mitigation of repetitive loss properties from future flooding events. The county will maintain a list of repetitive loss properties. Jones County will assist all municipal jurisdictions in working through the structural mitigation grant funding process.	NS	2020	On an annual basis, will apply for funding for all structures that meet cost-benefit thresholds as defined by FEMA.	County Admin., Municipal Admins.	Ongoing – as opportunities arise
Neuse - Jones	Review respective Flood Damage Prevention Ordinances annually to assess whether any revisions and/or updates have been mandated by FEMA or NCEM. In addition, jurisdictions will consider whether regulatory options are available to provide for more effective floodplain management. Through these efforts, the county will continue to enforce a two-foot freeboard requirement.	P, NS	2020	-	County Inspections (including municipalities under interlocal agreement), Municipal Admins.	Ongoing – next five years
Neuse - Jones	Ensure that a range of materials related to flood insurance, flood protection, floodplain management, information on floodplains, and listings of qualified contractors familiar with floodproofing and elevation techniques, are available to the realtors, developers, contractors, and citizens through various means including: placing materials in the local library, maintaining documents at the county admin. building, disseminating information to local contractors, and maintaining information in the county inspection offices.	NS	2020	-	County Admin., Municipal Admins.	Ongoing – next five years
Neuse - Jones	Ensure information is available on the county's website regarding hazards and development regulations within floodplains, including a link to FEMA and NFIP resources relating to emergency preparedness, flood protection, wind-proofing, and proper evacuation procedures. In addition, the towns will provide a link to this page through their respective municipal websites.	NS	2020	-	County Admin., Municipal Admins.	Ongoing – next five years
Neuse - Jones	Due to the widespread impacts of Hurricanes Matthew and Florence, work to identify funding to assist with the acquisition of non-residential structures in need of assistance.	NS	2020	-	County Admin., Municipal Admins.	Ongoing – As need is determined
Neuse - Jones	Create a guidebook for non-governmental organizations and faith-based organizations on emergency preparedness and their role in outreach, sheltering, and recovery.	NS	2020	-	County EM, American Red Cross, Faith-Based Organizations	Not Started - 2 to 3 years
Neuse - Jones	Work closely with the Town of Trenton in identifying funding and a location for the relocation of the county water treatment plant due to flooding.	NS	2020	-	County Board of Commissioners, Town of Trenton Town Council	Not Started- 2 to 3 years

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Neuse - Jones	Relocate the Jones County Courthouse Basement Magistrate's Office and Jail to a higher, safer level of the building or to an alternate site.	NS	2020	-	County Board of Commissioners	Not Started - 2 to 3 years
Neuse - Jones	Back wire electrical systems to accept permanent generators and provide generators for three county elementary schools. Also, establish permanent pad mount generators at these facilities.	NS	2020	-	County Admin.	2 to 3 years
Neuse - Jones	Implement all strategies outlined within the Hurricane Matthew Resilient Redevelopment Plan.	P	2020	-	County EM, Municipal Admins.	2 to 3 years
Neuse - Lenoir	Continue to maintain CRS rating through implementation of a comprehensive floodplain management program.	NS	2020	-	County Admin., Municipal Admins.	Ongoing – over next five years
Neuse - Lenoir	Work closely with the American Red Cross to address the sheltering needs of county residents. The county will continue to improve the preparedness of all existing shelter facilities, including the installation of on- site transformers at all shelter locations. In addition, these efforts will involve support of the NC Coastal Region Evacuation and Sheltering (CRES) plan aimed at providing inland sheltering resources for coastal counties.	NS	2020	-	County ES, Municipal Admins.	Ongoing – as funding becomes available
Neuse - Lenoir	Educate, inform, and provide educational materials to citizens, contractors, local real estate agents, and homeowners regarding the hazards associated with floodplain development. In addition, the county will use this service to inform the public about the potential natural hazards impact throughout Lenoir County and services available to provide assistance if the county is impacted.	NS	2020	-	County Planning, County Admin., Municipal Admins.	Ongoing – over next five years
Neuse - Lenoir	Ensure that a variety of materials related to flood insurance, emergency response, flood protection, floodplain management, increased cost of compliance coverage, information on floodplains, and listings of qualified contractors familiar with floodproofing and elevation techniques, are available through various methods including placing materials in the county library, maintaining documents at the inspection's office, disseminating information to local contractors on the County website	NS	2020	-	County Planning, County Admin., Municipal Admins.	Ongoing – over next five years
Neuse - Lenoir	Review the county's Comprehensive Land Use Plan to ensure that the Future Land Use Map adequately delineates portions of the county deemed unsuitable for development due to existing environmental conditions or the presence of natural hazard areas.	NS, P	2020	-	County Planning, County Admin., Municipal Admins.	Not Started- 2 to 3 years
Neuse - Lenoir	Work closely with local media outlets to disseminate timely and accurate information relating to natural hazard events. This task will involve reporting on weather, evacuations, sheltering and facility closures.	NS	2020	-	County EM, Municipal Admins.	Ongoing – Next Five Years

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Neuse - Lenoir	Continue to monitor drainage conditions throughout the county. In addition, the county will continue to enforce and support the following programs relating to stormwater management: NCDEQ Coastal Stormwater Rules, NCDEQ Sedimentation & Erosion Control Regulations, NCDEQ Statewide Stormwater Regulations, NCDEQ Coastal Area Management Act Regulations, USACE Non-Coastal Wetland Regulations	NS	2020	-	County Admin., Municipal Admins.	Ongoing – Next Five Years
Neuse - Lenoir	Following the impacts of Hurricanes Mathew and Florence, establish new development within sites throughout the county that were cleared for development following Hurricane Floyd in 1998. This effort will address both redevelopments, as well as affordable housing needs.	NS	2020	-	County Admin., Municipal Admins.	Ongoing – As opportunities arise
Neuse - Lenoir	Work to develop a management/reuse plan to address property acquired through the HMGP (FEMA).	NS, P	2020	-	County Admin., Municipal Admin.	2 to 3 years
Neuse - Lenoir	Actively work with federal, state, local and private partners to identify mitigation measures and secure funding via grants to alleviate flooding. These efforts should focus on the following areas: Arterial stream and ditch cleanup, MS4 in La Grange, MS4 in Kinston, Dam facilities at Till's Mill Pond, Stormwater improvements at Tick Bite	S, NS	2020	-	County Admin., Municipal Admin.	5 years
Neuse - Lenoir	Acquire generators or other forms of redundant power supply to ensure that critical facilities and infrastructure remain operational where normal power supply is not available.	NS	2020	-	County ES, Municipal Admins.	2 to 3 years
Neuse - Lenoir	Seek grant funding for mitigation opportunities eligible under the most current version of the Hazard Mitigation Assistance (HMA) (FEMA) guidance and Public Assistance 406 Mitigation Guidance at the time of application. Projects may include but are not limited to acquisition/elevation, mitigation/reconstruction, and wet/dry floodproofing to residential and non-residential structures. Funding may also be utilized for redundant power to critical facilities, wind retrofits to critical facilities, storm shelters and other activities that reduce the loss of life and property.	S, NS	2020	-	County Admin., Municipal Admins.	Ongoing – As Needed
Neuse - Pitt	Review the County's Comprehensive Land Use Plan (adopted December 5, 2011) annually to ensure that the Future Land Use Map adequately delineates portions of the County deemed unsuitable for development due to existing environmental conditions.	NS, P	2020	Review Annually	County Planning Dept., County Board of Commissioners, Municipal Admins.	Ongoing
Neuse - Pitt	Continue to coordinate and collaborate with East Carolina University and Pitt Community College through the development of their respective hazard mitigation plans. Through implementation of this update, Pitt County Planning will incorporate Vidant, GUC, and Duke Energy into the county's Mitigation Planning efforts.	P	2020	-	County Admin., Municipal Admins., East Carolina University, Pitt Community College	Ongoing – over the next five years

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Neuse - Pitt	Continue to impose a two-foot freeboard requirement for all development located within a defined flood hazard area. Through this plan update, Pitt County will consider amending its Flood Damage Prevention Ordinance to require two feet finished floor elevation above the lowest adjacent grade within the FEMA defined shaded X zone.	NS, P	2020	Review Annually	County Board of Commissioners, County Planning Board	Ongoing
Neuse - Pitt	Maintain all FEMA Elevation Certificates and FEMA Floodproofing Certificates for residential and non- residential structures for all structures built or floodproofed since application to the CRS. Non-CRS communities will also carry out this strategy to prepare for a potential application to the CRS Program.	NS	2020	-	County Planning Dept., Municipal Admin.	Ongoing – over next five years
Neuse - Pitt	Consider the data and recommendations outlined within this plan when preparing updates to the county's Capital Improvements Plan. All recommendations regarding capital expenditures will focus on siting all infrastructure and critical facilities outside of the Flood Hazard Area.	NS, P	2020	Annually	County Planning Dept., County Board of Commissioners, Municipal Admins.	Ongoing
Neuse - Pitt	Continue to proactively seek out grant funding through NCEM and FEMA for mitigation of repetitive loss properties from future flooding events. The County will maintain a list of repetitive loss properties and will apply for funding for all structures that meet cost-benefit thresholds as defined by FEMA. Pitt County will assist all municipal jurisdictions in working through the structural mitigation grant funding process.	NS	2020	-	County Board of Commissioners, Municipal Admins.	Ongoing – as opportunities arise
Neuse - Pitt	Coordinate with NCDEQ to enforce all NC State Erosion and Sedimentation and Erosion Control Regulations.	NS	2020	-	County Planning Dept., Municipal Admins.	Ongoing – over next five years
Neuse - Pitt	Continue to expand upon the Alert Emergency Notification System available to all residents. Pitt County EM will coordinate with all municipal jurisdictions regarding registration through the Pitt County Emergency Notification Registration Portal (https://pittcountync.onthealert.com). The county will work with NCDPS to incorporate the “Know Your Zone” program into this process. Efforts will be made to educate the public about the location and published resources defining evacuation zones and procedures.	NS	2020	Review Annually	County EM, Municipal Admins.	Ongoing
Neuse - Pitt	Pitt County EM, in conjunction with the County Planning Dept., will evaluate and assess the availability and effectiveness of all critical facilities outlined within this plan. Pitt County will coordinate with NCEM, Red Cross, local animal shelters, local care homes etc. in making determinations relating to need and capacity.	NS, P	2020	Review Annually	County EM, American Red Cross, Municipal Admins.	Ongoing

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Neuse - Pitt	Pitt County EM, in conjunction with annual EOP updates, will determine if access to all critical facilities is readily available in the event of a flooding event. Careful consideration should be given to localized flooding issues that may restrict access along limited access thoroughfares. Where access issues are identified, Pitt County will establish a plan for alternative transportation.	NS, P	2020	Review Annually	County EM, American Red Cross, Municipal Admins.	Ongoing
Neuse - Pitt	Continue to maintain the county's COOP. This effort will include an annual update addressing risk management, service retention, alternative staffing procedures and recovery checklist for each county dept..	P	2020	Review annually	County EM, Municipal Admins.	Ongoing
Neuse - Pitt	Pitt County EM will review and update the County Emergency Operations Plan on an annual basis. This update will involve coordination with all municipalities to ensure that all emergency contacts are accurate.	P	2020	Review annually	County EM, Municipal Admins.	Ongoing
Neuse - Pitt	Pitt County in coordination with all municipalities, will maintain the county's Special Medical Needs Registry (SMNR). The SMNR is available to all County residents. Effective participation will require close cooperation between County EM and local government staff members. All jurisdictions will work to advertise the availability of this service within their respective communities.	NS	2020	-	County Social Services, County EM, Municipal Admins.	Ongoing – over next five years
Neuse - Pitt	Continue to maintain a library of materials focused on educating citizens, builders, realtors, and developers about the dangers associated with floodplain development. This information will also provide material outlining sound techniques for floodplain development and floodproofing of existing structures. The county will also maintain staff educated on these issues to work with prospective builders.	NS	2020	-	County Planning Dept., Municipal Admins.	Ongoing – over next five years
Neuse - Pitt	Continue to work closely with real estate agents to ensure that prospective buyers are educated about development within a flood hazard area. The County will prepare materials for dissemination to local real estate agents to assist in this education process.	NS	2020	-	County Planning Dept., Municipal Admins.	Ongoing – over next five years
Neuse - Pitt	Work closely with the Greenville Utilities Commission and the Neuse Regional Water & Sewer Authority to establish a memorandum of understanding regarding supplemental resource and capacity availability in the event of an emergency.	NS, P	2020	-	County Board of Commissioners, Municipal Admins.	Not Started - 2 to 3 years
Neuse - Pitt	Use recently upgraded storm surge inundation data provided through NCEM. This data will be utilized when making changes to land use policy and regulatory documents. This data will also be used as a component of the NCDPS “Know Your Zone” program.	P	2020	-	County EM, Municipal Admins.	2 to 3 years

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Neuse - Pitt	Work closely with the American Red Cross, NCDPS, and local care homes to identify a location for and ultimately establish a special medical needs shelter for county residents.	NS	2020	-	County Board of Commissioners, Municipal Admins.	3 to 5 years
Neuse - Pitt	Work to proactively implement the recommendations of the Hurricane Matthew Resilient Redevelopment Plan developed in coordination with the NCDPS.	P	2020	-	County Board of Commissioners, Municipal Admins.	3 to 5 years
Neuse – Pitt County - City of Greenville	The City of Greenville will strengthen the city's existing stormwater control ordinances to require new residential development to provide 10-year flood ponds, instead of 1- year flood ponds. The city will ensure that development complies with all stormwater regulations.	P, NS, NBS	2020	-	City Council, Community Development Dept.	2 to 3 years
Neuse – Pitt County - Town of Farmville	The Town of Farmville will build a new 500,000 gallon above ground storage tank to enhance/increase the town's storage capacity to 1.8 million gallons of water, which exceeds current average daily consumption.	NS	2020	-	Town Council, Staff	5 years
Neuse - Wayne	Continue to impose a freeboard requirement through enforcement of their respective Flood Damage Prevention Ordinances. The freeboard requirement for Wayne County (including communities under interlocal agreement) and Goldsboro is 2 feet; Mount Olive is 1 foot.	NS	2020	-	County Inspections (including municipalities under interlocal agreement), Goldsboro Inspections, Mount Olive Inspections	Ongoing – next five years
Neuse - Wayne	Maintain a comprehensive Floodplain Management Program through the Community Rating System Program aimed at maintaining the lowest rating available to Wayne County flood insurance policyholders.	NS	2020	-	County Planning, Municipal Admins.	Ongoing – next five years
Neuse - Wayne	Review the vulnerability of all critical facilities identified in this plan as a component of annual County Emergency Operations Plan updates. This effort will involve an assessment of whether facilities are readily accessible before, during, or after a natural hazard event has transpired. The County will also consider all information and data outlined in this plan when making determinations on the location of all future critical facilities to ensure that they are not located within the Flood Hazard Area.	NS, P	2020	Annually	County ES, County Admin., Municipal Jurisdictions	Ongoing
Neuse - Wayne	Educate, inform, and provide educational materials to citizens, contractors, local real estate agents and homeowners regarding information that will advise individuals about the hazards associated with floodplain development. In addition, the county will use this service to inform a range of interest groups about the natural hazards present throughout Wayne County and services available to provide assistance, if and when the county is impacted.	NS	2020	-	County ES, County Admin.	Ongoing – next five years

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Neuse - Wayne	Post flood level signs at prominent locations throughout the county displaying past flood levels to remind citizens of the past and potential flood dangers that exist within their community.	NS	2020	-	County ES, County Admin.	Not Started - 2 to 3 years
Neuse - Wayne	Continue to promote the availability of flood insurance available through the NFIP (FEMA) using the following means: post on County website, provide information on building permit applications, make available at the county library, display information in the Inspections Dept.	NS	2020	-	County Inspections, Municipal Admins.	Ongoing – next five years
Neuse - Wayne	Continue to proactively seek out grant funding through NCEM and FEMA for mitigation of repetitive loss properties (repetitive loss properties) from future flooding events. The county will maintain a list of repetitive loss properties, and on an annual basis, will apply for funding for all structures that meet cost-benefit thresholds as defined by FEMA. The priority will be for the elevation of structures in Seven Springs and acquisition of structures in all other jurisdictions. The county will assist municipal jurisdictions in facilitating the grant submittal process.	NS	2020	-	County Admin., Municipal Admins.	Ongoing – as opportunities arise
Neuse - Wayne	Continue to monitor drainage conditions throughout the county. In addition, the county will continue to enforce and support the following programs relating to stormwater management: NCDEQ Coastal Stormwater Rules, NCDEQ Sedimentation & Erosion Control Regulations, NCDEQ Statewide Stormwater Regulations, NCDEQ Coastal Area Management Act Regulations, USACE Non-Coastal Wetland Regulations	NS	2020	-	County Public Works, Municipal Public Works Depts	Ongoing – next five years
Neuse - Wayne	Continue to support and recruit for participants for CERT. This effort will be coordinated with NCEM.	NS	2020	-	County ES	Not Started - 2 to 3 years
Neuse - Wayne	Continue to expand upon the county's Code Red Emergency Notification System available to all residents. The Wayne County Office of ES will coordinate with all municipal jurisdictions regarding registration through the Wayne County Emergency Notification Registration Portal.	NS	2020	-	County ES	Not Started - 1 year
Neuse - Wayne	Work to expand upon the county's Special Medical Needs Registry (SMNR). The SMNR is available to all county residents. Effective participation will require close cooperation between the county office of emergency services and local government staff members. All jurisdictions will work to advertise the availability of this service within their respective communities.	NS	2020	Annually	County ES, Municipal Admins.	Ongoing
Neuse - Wayne	Actively work with federal, state, local and private partners to identify mitigation measures and secure funding via grants to alleviate flooding. These efforts should focus on the following areas: Stormwater Assessment/Repair – Fremont; Stormwater Assessment/Repair – Pikeville; Dixie Trail and John St (Flooding/Stormwater) – Goldsboro; Engineering study of existing stormwater utility/drainage – County	S, NS, P	2020	-	County Public Works, Municipal Admins.	3 to 5 years

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Neuse - Wayne	Work to establish pad mount backup generators at all county/critical facilities to facilitate the efficient utilization of designated shelter facilities and facilitate post disaster response.	NS	2020	-	County ES, County Board of Commissioners, Municipal Admins.	2 to 3 years
Neuse - Wayne	Work to proactively implement the recommendations of the Hurricane Matthew Resilient Redevelopment Plan developed in coordination with the NCDPS.	P	2020	-	County ES, Municipal Admins.	5 years

Table 43. RHMP – Pamlico Sound Region (5.4.3)

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/Management	Status & Barriers
Pamlico Sound – Carteret	Address the sheltering needs of County residents. Continue to work on improving the preparedness of all existing shelter facilities, including the installation of onsite generators at all shelter locations. Maintain updated information regarding all shelters on the County website. Continue support of the NC CRES plan aimed at providing inland sheltering resources for coastal counties and preparation and adoption of a county sheltering plan.	NS, P	2020	-	County ES, County Social Services	2-3 years
Pamlico Sound – Carteret	Provide information regarding evacuation procedures and routes through county and municipal websites, as well as other means when feasible. These efforts will involve assisting the Towns of Atlantic Beach, Cape Carteret, Indian Beach, Morehead City, and Pine Knoll Shores with efforts relating to bridge closures and re-entry policies and procedures. As part of these efforts, the county will make handouts available for citizens and visitors outlining evacuation routes and procedures provide education and outreach for implementation of the Know Your Zone initiative.	NS	2020	-	County ES, NC Highway Patrol, Atlantic Beach Admin., Cape Carteret Admin., Indian Beach Admin., Morehead City Admin., Pine Knoll Shores Admin.	1 year
Pamlico Sound – Carteret	Annually review and maintain the county's Continuity of Operations Plan to ensure ongoing governmental operations following a natural or human induced disaster event. The county, in conjunction with all participating municipal jurisdictions, will review this plan annually and update as deemed necessary.	P	2020	Reviewed Annually	County ES, Municipal Admins.	Ongoing- next 5 years
Pamlico Sound – Carteret	Annually review and update the County's EOP to ensure compliance with all NC Emergency Management (NCEM) and NCOEMS procedures and policies. Through these updates, the county will work closely with all participating municipalities to ensure that all jurisdictions continue to be educated and prepared for activation of the EOP in the event of a disaster event.	P	2020	Reviewed Annually	County ES	Ongoing- next 5 years

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/Management	Status & Barriers
Pamlico Sound – Carteret	Maintain, and where necessary, establish backup generators at all identified critical facilities. In addition, the county ES will evaluate the equipment on a regular basis to assure it continues to meet operational demands at county facilities.	NS	2020	Evaluate all emergency generators on a regular basis to ensure operability.	County ES, Independent Facility Operators, Town Public Utilities	Ongoing- next 5 years
Pamlico Sound – Carteret	Maintain a contract with a qualified post-disaster recovery service provider. This contract will include the provision of essential services and equipment, including generators, and will include documentation required for reimbursement from FEMA/NCEM.	NS	2020	Reviewed Annually	County Governing Board, Municipal Governing Boards	Ongoing
Pamlico Sound – Carteret	Continue to maintain the county's Crisis Management System to efficiently deal with emergency situations. These efforts will involve training for officials and relevant staff regarding use of the program.	NS	2020	-	County ES, County Planning	Ongoing- next 5 years
Pamlico Sound – Carteret	Meet annually with all electric service providers operating within the county prior to hurricane season, in preparation for the effects of severe weather, and will provide the preliminary planning steps required for effective post-disaster recovery.	NS, P	2020	Meet Annually	County ES, Municipal Admins.	Ongoing
Pamlico Sound – Carteret	Maintain all property acquired within the Special Flood Hazard Area (SFHA) as undisturbed open space in perpetuity. Continue to proactively establish open space within the floodplain and floodway as HMGP (FEMA) grant funds become available to carry out this initiative.	NS, NBS	2020	-	County Planning, Municipal Admins.	Ongoing- next 5 years
Pamlico Sound – Carteret – Morehead City	Integrate, when feasible, new greenway and public park improvements into comprehensive planning and capital improvement efforts (including coordination with the county's certified Coastal Area Management Act Land Use Plans).	NS, NBS, P	2020	-	County Parks and Recreation, County Planning, Morehead City Parks and Recreation	Other- as opportunities arise
Pamlico Sound – Carteret	Review and update respective Flood Damage Prevention Ordinances as deemed necessary. Once annually, all jurisdictions will conduct a review to ensure that the current Flood Damage Prevention Ordnance is compliant with all FEMA and NCEM mandates.	NS	2020	Reviewed Annually	County Planning, Municipal National Flood Insurance Program (NFIP) participants	Ongoing- next 5 years
Pamlico Sound – Carteret	Strive to maintain respective CRS ratings through implementation of a comprehensive floodplain management program	NS, P	2020	-	County Planning, Municipal Admins.	Ongoing- next 5 years
Pamlico Sound – Carteret	Maintain a map information service involving the following: (1) Provide information relating to Flood Insurance Rate Maps (FIRMs) to all inquirers, including a provision of information on whether a given property is located with a flood hazard area (2) Provide information regarding the flood insurance purchase requirement (3) Maintain historical and current FIRMs (4) Advertise once annually in the local newspaper the availability	NS, P	2020	-	County Planning, Municipal Admins.	Ongoing- next 5 years

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/Management	Status & Barriers
	of FIRMs and (5) Provide information to inquirers about local floodplain management requirements					
Pamlico Sound – Carteret	Mail a notice annually to all property owners to educate citizens about dangers associated with flooding in low-lying coastal areas.	NS	2020	Once Annually	County Planning, Municipal Admins.	Ongoing
Pamlico Sound – Carteret	Make information regarding hazards and development regulations within floodplains available through: (1) Ensure that the local library maintains information relating to flooding and flood protection (2) Provide a link on the county website to FEMA resources addressing flooding and flood protection (3) Provide a link on all participating municipalities' websites to FEMA resources addressing flooding and flood protection, evacuation procedures, disaster preparedness, and post-disaster recovery and (4) Provide website links to relevant hazard mitigation websites (5) Provide information to local real estate agents	NS	2020	-	County Planning, Municipal Admins.	Ongoing- next 5 years
Pamlico Sound – Carteret	Continue to proactively seek out grant funding through NCEM and FEMA for mitigation of repetitive loss properties from future flooding events. The County will maintain a list of repetitive loss properties and on an annual basis, will apply for funding for all structures that meet cost-benefit thresholds as defined by FEMA. Carteret County will assist all municipal jurisdictions in working through the structural mitigation grant funding process	NS	2020	-	County Planning Dept., County Board of Commissioners, Municipal Admins.	Ongoing- next 5 years
Pamlico Sound – Carteret	Increase the availability of skilled contractors to perform needed work post hazard by: Developing a partnership with major national contractors in selected areas (roofing, tree trimming, etc.), such that they will deploy resources and skilled contractors to affected areas as needed; Creating local contractor retention plan (perhaps with incentives related to permits, commitments for county/city projects, a reduction in community college tuition, etc.) to reduce the flight of local skilled labor.	NS, P	2020	-	County Planning Dept., County Board of Commissioners, Municipal Admins.	2 to 3 years
Pamlico Sound – Carteret	Improve awareness regarding the intensity of natural hazard events as they materialize and subside by establishing an emergency radio broadcast frequency that runs a recorded message pre- and post-hazard to communicate critical-time sensitive information. It could include things like routes/ bridges that are open or closed, weather/hazard forecasts, location of emergency shelters; more fully utilizing county/town websites to provide pre-hazard and post-hazard recovery info (debris pick up schedule, critical dates, forms, phone numbers, housing availability, etc.).	NS	2020	-	County ES, County Board of Commissioners, Municipal Admins.	2 to 3 years
Pamlico Sound – Craven	Review respective Comprehensive Land Use Plans annually to ensure that the Future Land Use Map adequately delineates portions of the community deemed unsuitable for development due to existing environmental conditions. This effort will also involve the identification of	NS, NBS, P	2020	-	County Planning Dept., County Board of Commissioners, Municipal Admins.	2 to 3 years

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/Management	Status & Barriers
	potential drainage easements and open space areas that will positively affect drainage conditions within areas documented as stormwater/flooding hot spots. In addition, the county will attempt to identify portions of the county susceptible to wildfire damage.					
Pamlico Sound – Craven	Review respective Flood Damage Prevention Ordinances to assess whether any revisions and/or updates have been mandated by FEMA or NCEM. In addition, jurisdictions will consider whether regulatory options are available to provide for more effective floodplain management.	P	2020	Review annually	County Planning Dept., County Board of Commissioners, Municipal Admins.	Ongoing as Needed
Pamlico Sound – Craven	Continue to support NCDENR in efforts to enforce the Neuse River Basin wide Water Quality Management Rules.	NS	2020	-	County Planning Dept., Municipal Admins.	Ongoing- next 5 years
Pamlico Sound – Craven	Continue to proactively seek out grant funding through NCEM and FEMA for mitigation of repetitive loss properties from future flooding events. The County will maintain a list of repetitive loss properties, and on an annual basis, apply for funding for all structures that meet cost-benefit thresholds as defined by FEMA. Craven County will assist all municipal jurisdictions in working through the structural mitigation grant funding process.	NS	2020	-	County Planning Dept., County Board of Commissioners, Municipal Admins.	Ongoing – as needed
Pamlico Sound – Craven	Consider the data and recommendations outlined within this plan when preparing updates to respective Capital Improvements Plans. All recommendations regarding capital expenditures will focus on siting infrastructure and public facilities outside of the Flood Hazard Area	P	2020	Review annually with budget preparation	County Board of Commissioners, Municipal Elected Boards	In Progress
Pamlico Sound – Craven	Consider all the data, information, maps, and recommendations outlined throughout this plan when siting for the development of all new critical facilities	NS, P	2020	-	County Board of Commissioners, Municipal Elected Boards	Ongoing – as needed
Pamlico Sound – Craven	In conjunction with annual EOP updates, determine if access to all critical facilities is readily available in the event of a flooding event. Careful consideration should be given to localized flooding issues that may restrict access along limited access thoroughfares. Where access issues are identified, the county will establish a plan for alternative transportation.	NS, P	2020	-	County ES, Municipal Admins.	Ongoing – as needed
Pamlico Sound – Craven	Work to expand upon the county's Special Medical Needs Registry (SMNR). The SMNR is available to all county residents. Effective participation will require close cooperation between County ES and local government staff members. All jurisdictions will work to advertise the availability of this service within their respective communities. It should be noted that applicants must be approved once application is made. Application alone does not result in guaranteed emergency service	NS	2020	-	County ES, Municipal Admins.	Ongoing- over next 5 years

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/Management	Status & Barriers
Pamlico Sound – Craven	Continue to provide detailed information regarding properties located within flood hazard areas as outlined under CRS Manual Section 322.a through 322. g.	NS	2020	-	County Planning Dept., County Board of Commissioners, Municipal Admins.	Ongoing- over next 5 years
Pamlico Sound – Craven	Continue to maintain a library of materials focused on educating citizens, builders, realtors, and developers about the dangers associated with floodplain development. This information will also provide material outlining sound techniques for floodplain development and floodproofing of existing structures. The county will also maintain staff educated in these issues to work with prospective builders	NS	2020	-	County Planning Dept., County Board of Commissioners, Municipal Admins.	Ongoing- over next 5 years
Pamlico Sound – Craven	Work to implement all strategies outlined within the Hurricane Matthew Resilient Redevelopment Plan.	P	2020	-	County Board of Commissioners, Municipal Governing Boards	Ongoing- over next 5 years
Pamlico Sound – Craven	Continue to proactively seek out grant funding through NCEM and FEMA for mitigation of Craven County Schools and other critical facilities that involves public usage during and after disaster events (such as generators, structural modifications, etc.) which would make structures more resilient during future storms and natural hazard events.	NS	2020	-	County Planning Dept., County Admin., Municipal Admins.	2 to 3 years
Pamlico Sound – Craven	Continue to expand upon the county's Emergency Notification System available to all residents. Craven County ES will coordinate with all municipal jurisdictions regarding registration	NS	2020	-	County ES, Municipal Admins.	Ongoing- over next 5 years
Pamlico Sound – Craven	Continue to maintain the COOP. This effort will include an annual update addressing risk management, service retention, alternative staffing procedures and recovery checklist for each county dept.	P	2020	Reviewed annually	County ES, Municipal Admins.	Ongoing- over next 5 years
Pamlico Sound – Craven	Review and update the County Emergency Operations Plan. This update will involve coordination with all municipalities to ensure that all emergency contacts are accurate	P	2020	Reviewed annually	County ES, Municipal Admins.	Ongoing- over next 5 years
Pamlico Sound – Craven	Maintain a contract with a qualified post-disaster recovery service provider. This contract will include the provision of essential services and equipment, including generators, and will include documentation required for reimbursement from FEMA/NCEM.	NS	2020	Reviewed annually	County Board of Commissioners, Municipal Governing Boards	Ongoing
Pamlico Sound – Craven	Maintain information on the County website relating to evacuation and sheltering. Emergency information on the website will include evacuation routes, sheltering, delays and closures, pet sheltering options, and special needs information.	NS	2020	-	County ES, Municipal Admins.	Ongoing- over next 5 years
Pamlico Sound – Craven	Develop a formal system and plan for evaluating and assessing the availability and effectiveness of all critical facilities outlined within this plan. Craven County will coordinate with NCEM, American Red Cross, local	P	2020	Annual updates	County Emergency Services, County Board of	2-3 years

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/Management	Status & Barriers
	animal shelters, local care homes, etc., in making determinations related to need and capacity required in the event of a disaster.				Commissioners, Municipal Elected Boards	
Pamlico Sound – Pamlico	In the event of a substantial flooding event, or other natural hazard occurrence, perform damage assessments in coordination with NCEM. These assessments will assist the County in determining the extent of the damage caused by the respective disaster event. This data will be utilized as a tool for land use planning and future hazard mitigation plan updates and to gauge the effectiveness of the county's 2-foot freeboard requirement.	P	2020	-	County ES, County Admin, Municipal Admins.	Ongoing – as necessary
Pamlico Sound – Pamlico	Continue to monitor drainage conditions throughout the County: in particular, issues associated with drainage ditches and agricultural runoff canals situated throughout the county. Once issues are identified, the county will work with municipal jurisdictions and state agencies to identify short- and long-term solutions to these issues.	NS, P	2020	-	County Admin., County ES, Municipal Admins.	Ongoing- in process
Pamlico Sound – Pamlico	Continue to proactively seek grant funding through NCEM and FEMA for mitigation of repetitive loss properties (repetitive loss properties) from future flooding events. The county will maintain a list of repetitive loss properties, and on an annual basis, will apply for funding for all structures that meet cost-benefit thresholds as defined by FEMA. Pamlico County will assist all municipal jurisdictions in working through the structural mitigation grant funding process	NS	2020	-	County Planning Dept., County Board of Commissioners, Municipal Admins.	Ongoing – as needed
Pamlico Sound – Pamlico	Continue to educate county residents about the linkage between flooding (standing water) and the proliferation of mosquitos. These efforts will focus on teaching property owners how to mitigate mosquito issues throughout the county.	NS	2020	-	County Admin., County ES, Municipal Admins.	Ongoing- in process
Pamlico Sound – Pamlico	Make a range of materials related to flood insurance, flood protection, floodplain management, information on floodplains, and listings of qualified contractors/realtors familiar with floodproofing and elevation techniques, available through various avenues including: placing materials in the local library; maintaining documents at the County Planning and Economic Development office; disseminating information to local contractors; distributing information to churches and other community-based organizations; establishing a means to distribute information to schoolchildren	NS	2020	-	County Planning Dept., County Board of Commissioners, Municipal Admins.	Ongoing- over next 5 years
Pamlico Sound – Pamlico	Review and update the County Emergency Operations Plan on an annual basis. This update will involve coordination with all municipalities to ensure that all emergency contacts are accurate and that all jurisdictions are adequately prepared.	P	2020	-	County ES, Municipal Admins.	Ongoing – as needed

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/Management	Status & Barriers
Pamlico Sound – Pamlico	Develop a formal system and plan for evaluating and assessing the availability and effectiveness of all critical facilities outlined within this plan. Pamlico County will coordinate with NCEM, Red Cross, local animal shelters, local care homes etc., in making determinations relating to need and capacity.	P	2020	Update annually	County ES, County Board of Commissioners, Municipal Elected Boards	2 to 3 years
Pamlico Sound – Pamlico	Continue to maintain all development regulations, emergency and land use related plans, and applications for permits on the respective jurisdictions' website. This information will be maintained and updated as deemed necessary. If a local website does not exist, municipal jurisdictions will consider developing one through implementation of this plan.	NS, P	2020	-	County Administration, Municipal Admins.	3 to 5 years
Pamlico Sound – Pamlico	Maintain Debris Removal and Monitoring Services Contracts for post disaster response. These services should focus on preparing documentation necessary to ensure full reimbursement of cost associated with community cleanup and immediate infrastructure restoration	NS	2020	-	County ES, County Board of Commissioners, Municipal Admins.	Ongoing- as needed
Pamlico Sound – Pamlico	Continue to work with the NCDEQ to enforce standards outlined within the statewide stormwater management program. Currently, this program generally addresses stormwater management for projects disturbing an area equal to or greater than one acre. In addition, the county will monitor localized flooding issues and, where feasible, address these issues through the installation of stormwater best management practices.	S, NS	2020	-	County Admin., Municipal Admin.	Ongoing- in process
Pamlico Sound – Pamlico	Develop a formal system and plan for evaluating and assessing the availability and effectiveness of all critical facilities outlined within this plan. Pamlico County will coordinate with NCEM, Red Cross, local animal shelters, local care homes etc., in making determinations relating to need and capacity.	P	2020	-	County ES, County Board of Commissioners, Municipal Elected Boards	2 to 3 years
Pamlico Sound – Pamlico	Maintain all property acquired through annual and post disaster mitigation funding as open space in perpetuity. In addition, appropriate reuse strategies will be developed regarding this dedicated open space	NS, NBS	2020	-	County Admin., Municipal Admins.	Ongoing- in process
Pamlico Sound – Pamlico – Town of Oriental	Annual outreach to residents for hurricane season preparations, quarterly meetings with church reps to disseminate prep materials, instructions for before, during, and following disasters. Keep seasonal information in Town Hall and disseminate to businesses. Distribute through mailings (newsletter), social media, traditional media materials. Disseminate info on elevation for new construction, restrict building in floodplain	NS	2020	-	Town Admin.	Ongoing
Pamlico Sound – Pamlico – Town of Oriental	Annual outreach to realtors to make sure most updated building restrictions in Growth Management Ordinance are disseminated to all potential buyers	NS	2020	-	Town Admin.	Ongoing

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/Management	Status & Barriers
Pamlico Sound – Pamlico – Town of Oriental	Annual review by Planning Board and Town Board and make changes to Growth Management Ordinance that prevent recurrent flooding and enhance drainage capacity	NS, P	2020	Annually	Town Admin.	Ongoing
Pamlico Sound – Pamlico – Town of Oriental	Annual ditch clearing and assessment of town maintained open and covered culverts. Annual education of residents/businesses about the flow of drainage (culverts not there to take water away, but to settle solids), Priority list established and reviewed for clearing/blockage of street culverts, education about ownership of land vs. rights-of-way, necessity of clearing residentially maintained ditches	S, NS, P	2020	Annually	Town Admin.	Ongoing

Table 44. RHMP – Eno-Haw Region (5.4.3)

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Eno-Haw – Durham County – City of Durham	Identify and obtain additional properties to increase protected open space as a land-use tool to reduce adverse impacts from floods.	NS, NBS	2020	-	City & County Planning Dept.	2025
Eno-Haw – Durham County	Implement a Stormwater Utility Fee for all properties within the unincorporated areas of Durham County.	NS	2020	-	County Engineering and Environmental Services	New
Eno-Haw – Orange County	Continue participation in the CRS and annual recertification to increase public safety, reduce property damage, avoid economic loss, and allow for a decrease in flood insurance premiums for Orange County residents.	NS	2020	-	County Planning and Inspections Dept.	2020-2025
Eno-Haw – Orange County	Continue to enforce floodplain regulations through the county's Special Flood Hazard Area (SFHA) Overlay District contained within the Orange County Unified Development Ordinance and continue training efforts for the Certified Floodplain Manager.	NS	2020	-	County Planning and Inspections Dept.	2020-2025
Eno-Haw – Orange County	Continue to collaborate and support municipal mitigation strategies	P, NS, S, NBS	2020	-	County ES	2025
Eno-Haw – Orange County	Continue enforcement of the North Carolina State Building Code.	NS	2020	Updated every 6 years and next scheduled update is Jan. 2025.	County Planning and Inspections Dept.	2025 - Currently operating under the 2018 edition of the NC State Building Codes and 2017 edition of the National Electrical Code.

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Eno-Haw – Orange County	Continue participation in the NFIP (FEMA) to reduce the impact of a future flood event, mitigate effects of flooding, and allow citizens to be eligible for affordable flood insurance.	NS	2020	-	County Planning and Inspections Dept.	2020-2025
Eno-Haw – Orange County	Identify potential flood hazards of critical infrastructure and mitigation measures to address.	NS	2020	-	Water and Sewer Authority	2020-2025
Eno-Haw – Orange County	Strive to ensure future development occurs in a manner that protects floodplains, streams, wetlands, and other natural features which work to reduce flood hazard susceptibility and continue to enforce existing regulations pertaining to stormwater management and erosion control standards contained within the Orange County Unified Development Ordinance.	NS	2020	-	County Planning and Inspections Dept.	2025
Eno-Haw – Orange County	Identify and implement strategies to increase swift water rescue capacity.	NS	2020	-	County ES	2025
Eno-Haw – Orange County	Provide staff support and information on Orange County's website to provide education and assistance to residents experiencing floodplain, stormwater, and erosion control issues.	NS	2020	-	County Planning and Inspections Dept., ES	2025
Eno-Haw – Orange County – Town of Hillsborough	Work with the Tree Board, Public Works Dept., and utility companies to ensure that dangerous situations are addressed in a timely manner	NS	2020	-	Public Works Dept.	2025
Eno-Haw – Orange County – Town of Hillsborough	Work with state efforts to study hydrology and maps/designate any new flood prone areas	P	2020	-	Planning Dept.	2019-2025 - New flood maps and GIS maps have been drawn for a good portion of our jurisdiction as of 2017, but the northwest, south, and southwest areas of town still utilize 2007 FIRM panels.
Eno-Haw – Orange County – Town of Hillsborough	Construct new recreational facilities out of flood-resistant and resilient building materials due to their locations in flood prone areas	NS	2020	-	Public Space and Public Works	2020-2025 - Due to the propensity for recreational land and structures to be located in flood prone areas, this will become a higher priority as the Town develops new public spaces and amenities
Eno-Haw – Orange County – Town of Hillsborough	Relocate the Public Works operation to a non-flood prone site. This is a sizable project and is expected to be completed in the next 5-7 years.	NS	2020	-	Public Works Dept.	2023-2024 - This was originally budgeted for a contract for the 2016-2017 budget cycle, but due to funding and project

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
						delays, this will likely be reprioritized to the 2023-2024
Eno-Haw – Person	Update the Person County Floodplain Ordinance to comply with state and national standards.	NS	2020	-	County Planning	2020 - Floodplain Ordinance update is in progress
Eno-Haw – Person – City of Roxboro	Revise and update the regulatory floodplain maps.	P	2020	-	County & City Planning and GIS Depts	2020 - Floodplain map updates are in progress (per FEMA).
Eno-Haw – Person – City of Roxboro	Use GIS to map 50' riparian buffers as required by the State within watersheds	P	2020	-	GIS Staff	2021 - Riparian buffers have not yet been mapped by the County due to administrative limitations.
Eno-Haw – Person – City of Roxboro	Public Services receive training on erosion and sedimentation control and assists property owners and developers with issues. Planning Director, who serves Floodplain Administrator, attends regular NFIP workshops for updates and provides information to property owners regarding proper floodplain development practices. Public Services Director requires sedimentation and erosion control data on all new development projects.	NS	2020	-	Admin., Planning and Public Services	2020-2025
Eno-Haw – Person – City of Roxboro	At the next update of the Land Use Plan, consider incorporating a Greenway or Open Space Plan	NBS, P	2020	-	Planning	2020 - There are some provisions in the existing Unified Development Ordnance (UDO), additional improvements may be considered, pending the political climate
Eno-Haw – Person – City of Roxboro	Enforce impervious surface calculation/ limitation for residential and non-residential development.	NS	2020	City requires Stormwater Administrator review and approval of all new construction/ redevelopment projects	Planning	2024
Eno-Haw – Person – City of Roxboro	Enforce minimum housing standards ordinance	NS	2020	-	Planning & Code Enforcement	2025 - Have increased contracted hours with Code Enforcement officer to be able to maintain activity on

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
						minimum housing enforcement issues throughout the City and will continue to monitor the need to determine if further increases are necessary.
Eno-Haw – Person – City of Roxboro	Create and maintain a list of repetitive flood loss properties. Currently none to record/map	P	2020	-	County & City Planning and GIS as well as Inspections	2021
Eno-Haw – Person – City of Roxboro	Enforce Stormwater Ordinance for new and redevelopment on residential and commercial properties.	NS	2020	-	County and City Planning	2025
Eno-Haw – Person – City of Roxboro	Establish Enhanced Voluntary Agricultural District Ordinance	NS	2020	-	Stormwater	2025
Eno-Haw – Person – City of Roxboro	Develop a conservation easement program	NS	2020	-	Stormwater, Planning	2025
Eno-Haw – Person – City of Roxboro	Encourage participation in State & Federal Cost Share programs	NS	2020	-	Stormwater, Natural Resource Conservation Service (NRCS) (USDA) and NC Forestry	2020-2025
Eno-Haw – Person – City of Roxboro	Conduct landowner/farmer workshops on conservation practices	NS	2020	-	Stormwater & NCDACS	2020-2025
Eno-Haw – Person – City of Roxboro	All portions of the buildings that have been submerged for any length of time will be inspected for flood related damage as well as other conditions that may be dangerous to live, health or property	NS	2020	Performed by Building Inspections on a case-by-case basis, as needed. Re-evaluate program success in next update	Inspections	2025
Eno-Haw – Person – City of Roxboro	Track drainage, erosion, and flooding problems within the city planning jurisdiction	NS, P	2020	-	Planning & Public Services	2025 - Tracking underway and will be ongoing through next plan update from NCOEM, Plans and GIS.

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Eno-Haw – Person – City of Roxboro	Continue to maintain a debris removal program for problem sites	S	2020	-	Planning	2025 - Some work complete, further may be necessary. County is looking at participating in the State's Pre-Position Debris Contract Program and we are in conversation with Private Sector about contractor. This is ongoing through next plan update.
Eno-Haw – Person – City of Roxboro	Place flood protection and other hazard mitigation education materials in public buildings (i.e., City Hall, county offices, library etc.)	NS	2020	-	County and City Planning & ES	2025
Eno-Haw – Alamance – City of Mebane	Maintain shelter agreements with the American Red Cross	NS	2020	-	County/City	2025
Eno-Haw – Alamance – City of Mebane	Expand the county's GIS capabilities to include maintaining elevation certificates	NS, P	2020	County maintains GIS but City maintains elevation certificates	County and City	2025
Eno-Haw – Alamance – City of Mebane	Continue the City of Mebane's participation in the NFIP (FEMA)	NS	2020	The city has maintained compliance with the NFIP and will continue to do so as part of plan review and permitting process.	City of Mebane	2025
Eno-Haw – Alamance – City of Mebane	Monitor reservoirs, lakes, and streams for potential flooding problems and note any unexpected flooding issues	NS	2020	-	City of Mebane	2025 - City has checked culverts and streams along outfalls ahead of large, predicted storm events and cleared debris as necessary to prevent flooding. No major issues beyond maintenance needs have been noted.

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Eno-Haw – Alamance – City of Mebane	When county land use plan is complete, create a land use map with an overlay for flood hazards and any other natural hazards	P	2020	Will look to provide additional mapping as data becomes available	City of Mebane	2025 - Land use plan completed locally. County has flood hazard on the County GIS.
Eno-Haw – Alamance – City of Mebane	Monitor structures affected by flood and track damages and repair costs.	NS	2020	-	City of Mebane	2020-2025 - No progress to report due to low priority. City owned structures will be monitored and tracked. Private structures will be tracked by building permits
Eno-Haw – Alamance – City of Mebane	Seek funding to install backup generators or quick connect hook ups for mobile generators on any newly constructed county/town critical facilities	NS	2020	-	City of Mebane	2025 - Backup generators have now been installed at nearly all existing facilities. All new construction facilities will be evaluated as part of plan review.
Eno-Haw – Alamance – City of Mebane	Encourage familiarity with NFIP (FEMA)	NS	2020	-	Planning, Zoning, and Inspections	2025 - No new progress to report due to limited administrative resources. Will continue existing outreach as part of plan review and permitting process
Eno-Haw – Alamance – City of Mebane	Encourage citizens and businesses to develop emergency preparedness plans	NS, P	2020	-	City of Mebane	2025 - No progress made due to administrative limitations. Will place information on the website encouraging development of emergency preparedness plans.
Eno-Haw – Alamance – City of Mebane	Encourage homeowners to review insurance policies as part of an overall family disaster plan	NS, P	2020	-	City of Mebane	2025 - Educational material is posted on website/handouts
Eno-Haw – Alamance – City of Mebane	Increase awareness of the natural hazards potential to officials, public and industry	NS	2020	-	City of Mebane	2025 - Code Red information is placed on the City's website. Citizens are informed by Code Red notifications as hazards arise.

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Eno-Haw – Alamance – City of Mebane	Provide local real estate agents with handouts that will advise potential buyers to investigate the flood hazards for the property under consideration	NS	2020	Planning Dept. provides information to agents and developers	City of Mebane	2025

Table 45. RHMP – Wake County (5.4.3)

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Wake County	Partner with other governmental units and other interested parties to jointly identify and acquire 30,000 acres of open space lands	NS, NBS	2019	-	County Community Services	3-5 years
Wake County	Identify road network segments no longer maintained by NCDOT and provide funding and planning resources for mitigation and recovery efforts to communities to ensure infrastructure and transportation resiliency. Assist in reinstating water and sewer services post disaster.	NS, P	2019	-	County Community Services	5 years
Wake County	Replace emergency generators located at facilities that serve as emergency shelter locations based on their scheduled end of life cycle	NS	2019	-	County Facilities Design & Construction	More than 5 years
Wake County	Construction of a new Emergency Operations Center adequate for the size and complexity of the jurisdiction	NS	2019	-	County EM	Completed October 2023
Wake County	Recovery Plan. Develop a comprehensive disaster recovery plan for Wake County consistent with the vision and goals described in Presidential Policy Directive-8 and the National Disaster Recovery Framework.	P	2019	-	County EM	3-5 years
Wake County	Upload dam failure inundation maps to Everbridge system for notification and evacuation	NS	2019	-	County EM	1 year
Wake County	Increase public awareness and participation in the Ready Wake program and resources.	NS	2019	-	County Fire Service and EM	2-3 years

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Wake County – City of Raleigh	Establish a Lake Preservation Policy that encourages private property owners to preserve existing lakes and ponds, and in certain circumstances provides for public assistance.	NS, NBS	2019	-	Engineering Services	1 year
Wake County – City of Raleigh	Develop ongoing multi-year program of detailed basin studies for each watershed in City's jurisdiction. Fifteen basin studies are complete with ten additional studies budgeted in the capital program. (CRS 410).	P	2019	-	Engineering Services	1 year
Wake County – City of Raleigh	Planning Commission to consider program to develop future conditions floodplain mapping for all FEMA mapped areas (this is already done for non-FEMA mapped areas). The program would consist of a multi-year capital program for mapping for all FEMA streams in the extra-territorial jurisdiction (ETJ) and consideration of changes to development regulations in these areas. Future conditions would be based on expected development per the Comprehensive Plan and zoning maps	NS, P	2019	-	Engineering Services	3-5 years
Wake County – City of Raleigh	Develop a written Resiliency Plan for City of Raleigh operations and services, including infrastructure resilience, community resilience, ecosystem resilience and governance resilience	P	2019	-	Office of Sustainability	2-3 years
Wake County – City of Raleigh	Update and maintain GIS data of building footprints, parcels, and critical facilities, and use it to regularly identify buildings in need of mitigation.	P	2019	-	City Information Technology & GIS Staff	5 years
Wake County – City of Raleigh	Develop ongoing program designed to utilize Federal grant resources to assist private property owners in relocating existing structures out of flood hazard zones.	NS	2019	-	Engineering Services	3-5 years
Wake County – City of Raleigh	Develop an ongoing program designed to utilize federal grant resources to assist private property owners in renovating and retrofitting existing structures in flood hazard zones to reduce vulnerability to flooding damage.	NS	2019	-	Engineering Services	Ongoing - next 5 years
Wake County – City of Raleigh	Program to install emergency electrical generators at all public utility facilities. Current focus on redundant generators at critical facilities, second fuel truck and completion of 100% generator coverage in Garner area.	NS	2019	-	City Public Utilities	2-3 years - Now have emergency backup power generators at all our critical facilities except

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
						for South Raleigh Facility.
Wake County – City of Raleigh	Install cameras in flood prone areas throughout the City of Raleigh to allow us to view these locations and make informed decisions as it relates to flooding	NS, P	2019	-	Transportation	3-5 years
Wake County – City of Raleigh	Provide and enhance technical rescue capabilities more equitably throughout the city.	NS	2019	-	Fire	2-3 years
Wake County – City of Raleigh	Design GIS programming capable of providing real-time data to emergency managers and historic data for future emergency response planning.	NS, P	2019	-	City Manager and Information Technology	3-5 years
Wake County – City of Raleigh	Continue to conduct disaster tabletop exercise program.	NS	2019	Annual	Public Utilities, Fire, Police, City Manager, EM, and Engineering Services	5 years
Wake County – City of Raleigh	Establish cross-functional team to develop Debris Management Plan. Team should work to identify and prepare additional debris management sites.	NS, P	2019	-	Transportation	1 year
Wake County – Town of Apex	Revise and update the regulatory floodplain boundary, including flood studies.	NS, P	2019	-	Public Works & Transportation (Floodplain Administrator)	Ongoing - next 5 years
Wake County – Town of Apex	Develop an environmental committee that meets regularly to discuss issues and recommend projects.	P	2019	-	Water Resources (Stormwater and Utility Engineering Manager)	5 years
Wake County – Town of Apex	Encourage the use of Low Impact Development techniques	NS	2019	-	Water Resources (Stormwater and Utility Engineering Manager)	Ongoing - next 5 years

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Wake County – Town of Apex	Use system development fees to help fund public projects	NS	2019	-	Water Resources (Stormwater and Utility Engineering Manager)	3-5 years
Wake County – Town of Apex	Update the Unified Development Ordnance (UDO) & Design and Development Manual to incorporate proper species selection and practices for planting and maintenance into the landscape ordinance	P, NBS	2019	-	Planning Dept.	2-3 years
Wake County – Town of Apex	Incorporate GIS data and risk analysis into the development review process.	P	2019	-	Fire Dept. & Planning Dept.	5 years
Wake County – Town of Apex	Create a Stormwater Utility to fund the Town's Stormwater Program.	NS	2019	-	Water Resources (Stormwater and Utility Engineering Manager)	2-3 Years
Wake County – Town of Apex	Annually update the comprehensive occupancy pre-plan program with local data for use in risk analysis	P	2019	Annual	Fire Dept.	Ongoing - next 5 years
Wake County – Town of Apex	Restore streams to slow the speed of water and reduce erosion to prevent both private property loss and public infrastructure damage.	NBS	2019	-	Water Resources (Stormwater and Utility Engineering Manager)	Ongoing - next 5 years
Wake County – Town of Apex	Middle Creek Greenway (Miramonte to Holly Springs).	NS, NBS	2019	-	Parks and Recreation	3-5 years – under construction
Wake County – Town of Apex	White Oak Creek Greenway	NS, NBS	2019	-	Parks and Recreation	3-5 years – under construction
Wake County – Town of Apex	During development review, ensure new development complies with floodplain development restrictions listed in UDO Section 6.2 Flood Damage Prevention Overlay District	NS	2019	-	Public Works and Transportation (Floodplain Administrator)	Ongoing - next 5 years
Wake County – Town of Apex	During development review, ensure new development complies with UDO stream buffer standards.	NS, NBS	2019	-	Town of Apex Water Resources (Stormwater and	Ongoing - next 5 years

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
					Utility Engineering Manager)	
Wake County – Town of Apex	During development review, ensure SCMs are designed in accordance with State criteria to safely pass 100-year storm.	NS, P	2019	-	Water Resources (Stormwater and Utility Engineering Manager)	Ongoing - next 5 years
Wake County – Town of Apex	Build Jessie Drive to connect TenTen Rd and NC-55. This will provide greater connectivity and make evacuation faster & safer	NS	2019	-	Public Works and Transportation	3-5 years
Wake County – Town of Apex	Relocate Beaver Creek Sewer Line out of the creek.	NS	2019	-	Water Resources (Stormwater and Utility Engineering Manager)	3-5 years
Wake County – Town of Apex	Finish the Peakway loop road. Will provide greater connectivity, faster emergency response times, and make evacuation faster & safer.	NS	2019	-	Public Works and Transportation	More than 5 years
Wake County – Town of Apex	Town website and utility billing announcing National Preparedness Month (September) reminding citizens to have a plan and be prepared.	NS	2019	Annual	Public Information Officer	5 years
Wake County – Town of Apex	Include Environment Education Station and classroom at Nature Park.	NS	2019	-	Parks and Recreation	2022
Wake County – Town of Apex	Hand out hazards educational materials at Apex festivals.	NS	2019	-	Planning Dept. & Water Resources	5 years
Wake County – Town of Apex	Use social media to inform residents about local hazards	NS	2019	-	Public Information Office & Planning Dept.	5 years
Wake County – Town of Cary	Adaptive Approach to Stormwater	NBS	2019	-	Stormwater	Ongoing
Wake County – Town of Cary	Stormwater Condition Assessment Program	P	2019	-	Stormwater	2-3 years
Wake County – Town of Cary	Develop flood model for upper Swift Creek watershed	P	2019	-	Stormwater	1 year

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Wake County – Town of Cary	Develop flood model for Symphony Lake	P	2019	-	Stormwater	2-3 years
Wake County – Town of Cary	Engineering evaluation of Tryon Road dam	P	2019	-	Stormwater	3-5 years
Wake County – Town of Cary	Conduct study and develop improvement plan for Twin Lakes dam	P	2019	-	Stormwater	3-5 years
Wake County – Town of Cary	Conduct flood study on Town-owned Lake/dam, including breach analysis	P	2019	-	Stormwater	2-3 years
Wake County – Town of Cary	Triangle Regional Resiliency Partnership	P	2019	-	Town of Cary	Ongoing
Wake County – Town of Cary	Culvert Replacement - Arbor Brook	S	2019	-	Stormwater	1 year
Wake County – Town of Cary	Culvert Replacement - Two Creeks	S	2019	-	Stormwater	1 year
Wake County – Town of Cary	Downtown Park	NS, NBS	2019	-	Stormwater and Facilities	2-3 years
Wake County – Town of Cary	Buffer and UTB Protection	NS, NBS	2019	-	Stormwater and Cary Planning	Ongoing - next 5 years
Wake County – Town of Cary	Infrastructure improvements on Summer Lakes Dr	S	2019	-	Stormwater	1 year
Wake County – Town of Cary	Infrastructure improvements on Vincrest Ct	S	2019	-	Stormwater	2-3 years
Wake County – Town of Cary	Water System Risk Analysis	P	2019	-	Town of Cary	1 year
Wake County – Town of Cary	Provide and enhance technical rescue capabilities throughout the Town	NS	2019	-	Fire Dept.	5 years

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Wake County – Town of Cary	Provide after-action report of emergency response to severe weather events to improve planning for future disasters	P	2019	-	Fire, Water Resources, and Facilities Design & Transportation Services	5 years
Wake County – Town of Cary	Establish a relationship/partnership with the Renaissance Computing Institute to create a web-based tool capable of providing real-time flood data to emergency managers and historic data for future emergency response planning.	NS, P	2019	-	Fire and Technological Services	Ongoing - next 5 years
Wake County – Town of Cary	Citizen volunteers make up the Community Emergency Response Team (CERT). CERT training is a Citizens Corps program designed to enable citizens to care for themselves and their neighbors during the first three days following a disaster event. Participants are educated about disaster preparedness, CERT organization, light search and rescue, medical care, fire extinguisher use and disaster psychology.	NS	2019	-	Police Dept. and Fire Dept.	5 years
Wake County – Town of Cary	Environmental Education "green infrastructure" signage on Dry Avenue Properties that were bought out due to flooding. Signs to be installed early 2019	NS	2019	-	Stormwater and Sustainability	Ongoing - next 5 years
Wake County – Town of Fuquay-Varina	Require pre and post construction certification for residential lot development within ten feet of Wake County Flood Hazard Soils	NS	2019	-	Planning	Ongoing- next 5 years
Wake County – Town of Fuquay-Varina	Annually calculate acreage of flood prone property preserved as open space.	P, NBS	2019	-	Planning	Ongoing- next 5 years
Wake County – Town of Fuquay-Varina	Provide for public dissemination building inspections brochures regarding high winds, water damage prevention, and tie downs for accessory structures.	NS	2019	-	Inspections	Ongoing- next 5 years
Wake County – Town of Fuquay-Varina	Map storm water drainage system as part of Phase II Stormwater Management Plan	P	2019	-	Engineering	Ongoing- next 5 years
Wake County – Town of Fuquay-Varina	Review and update the 2014 Comprehensive Systemwide Parks, Recreation & Cultural Resources Master Plan for inclusion of hazard safety information at facilities	NS	2019	-	Planning and Parks, Recreation & Cultural Resources	3-5 years

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Wake County – Town of Fuquay-Varina	Continue to enforce the Flood Damage Prevention Ordinance for all new construction or substantial building rehabilitations.	NS	2019	-	Planning	Ongoing - next 5 years
Wake County – Town of Fuquay-Varina	Require minimum finished floor elevation in known FEMA flood hazard zones be minimum 2 feet above base flood elevation	NS	2019	-	Planning and Inspections	Ongoing - next 5 years
Wake County – Town of Fuquay-Varina	Identify and inventory buildings that are in FEMA flood zones to determine which structures may be prone to flooding (possible relocation and/or elevation).	NS, P	2019	-	Planning and Engineering	Ongoing - next 5 years
Wake County – Town of Fuquay-Varina	Work with the US Army Corps of Engineers on wetland protection	NBS	2019	-	Planning	Ongoing - next 5 years
Wake County – Town of Fuquay-Varina	Notify Wake County of any illegal stream dumping instances	NS	2019	-	Planning and Public Utilities	Ongoing - next 5 years
Wake County – Town of Fuquay-Varina	Enforce standards for tree protection and control of clear cutting (town has received legislative authority to enact tree protection and control of clearcutting standards.)	NS, NBS	2019	-	Planning	Ongoing - next 5 years
Wake County – Town of Fuquay-Varina	Install a generator at the new town hall	NS	2019	-	All Depts.	1 year
Wake County – Town of Fuquay-Varina	Maintain current warning system with local sirens on elevated platforms and use of the Emergency Broadcast System.	NS	2019	-	Planning, Fire and Police	Ongoing - next 5 years
Wake County – Town of Fuquay-Varina	Coordinate an incident command course for all town employees, related to Emergency Operations Plan and Disaster Operations Plan for the Town.	NS, P	2019	-	Fire and Police	Ongoing - next 5 years
Wake County – Town of Fuquay-Varina	Conduct a scenario-based training exercise, related to Emergency Operations Plan and Disaster Operations Plan for the town.	NS, P	2019	-	Fire and Police	Ongoing – next 5 years (lack of staffing has prevented implementation)
Wake County – Town of Fuquay-Varina	Continue to evaluate and improve response and recovery methods following each hazard event.	NS	2019	-	Fire and Police	Ongoing – next 5 years

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Wake County – Town of Fuquay-Varina	Finalize implementation of new/updated radio communication equipment.	NS	2019	-	Fire and Police	Ongoing – next 5 years
Wake County – Town of Fuquay-Varina	Maintain floodplain maps for public use and produce other maps as needed	P	2019	-	Planning and Engineering	Ongoing – next 5 years
Wake County – Town of Fuquay-Varina	Develop and maintain a hazard mitigation section on the Town website that is updated every 5 years as the plan is updated.	P	2019	-	Public Information and Information Technology	Ongoing - next 5 years
Wake County – Town of Fuquay-Varina	Collect educational materials on disaster preparedness and display at public library and local government offices	NS	2019	-	Planning, Inspections, Police, and Fire	Ongoing - next 5 years (lack of staffing has prevented implementation)
Wake County – Town of Fuquay-Varina	Educate public on importance of channel maintenance as part of Phase II Stormwater Management Plan	NS, P	2019	-	Engineering	Ongoing - next 5 years
Wake County – Town of Fuquay-Varina	Work with local real estate agents to ensure that potential buyers are aware of properties that are exposed to potential flood damage	NS	2019	-	Planning	Ongoing - next 5 years
Wake County – Town of Fuquay-Varina	Require delineation of Wake County Flood Hazard Soils, FEMA flood zones, and wetlands on final plats.	NS	2019	-	Planning	Ongoing - next 5 years
Wake County – Town of Fuquay-Varina	Annual participation in Hurricane Prep Week (May 13-19) via Weather Channel (social media campaign, newsletter, published materials)	NS	2019	-	Planning and Public Information	Ongoing - next 5 years
Wake County – Town of Fuquay-Varina	Annual participation in National Preparedness Month (September) Ready.gov (social media campaign, newsletter, published materials)	NS	2019	-	Planning and Public Information	Ongoing - next 5 years
Wake County – Town of Fuquay-Varina	Annual participation in National Dam Safety Awareness Day (May 31) Ready.gov (social media campaign, newsletter, published materials)	NS	2019	-	Planning and Public Information	Ongoing - next 5 years
Wake County – Town of Fuquay-Varina	Structured public education through social media, brochures, and flyers in critical facilities	NS	2019	-	Planning, Fire & Police, and Public Information	Ongoing - next 5 years

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Wake County – Town of Garner	Evaluate the need for regulations to encourage use of low impact development site planning principles to help control stormwater volume impacts.	NS	2019	-	Engineering and Planning	Not Started - 2-3 years (2021)
Wake County – Town of Garner	UDO: Continue to provide stream and creek buffers, and floodplain and wetland protection.	NBS, NS	2019	-	Planning	2-3 years (2021)
Wake County – Town of Garner	Garner Transportation Plan – Continue to address disaster preparedness (evacuation) through road interconnectivity, paved roads, and widening of roads	NS, P	2019	-	Planning and Public Works	Ongoing - next 5 years
Wake County – Town of Garner	Develop for public dissemination building inspections brochures regarding high winds, water damage prevention, and tie downs for accessory structures.	NS	2019	-	Inspections	Ongoing - next 5 years
Wake County – Town of Garner	The town will inventory all its structures located within or immediately adjacent to known flood hazard areas.	NS, P	2019	-	Planning and Engineering	Ongoing - next 5 years
Wake County – Town of Garner	The town has a service to respond to requests and questions from citizens regarding actions they may take to improve drainage, halt erosion, and to relocate, renovate or retrofit structures being flooded.	NS	2019	-	Engineering	Ongoing - next 5 years
Wake County – Town of Garner	Develop and adopt a conservation subdivision ordinance to help preserve significant natural features.	NS, NBS	2019	-	Planning	Not Started - 2-3 years (2021)
Wake County – Town of Garner	Pursue stream restoration projects	NS, NBS	2019	-	Engineering	Not Started - 2-3 years (2021)
Wake County – Town of Garner	Develop a Business Continuity Plan that is the primary document housing all disaster related plans and procedures including Hazard Mitigation Plan, Debris Management Plan, Multi-Hazard Plan as well as disaster response plans for all town depts..	P	2019	-	Police, Public Works, and Administration	2-3 years (target 2021)
Wake County – Town of Garner	Town website will be updated with public access to information pertaining to evacuation routes, emergency contact numbers, and detailed weather reports in case of emergency.	NS	2019	-	Police & Fire Depts, Communications	Ongoing - next 5 years
Wake County – Town of Garner	Develop and maintain a hazard mitigation section on the Town website.	NS	2019	-	Communications and IT	2-3 years (target 2021)

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Wake County – Town of Garner	Website - The town maintains its own website which can provide up to date information for the public. Town continuously updates the site with additional resources.	NS	2019	-	Police & Fire, Communications, and IT	Ongoing - next 5 years
Wake County – Town of Holly Springs	Update Floodplain Development Regulations - The town has an ordinance developed to minimize public and private losses due to flood conditions. The latest update of the Flood Damage Prevention Ordinance was May 2, 2006.	NS	2019	-	Engineering	3-5 years
Wake County – Town of Holly Springs	Implement Floodplain Development Regulations related to participating in the National Flood Insurance Program (NFIP) (FEMA)	NS	2019	-	Engineering	Not Started - 2-3 years
Wake County – Town of Holly Springs	Floodplain Development Regulations - The town has been a participating member of the NFIP (FEMA) since 1992, The town evaluated the town's potential participation in the CRS and determined that the number of insured properties in the Town did not warrant participation in the CRS. However, staff will reevaluate this determination in the future through the implementation of the Floodplain Management Program.	NS, P	2019	-	Engineering	Ongoing - next 5 years
Wake County – Town of Holly Springs	Building Acquisition and Clearance - The town is willing to develop a plan designed to utilize federal grant resources to assist private property owners in purchasing properties located in flood hazard zones.	NS, P	2019	-	Code Enforcement	Not Started - 2-3 years
Wake County – Town of Holly Springs	Building Relocation - The town is willing to develop a plan designed to utilize federal grant resources to assist private property owners in relocating existing structures out of flood hazard zones.	NS, P	2019	-	Code Enforcement	Not Started - 2-3 years
Wake County – Town of Holly Springs	Building Retrofit - The Town is willing to develop a plan to utilize Federal grant resources to assist private property owners in renovating and retrofitting existing structures in flood hazard zones to reduce vulnerability to flooding damage	NS, P	2019	-	Code Enforcement	Not Started - 2-3 years
Wake County – Town of Holly Springs	Backup Power to Fire and Police Stations – The town provides backup power to all fire and police stations. Fire Station 1 – backup power provided by a grant; backup power to Fire Station 2 and Fire Station 3 and Police Station provided by local funds.	NS	2019	-	Public Safety	3-5 years
Wake County – Town of Holly Springs	Emergency Generator for Public Works Building - The town currently has an emergency generator to provide power to the Front Office of the	NS	2019	-	Public Works	3-5 years

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
	Public Works Building during emergencies. Future goal is to provide 100% generator power to the building.					
Wake County – Town of Holly Springs	Install additional Generators - Over the next ten years, the town would like to purchase generators for lift stations that do not currently have generators.	NS	2019	-	Public Utilities	1 year
Wake County – Town of Holly Springs	Purchase of Open Space, Parks, and Greenways - The Parks and Recreation Dept. is asking for $500,000 for Capital Improvement Projects to purchase open space. The town also works with Wake County and other agencies to find other funding for open space acquisition. Once funds are obtained the town will acquire land consistent with Land Use and Master Open Space Plans	NS, NBS, P	2019	-	Parks and Recreation	More than 5 years
Wake County – Town of Holly Springs	As part of the next phases(s) of the Town's Watershed Masterplan, a map of impervious cover will be created. This information may be used overlain to show which structures are in hazardous locations.	P	2019	-	Engineering	3-5 years
Wake County – Town of Holly Springs	The town is in the process of pursuing options to improve the existing spillway or create a secondary spillway. Per an agreement with NC Dam Safety, this will be completed within the next 5 years.	S	2019	-	Engineering, Parks & Recreation	3-5 years
Wake County – Town of Holly Springs	Reservoirs/Retention/Detention Basins - The town does not currently maintain any retention or detention basins. The town does maintain Bass Lake Dam. The town regularly provides maintenance of vegetation and minor erosion while providing visual inspections of the dam. If larger repairs are required, the town will find appropriate means to resolve the problem. The town also has a few small ponds located on existing parks. The town maintains these ponds consistent with measures taken to maintain the Bass Lake Dam.	S	2019	-	Parks & Recreation	Ongoing - next 5 years
Wake County – Town of Holly Springs	Technical Rescue Capabilities - Provide and enhance technical rescue capabilities more equitably throughout the town.	NS	2019	-	Public Safety	3-5 years – currently looking into specialty training
Wake County – Town of Holly Springs	GIS Programming - Design GIS programming capable of providing real-time data to emergency managers and historic data for future emergency response planning.	NS, P	2019	-	Public Safety	3-5 years - Currently in the implementation phase. The new Wake County

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
						computer aided design (CAD) system will be issued in May 2019. This is a no cost to the Town.
Wake County – Town of Holly Springs	Purchase ACU 1000 Communications Unit – System should allow all agencies on ACU 1000 to communicate using own radios and frequencies	NS	2019	-	Public Safety	3-5 years - In process of purchasing, but not yet completed.
Wake County – Town of Holly Springs	Tabletop Exercise Program - Continue to conduct disaster tabletop exercise program with Wake County	NS	2019	-	Public Safety	Ongoing - next 5 years
Wake County – Town of Holly Springs	Counseling – Police psychologist and Critical Incident Stress Debriefing Team training to provide debriefing sessions for personnel	NS	2019	-	Police Dept.	5 years - Partially implemented, under construction
Wake County – Town of Holly Springs	Environmental education	NS	2019	-	Engineering	Ongoing - next 5 years
Wake County – Town of Holly Springs	Website - The town maintains its own website, which can provide up to date information for the public. The town is continuously updating the site with additional resources.	NS	2019	-	Governing Body	Ongoing - next 5 years
Wake County – Town of Knightdale	Pursue grants to acquire, elevate and or relocate flood prone structures and property.	NS	2019	-	Planning	Ongoing - next 5 years
Wake County – Town of Knightdale	Establish post-disaster clean-up procedures.	P	2019	-	Public Works	Ongoing - next 5 years
Wake County – Town of Knightdale	Prepare debris removal and disposal plan	P	2019	-	Public Works	Ongoing - next 5 years
Wake County – Town of Knightdale	Dredging, new riser and plunge pool for pond restoration at Environmental Park	NBS	2019	-	Admin., Public Works	3-5 years

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Wake County – Town of Knightdale	Have a town staff member that is a Certified Floodplain Manager.	NS	2019	-	Engineering/Public Works	2-3 years
Wake County – Town of Knightdale	Issue an annual local proclamation for Severe Weather Awareness Week and conduct associated promotional activities	NS	2019	-	Fire	5 years – Not started (due to staff turnover this item has not been started)
Wake County – Town of Morrisville	Update Land Use Plan to ensure protection of natural resources, strengthen existing development to resist hazards, and guide future development away from hazard prone areas.	NS, NBS, P	2019	-	Town of Morrisville	2-3 years
Wake County – Town of Morrisville	Obtain frequently updated, high-resolution aerial photography to assist with land use decisions, emergency response planning, and code enforcement	NS, P	2019	-	Town of Morrisville	Ongoing - next 5 years
Wake County – Town of Morrisville	Working through the Triangle Water Supply Partnership, draft an Emergency Spill Response and Mitigation Plan to protect watersheds and other water resources from hazardous spills.	P	2019	-	Triangle Water Supply Partnership, Town of Morrisville	3-5 years
Wake County – Town of Morrisville	Transition Wake County's sedimentation and erosion control permitting and monitoring to Town of Morrisville for better increased processing efficiency and faster incident response.	NS	2019	-	Town of Morrisville	2-3 years
Wake County – Town of Morrisville	Conduct a complete review and update to the town's stormwater management program, which helps mitigate effects of stormwater runoff and flooding.	P	2019	-	Town of Morrisville	2-3 years
Wake County – Town of Morrisville	Seek Federal, State, and County funding opportunities to purchase property located completely or partially in FEMA designated floodplains to mitigate potential property damage and protect natural resources.	NS	2019	-	Director of Community Services, Director of Development Services	More than 5 years
Wake County – Town of Morrisville	Construct Green Drive and Fairview Road Flood Reduction Drainage Project to mitigate potential flood hazards.	S	2019	-	Town of Morrisville	2-3 years

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Wake County – Town of Morrisville	Construct new public works facility, which will increase town's capacity to respond to hazards and other safety concerns	NS	2019	-	Town of Morrisville	3-5 years
Wake County – Town of Morrisville	Monitor the status of backup generators, communications and vehicles for all Morrisville owned critical public facilities.	NS	2019	-	Town of Morrisville	Ongoing - next 5 years
Wake County – Town of Morrisville	Install new generators for Town Hall and Police Station to ensure continuity of critical operations during a power outage	NS	2019	-	Town of Morrisville	1 year
Wake County – Town of Morrisville	Update Town's Emergency Operations Plan to ensure best processes and procedures for the most likely and applicable emergency scenarios.	P	2019	-	Town of Morrisville	3-5 years
Wake County – Town of Morrisville	Implement Wake County's Everbridge text alert system to notify citizens and Town staff of potential safety hazards or concerns.	NS	2019	-	Wake County	1 year
Wake County – Town of Morrisville	Purchase and implement new online civic engagement platform to be used in part to inform citizens on disaster preparation, emergency response training opportunities, and evacuation information.	NS	2019	-	Town of Morrisville	1 year
Wake County – Town of Morrisville	Use volunteer citizen committees, such as CERT or Public Safety Committee, to educate residents in preparing for natural hazards.	NS	2019	-	Town of Morrisville	Ongoing - next 5 years
Wake County – Town of Wake Forest	Prepare a Storm Drainage Master Plan to include all storm drainage, infrastructure, and capacity analysis	P	2019	-	Engineering	2019
Wake County – Town of Wake Forest	Become a CRS community	NS	2019	-	Public Works	2022
Wake County – Town of Wake Forest	Explore the use of Stormwater Utility Fees	NS	2019	-	Admin.	2020
Wake County – Town of Wake Forest	Maintain a GIS database of building footprints and use it to regularly update a map of critical facilities and vulnerable buildings	P	2019	Annual	Town GIS	Ongoing
Wake County – Town of Wake Forest	Document each historic structure in Wake Forest town limits and ETJ	P, NS	2019	-	Planning	2020
Wake County – Town of Wake Forest	Provide for primary or mobile generators to shelter sites	NS	2019	-	Wake Forest EM	

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Wake County – Town of Wake Forest	Assess facilities for the need for emergency generation, considering alternate facility sites	P	2019	-	Wake Forest Power	
Wake County – Town of Wake Forest	Manage the Wake Forest Reservoir for hazard mitigation	S	2019	-	Public Works	2021
Wake County – Town of Wake Forest	Expansion of our greenway trail network	NS, NBS	2019	-	Planning	2024
Wake County – Town of Wake Forest	Conduct stream mitigation projects on Old Mill Stream, Richland Creek, and others subject to flooding or erosion.	NBS	2019	-	Engineering	2024
Wake County – Town of Wake Forest	See that all nursing homes and assisted living facilities have backup generators.	NS	2019	-	Property Owners	2022 - Existing facilities without generators are financially constrained and have little ability to add generators
Wake County – Town of Wake Forest	Develop a policy and advise the public that all outside above ground liquid propane or propane gas tanks be cut off during a major event.	NS	2019	-	Communications	2020
Wake County – Town of Wendell	Amend the Town's Water Allocation Policy to add a new point category for voluntarily increasing undisturbed riparian buffer protections from 50 to 100 feet around Neuse perennial streams	NS, NBS	2019	-	Planning	1 year
Wake County – Town of Wendell	Add environmentally sensitive and hazard areas to the Future Land Use Map and adopt updated Comprehensive Plan, which will allow environmental conditions and hazard areas to guide zoning and density decisions	P	2019	-	Planning	2-3 years
Wake County – Town of Wendell	Consider amendments to the UDO to establish minimum ingress/egress standards for new residential development based on density/# of lots	NS	2019	-	Planning	1 year
Wake County – Town of Wendell	Encourage the use of low-impact development techniques through amendments to the town's Water Allocation Policy	NS	2019	-	Planning	1 year
Wake County – Town of Wendell	Consider regulations to regulate clear-cutting to help control erosion from construction sites	NS	2019	-	Planning	2-3 years

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Wake County – Town of Wendell	Evaluate potential changes to the town's Arterial and Collector Street Plan to minimize adverse impacts to environmentally sensitive areas due to new roadway construction or widening	P	2019	-	Planning	2-3 years
Wake County – Town of Wendell	Perform environmental asset mapping to identify areas most key for preservation and potential acquisition due to an array of environmental factors	P	2019	-	Planning	2-3 years
Wake County – Town of Wendell	Evaluate policy regarding greenway dedication requirements to expand greenway network and further protect riparian corridors	NS, NBS	2019	-	Planning	2-3 years
Wake County – Town of Wendell	Perform improvements to existing open drainage device near intersection of 1st St & Pine St. to increase total water volume & flow	S	2019	-	Public Works	3-5 years
Wake County – Town of Wendell	Develop Adverse Weather Plan Map for Public Works crew	NS, P	2019	-	Planning	1 year
Wake County – Town of Wendell	Evaluate potential locations for a future public works debris site, to accommodate debris associated with natural hazards	P	2019	-	Public Works	3-5 years
Wake County – Town of Wendell	Provide written after-action report of response to severe weather and hazard events to include recommendations for process improvements and improve planning for future disasters	P	2019	-	Police Dept.	2-3 years
Wake County – Town of Wendell	Secure and use visual warning barricades for vehicular and pedestrian traffic to block properties, roadways, etc. for public safety during or following hazard events	NS	2019	-	Public Works	3-5 years
Wake County – Town of Wendell	Conduct periodic training exercises, related to higher-risk hazard threats identified by the Hazard Mitigation Plan	NS	2019	-	Police Dept.	2-3 years
Wake County – Town of Wendell	Work with Wake County and the City of Raleigh to operate and update the County's Master Address Repository program, which will support emergency response following hazards.	P	2019	-	Planning	2-3 years
Wake County – Town of Wendell	Modify the town's "Tell Wendell" webpage application to allow citizens o report flood issues and create a tracking mechanism for the Town	NS	2019	-	Planning	2-3 years

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Wake County – Town of Wendell	Incorporate hazard awareness class into the Track-Out Camp run by the Wendell Parks & Recreation Dept	NS	2019	-	Parks and Recreation	2-3 years
Wake County – Town of Wendell	Facilitate community outreach and distribution of educational materials regarding hazard awareness to the community, to include participation at community events such as Public Safety Day.	NS	2019	-	Public Works	2-3 years
Wake County – Town of Wendell	Perform Continuing Education Training for select Public Works personnel as it relates to state storm water regulations	NS	2019	-	Public Works	2-3 years
Wake County – Town of Zebulon	Enforce subdivision standards for development in flood hazard areas.	NS	2019	-	Planning & Inspections	2019
Wake County – Town of Zebulon	Further restrict development in floodplain by prohibiting development or requiring two feet of freeboard	NS	2019	-	Planning	2019
Wake County – Town of Zebulon	Revise floodplain ordinance.	NS	2019	-	Planning	2019
Wake County – Town of Zebulon	Resolve localized flooding issue that occurs in/around West Sycamore Streets, Gannon Avenue, and North Arendell Avenue during heavy rainfall events.	S, NS	2019	-	Admin., Public Works	2019
Wake County – Town of Zebulon	Develop an Emergency Operations Plan	P	2019	-	Fire Dept.	2019 - in the process of developing an Emergency Operations Plan and hopes to adopt the plan within the year
Wake County – Town of Zebulon	Develop a public education program to provide hazard risk and preparedness education via social media	NS	2019	-	Fire Dept.	2019
Wake County – Town of Zebulon	Require disclosure of flood hazard in real estate transactions.	NS	2019	-	Planning	2019

Table 46. RHMP – N.E.W. Region (5.4.3)

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
N.E.W. – Nash County	Establish a three or more-member local Hazard Mitigation Committee	P	2020	-	County EM Director, Planning Director, & Public Utilities Director	2021
N.E.W. – Nash County	Expand Emergency Shelter Capabilities with the installation of transfer switches at identified shelter sites to enable use of backup power to these critical facilities.	NS	2020	-	Nash County EM Services	2021 - Grant funds applied for under Pre-Disaster Mitigation Program in 2017 to install transfer switches at Southern Nash High School & Nash Central High School, but funds not received
N.E.W. – Nash County	Establish predetermined evacuation areas in flood-prone areas. Use NC Flood Inundation Mapping and Alert Network (FIMAN) data to identify flood prone areas for potential pre1storm evacuation. Consider utilizing the services of the US Army 83rd Civil Affairs Battalion to survey, inventory, and categorize critical facilities and infrastructure throughout the county and develop recommendations for protection. Enter critical facilities into existing Orion Damage Assessment Solution software for tracking.	NS	2020	-	County EM Services	2022
N.E.W – Nash – Town of Bailey	Strengthen the Public Water and Sewer Ordinance by adding language that specifically prohibits extending public services and utilities into flood hazard or other environmentally sensitive areas to discourage growth	NS	2020	-	Town Board	2023
N.E.W – Nash – Town of Bailey	Identify roads that had a problem with high water during Hurricane Floyd and place signs on streets stating "Road Subject to Flooding"	P, NS	2020	-	Public Works, NCDOT	2021
N.E.W – Nash – Town of Bailey	Obtain a generator(s) to provide emergency power for critical town facilities	NS	2020	-	Town Admin.	2021
N.E.W – Nash – Town of Bailey	Establish a three or more-member local Hazard Mitigation Committee	P	2020	-	Town Board and Mayor	2025
N.E.W – Nash – Town of Bailey	Obtain FEMA handouts & make available for residents at town hall	NS	2020	-	Town Clerk	2023
N.E.W – Nash – Town of Middlesex	Work to adopt a floodplain ordinance	NS	2020	-	Planning & Development	2023 – postponed but still a priority

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
N.E.W – Nash – Town of Middlesex	Seek funding to place generators at our lift stations that do not have them to ensure this critical infrastructure continues functioning during power outages	NS	2020	-	Admin., Town Board	2025
N.E.W – Nash – Town of Middlesex	Establish a three or more-member local Hazard Mitigation Committee	P	2020	-	Board and Mayor	2022 – Town currently has two representatives
N.E.W – Nash – Town of Middlesex	Expand the use of new website for public information & emergency updates	NS	2020	Regular updates	Town Clerk	Ongoing
N.E.W – Wilson County	Add drainage as an issue to be discussed during Technical Review Committee review of proposed development plans	P	2020	-	County Planning and Inspections	2025 – in process of creating Technical Review Committee
N.E.W – Wilson County	Inventory existing lots and structures within flood hazard areas to establish baseline data regarding current state of development within flood hazard areas	P	2020	-	County Planning and Inspections	2025
N.E.W – Wilson County	Establish coordinating committee to ensure that all parties responsible for stormwater management communicate to ensure maximum cooperation in developing and maintaining stormwater drainage systems within the County	P	2020	-	County Planning and Inspections	2025
N.E.W – Wilson County	Establish and maintain coordinated debris inspection program with debris removal program to correct problem sites.	P	2020	-	County Planning and Inspections, Natural Resource Conservation Service (NRCS), EM, Solid Waste Dept.	2025 – not complete due to lack of funding
N.E.W – Wilson County	Update flood maps to reflect new subdivisions, changes in corporate limits, and all new FIRM data; publicize the availability of maps and keep record of service (CRS 320)	P	2020	-	County Manager and Commissioners	2025
N.E.W – Wilson County	Establish a three or more-member local Hazard Mitigation committee with private sector participation	P	2020	-	County Fire Marshal and County Admin.	2025 – need to identify private sector participation and formalize committee's role
N.E.W – Wilson County	Acquire destroyed or substantially damaged properties and relocate households (voluntary program) (CRS 520/420)	NS	2020	-	County Planning and Inspections	Ongoing
N.E.W – Wilson County	Require all developments that involve the disturbance of more than one acre of land to receive a sediment/erosion control permit from NCDEQ	NS	2020	-	County Planning and Inspections, NCDEQ	Ongoing
N.E.W – Wilson County	Evaluate evacuation routes considering road upgrades and new road construction	P, NS	2020	-	County EM and Planning	2025

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
N.E.W – Wilson County	Advise/assist property owners in retrofitting homes and businesses (retrofitting is defined as any modification to an existing building or yard to protect the property from flood damage)	NS	2020	-	County Planning and Inspections	Ongoing – retrofitting information is provided when building permits are applied for to develop in flood prone areas
N.E.W – Wilson County	Establish and maintain information on retrofitting techniques at the Planning and Inspections Dept. and, at the public library. Publicize through citizen news bulletins or newsletters (CRS 330/350/360)	NS, P	2020	-	County Planning and Inspections	Ongoing – inclusion in citizen news bulletins
N.E.W – Wilson County	Provide information on the county website about hazard risk, mitigation, and preparedness	NS	2020	-	County Planning and Inspections	Ongoing
N.E.W – Wilson – Town of Lucama	Establish a three or more-member local Hazard Mitigation Advisory Committee	P	2020	-	Town Board and Mayor	2022 - Full committee was not in place for this plan update. The Town will expand participation in future regional mitigation planning through this effort
N.E.W – Wilson – Town of Lucama	Conduct an internal review and prepare a report that: evaluates all critical facilities for possible improvements to reduce their exposure to hazards and includes all findings that will be presented in a report to the elected governing board	P	2020	-	Town Board and Admin.	2023
N.E.W – Wilson – Town of Lucama	Obtain FEMA handouts & make available for residents at Town Hall	NS	2020	-	Town Admin.	2023
N.E.W – Wilson – Town of Saratoga	Establish or continue a three or more-member local Hazard Mitigation Committee with private sector participation	P	2020	-	Town Council	2021 - Town Council to formalize committee role
N.E.W – Wilson – Town of Saratoga	Conduct an internal review and prepare a report that: evaluates all critical facilities for possible improvements to reduce their exposure to hazards and includes all findings that will be presented in a report to the elected governing board	P	2020	-	Town Council and Admin.	2023 - Will continue to evaluate need and pursue funding for additional critical facility improvements.
N.E.W – Wilson – Town of Saratoga	Obtain FEMA Hazard Mitigation Related handouts & make available for residents at Town Hall and/or as inserts in utility bills	NS	2020	-	Town Admin.	2023
N.E.W – Wilson – Town of Sims	Establish a three or more-member local Hazard Mitigation Committee	P	2020	-	Town Board and Mayor	2022
N.E.W – Wilson – Town of Sims	Obtain a generator(s) to provide emergency power for critical town facilities (water well & town hall)	NS	2020	-	Town Board and Admin.	2021
N.E.W – Wilson – Town of Sims	Obtain new FEMA handouts & make available for residents at Town Hall	NS	2020	-	Town Clerk	2023

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
N.E.W – Wilson – Town of Stantonsburg	Update and amend the Zoning Ordinance (1985)	NS	2020	-	Planning Board and Town Council	2023 - This update was delayed due to budgetary restraints and other ongoing capital projects. However, some minor amendments have been approved
N.E.W – Wilson – Town of Stantonsburg	Update Town website with accurate information on hazard risk and mitigation options to reduce risk.	NS	2020	-	Town Manager and Council	2021 - This update was delayed due to budgetary restraints and other ongoing capital projects.
N.E.W – Wilson – Town of Stantonsburg	Establish a three or more-member local Hazard Mitigation Committee	P	2020	-	Mayor and Town Board	2022 - the establishment of this committee was delayed until a future date
N.E.W – Wilson – Town of Stantonsburg	Conduct an internal review and prepare a report that: evaluates all critical facilities for possible improvements to reduce their exposure to hazards and includes all findings that will be presented in a report to the elected governing board	P	2020	-	Public Works	2023 - This project was delayed due to budgetary restraints and other ongoing capital projects.
N.E.W – Wilson – Town of Stantonsburg	Update and amend the Wellhead Protection Plan to correspond to new flood maps	P	2020	-	Town Manager and Town Council	2023 - This revision was delayed allowing for the completion of a new water supply well to be constructed outside the Central Coastal Plains Capacity Use Area
N.E.W – Wilson – City of Wilson	Floodplain Management: Consider a floodplain/stream modeling program that allows evaluation of flooding potential along streams based upon new developments that occur upstream	P	2020	-	Stormwater	2025 – seeking grant funding
N.E.W – Wilson – City of Wilson	Building Code: Encourage builders to incorporate mitigative measures for disaster resiliency during construction	NS	2020	-	Construction Standards	2025: discussed mitigation measures at their annual meeting with contractors
N.E.W – Wilson – City of Wilson	Capital Improvement Program: Evaluate the feasibility the relocation/elevation/flood proofing needs of designated critical facilities	P, NS	2020	-	Engineering, Planning & Development Services, Utilities	2025
N.E.W – Wilson – City of Wilson	Repetitive Loss: Wilson seeks funds to buyout repetitive loss properties.	NS	2020	-	Planning & Development Services	2025 – seeking grant funding
N.E.W – Wilson – City of Wilson	Preservation: Seek funding for acquisition of properties within the floodplain, apply for acquisition funds to purchase other properties flooded	NS	2020	-	Engineering, Stormwater, Planning & Development Services	2025 – seeking grant funding

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
N.E.W – Wilson – City of Wilson	Stormwater Management: Acquire easements along drainage features and streams for public maintenance	NS	2020	-	Engineering, Stormwater, Planning & Development Services	2025 – seeking grant funding
N.E.W – Wilson – City of Wilson	Stormwater management: install detention facilities to mitigate peak flow in the downtown area	S	2020	-	Engineering, Stormwater, Land Development, Planning & Development Services	2025 – city peak flow policy exceeds state requirements
N.E.W – Wilson – City of Wilson	Restoration Program: Begin design and development of Hominy Creek Water Quality Park & Greenway Plan.	NS, NBS, P	2020	-	Engineering, Stormwater, Planning & Development Services	2025 – seeking grant funding
N.E.W – Wilson – City of Wilson	Stormwater Management: Continue improving and maintaining streams throughout the community	NBS	2020	-	Public Services, Stormwater	2025
N.E.W – Wilson – City of Wilson	Capital Improvement Program: Install monitoring systems for flood waters.	NS	2020	-	Engineering, Stormwater	2025 – seeking grant funding

Table 47. RHMP – Tar River (5.4.3)

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Tar River – Franklin County	Work with the State Office of Dam Safety (ODS) to 1) ensure that all dams in Franklin County for which the ODS has jurisdiction are inspected on a regular basis; 2) ensure that ODS notifies the Franklin County EM office of all ODS jurisdictional dams classified as “high hazard” or “distressed” dams; c) attempt to ensure that all high hazard or distressed dams in the county have an updated and implemented operations and maintenance plan and emergency action plans; and d) provide the county EM office with an inventory of all ODS jurisdictional dams in the county.	S, NS, P	2021	-	County EM Director	2026 – To be continued (TBC): Although there have been some efforts to coordinate this inspection process, there is still a great deal of coordination that needs to be worked out to ensure inspections of all high hazard dams are taking place and that the county is involved in the process.
Tar River – Franklin County	The responsible party will coordinate with each Dept. head in the local government and produce a report on ways in which hazard mitigation goals, objectives, and tasks can be incorporated into	P	2021	-	County Planning Director	2026 - TBC: The county planning Dept. has worked on including mitigation goals/tasks into existing policies/programs, but there is still a

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
	existing policies and implemented through existing programs and personnel.					good deal of effort that needs to be made to fully incorporate hazard mitigation into other areas of local governance.
Tar River – Franklin County	Each local government participating in this Hazard Mitigation Plan (HMP) will: 1) continue to monitor the types and numbers of structures (including infrastructure and critical facilities) that might be in known hazard areas based on their best available current projections and 2) calculate aggregate projected dollar losses for each type of development and for each hazard risk	P	2021	-	County Planning Director	2026 - TBC: Local governments have worked to monitor their structures that might be in known hazard areas and continue to do so, through this planning effort. However, all jurisdictions need to make a stronger effort to assess potential solutions going forward, so this action will remain in place
Tar River – Franklin County	Work with the NCDOT Division Five Highway Operations unit and convene a working group (county-wide or local) to develop solutions to localized drainage issues caused (in part or in whole) by NCDOT maintained drainage facilities.	S, P	2021	-	County Planning Director	2026 - TBC: Local drainage issues have been addressed in some of the recent NCDOT projects, but there remain many drainage issues throughout the county that will need to be resolved before this action can be considered complete.
Tar River – Franklin County	Apply for funding from HMGP and other Hazard Mitigation Assistance Programs for hazard mitigation projects	S, NS, NBS, P	2021	-	County Planning Director	2026 - TBC: There has generally not been successful funding of brick-and-mortar type projects. Therefore, the jurisdiction will continue to pursue this action
Tar River – Franklin County	Apply for funding through the FEMA High Hazard Dam Repair Program for mitigation measures associated with high hazard dams to include: (1) Geotechnical investigation to establish data for risk analysis and development of engineering designs/solutions (2) Build upstream dam to reduce load on existing dam (3) Property Acquisition in inundation areas below dam (4) Raise crest of dam to increase storage capacity (5) Add additional spillways, widen or lower existing spillways to increase discharge capacity (6) Warning systems to alert downstream areas of potential dam failure (7) Improve flow path below dam to increase conveyance capacity (8) Encourage conservation or re-forestation of upstream land to reduce runoff (9) Development of community Stormwater Management Plans for upstream communities (10) Complete an Emergency Action	NS, S, P	2021	-	County EM Director	2026

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
	Plan in conjunction with NCDEQ for all High Hazard Dams in the county					
Tar River – Franklin County	NCDEQ Dam Safety developed a risk-based selection and prioritization process for addressing high hazard dams as funding becomes available. This process will be employed by NCEM and by communities that wish to participate in the High Hazard Dam Rehabilitation program. The analysis complies with the latest practices in dam safety risk management and are compliant with FEMA's Federal Guidelines for Dam Safety Risk Management, FEMA publication P11025. Initial screening steps include securing buy in and support from the local government/dam owner(s) and assurance that cost-matching requirements can be met by the local government. The second level of screening involves confirming that a particular dam is identified as a High Hazard Dam and has of updated Emergency Action Plan	S, P	2021	-	County EM Director	2026
Tar River – Franklin County	Implement public education efforts designed to help inform the public of their exposure to all natural hazards and to inform them of actions they can take to mitigate the damages to their health and property from natural hazards.	NS	2021	-	County Planning Director; County ES/EM	2026 - TBC: The county has worked with the Red Cross to try to improve efforts by the public to mitigate damage, but there is still significant work that needs to be done to educate the public on these matters. This action will remain in the plan.
Tar River – Franklin County	Ensure that the local library maintains documents about flood insurance, flood protection, floodplain management, and natural and beneficial functions of floodplains. Many documents are available free of charge from FEMA.	NS	2021	-	County Planning Director, County ES/EM	2026 - TBC: Local libraries have maintained information about flood insurance and protection, but the materials have not been evaluated recently and may need to be replaced to ensure they reflect the most up to date information
Tar River – Franklin County	Encourage builders, developers, and architects to become familiar with the National Flood Insurance Program (NFIP) land use and building standards by attending annual workshops presented by the NCEM. This can be accomplished by creating a mailing list and providing it to NCEM to use for its announcements. This task can be further supported by distributing copies of NCEM's announcement from the city and county inspections Depts when builders and developers apply for permits.	NS	2021	-	County Planning Director	2026 - TBC: Builders/developers/etc. are always able to attend these workshops, but there has not been much effort made to encourage these groups to attend these kinds of sessions. The county will need to reevaluate its process for implementing this.

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Tar River – Franklin County	Send a flood protection flyer to all properties in the county through a community newsletter, utility bill, telephone book, or other document that is distributed to all residences. The flyer should include the following information: the name and location of the closest, county-approved shelter, a general identification of the local flood hazard, flood safety, flood insurance, property protection, floodplain development permit requirements, and drainage system maintenance.	NS	2021	-	County Planning Director	2026 - TBC: The county and city have pushed out information to some residents via flyers, but they have not been able to reach all residents so there will need to be additional efforts to evaluate the best techniques for getting this information out to the public. The county and city will evaluate this action and try to improve it going forward.
Tar River – Franklin County	Provide local real estate agents with handouts that will advise potential buyers to investigate the flood hazard for the property they are considering purchasing	NS	2021	-	County Planning Director	2026 In progress: Some handouts have been developed by the county and passed along to real estate agents, but not every agent has been reached and it is likely that the information needs to be updated, so the county will keep this action in place.
Tar River – Franklin County	Create outreach website for public designed to display risk information developed during the Hazard Mitigation Plan process.	NS	2021	-	Tar River Region, Franklin County	2026 - In progress: no measurable progress due to lack of funding and staff
Tar River – Franklin – Town of Youngsville	The responsible party will coordinate with each Dept. head in the local government and produce a report on ways in which hazard mitigation goals, objectives, and tasks can be incorporated into existing policies and implemented through existing programs and personnel.	P	2021	-	Town Administrator/ Manager	2026 - TBC: The town manager has worked on including mitigation goals/tasks into existing policies/programs, but there is still a good deal of effort that needs to be made to fully incorporate hazard mitigation into other areas of local governance.
Tar River – Franklin – Town of Youngsville	Each local government participating in this HMP will: 1) continue to monitor the types and numbers of structures (including infrastructure and critical facilities) that might be in known hazard areas based on their best available current projections and 2) calculate aggregate projected dollar losses for each type of development and for each hazard risk	P	2021	-	Town Administrator/ Manager	2026 - TBC: The town has worked to monitor its structures that might be in known hazard areas and has continued to do so through this planning effort. However, the town needs to make a stronger effort to assess potential solutions going forward, so this action will remain in place
Tar River – Franklin –	Work with the NCDOT Division Five Highway Operations unit and convene a working group (county-wide or local) to develop	S, P	2021	-	Public Works Director/Water System Operator	2026 - TBC: Local drainage issues have been addressed in some of the recent NCDOT projects, but there remain

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Town of Youngsville	solutions to localized drainage issues caused (in part or in whole) by NCDOT maintained drainage facilities.					many drainage issues throughout the county that will need to be resolved before this action can be considered complete. The town will work with county officials and NCDOT on this issue.
Tar River – Franklin – Town of Youngsville	Apply for funding from the HMGP (FEMA) for mitigation related projects.	S, NS, NBS, P	2021	-	Town Administrator/ Manager	2026 - TBC: There has generally not been successful funding of brick-and-mortar type projects. Therefore, the jurisdiction will continue to pursue this action.
Tar River – Franklin – Town of Youngsville	Implement public education efforts designed to help inform the public of their exposure to all natural hazards and to inform them of actions they can take to mitigate the damages to their health and property from natural hazards	NS	2021	-	Town Clerk	2026 - TBC: The county and town have worked with the Red Cross to try to improve efforts by the public to mitigate damage, but there is still significant work that needs to be done to educate the public on these matters. This action will remain in the plan.
Tar River – Franklin – Town of Youngsville	Ensure that the local library maintains documents about flood insurance, flood protection, floodplain management, and natural and beneficial functions of floodplains. Many documents are available free of charge from FEMA.	NS	2021	-	Town Clerk	2026 - TBC: Local libraries have maintained information about flood insurance and protection, but the materials have not been evaluated recently and may need to be replaced to ensure they reflect the most up to date information
Tar River – Franklin – Town of Youngsville	Encourage builders, developers, and architects to become failure with the NFIP land use and building standards by attending annual workshops presented by the NCEM. This can be accomplished by creating a mailing list and providing it to NCEM to use for its announcements. This task can be further supported by distributing copies of NCEM's announcement from the city and county inspections Depts when builders and developers apply for permits.	NS	2021	-	Town Clerk	2026 - TBC: Builders/developers/etc. are always able to attend these workshops, but there has not been much effort made to encourage these groups to attend these kinds of sessions. The county will need to reevaluate its process for implementing this action.
Tar River – Franklin – Town of Youngsville	Send a flood protection flyer to all properties in the county through a community newsletter, utility bill, telephone book, or other document that is distributed to all residences. The flyer should include the following information: the name and location of the closest, county-approved shelter, a general identification	NS	2021	-	Town Clerk	2026 - TBC: The county and city have pushed out information to some residents via flyers, but they have not been able to reach all residents so there will need to be additional efforts to

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
	of the local flood hazard, flood safety, flood insurance, property protection, floodplain development permit requirements, and drainage system maintenance					evaluate the best techniques for getting this information out to the public. The county and city will evaluate this action and try to improve it going forward.
Tar River – Franklin – Town of Youngsville	Provide local real estate agents with handouts that will advise potential buyers to investigate the flood hazard for the property they are considering purchasing.	NS	2021	-	Town Clerk	2026 - In progress: Some handouts have been developed by the county and passed along to real estate agents, but not every agent has been reached and it is likely that the information needs to be updated, so the county will keep this action in place
Tar River – Franklin – Town of Youngsville	Create outreach website for public designed to display risk information developed during the Hazard Mitigation Plan process.	NS	2021	-	County/Town	2026 - In progress: no measurable progress due to lack of funding and staff
Tar River – Granville County	Work with the State Office of Dam Safety (ODS) to a) ensure that all dams in Granville County for which the ODS has jurisdiction are inspected on a regular basis b) ensure that ODS notifies the Granville County EM (EM) office of all ODS jurisdictional dams classified as “high hazard” or “distressed” dams c) attempt to ensure that all high hazard or distressed dams in the county has an updated and implemented operations and maintenance plan and emergency action plans and d) provide the county EM office with an inventory of all ODS jurisdictional dams in the county	S, NS, P	2021	-	County EM Director	2026 - TBC: The county has worked to identify dams located within the county, including through this mitigation planning effort. Dam Safety Action Plans have been completed and reviewed by Cities of Oxford and Creedmoor. However, further efforts are needed to ensure that all high hazard dams have sufficient plans in place and that coordination with state dam safety officials are maintained to keep dam information up to date at the county level
Tar River – Granville County	Adopt flood maps as they are updated by FEMA and/or the state.	P	2021	-	County Planning	2026 - In progress: Last update in December 2019. Maps are updated periodically as directed by FEMA and the State of NC
Tar River – Granville County	Work with the NCDOT Division Five Highway Operations unit and convene a working group to develop solutions to localized drainage issues caused (in part or in whole) by NCDOT maintained drainage facilities	S, P	2021	-	County Planning Director	2021 - Deleted: The county has determined that this action may not be necessary as the NCDOT generally addressed drainage issues through its programs without the need to convene a working group.

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Tar River – Granville County	Apply for funding from the Hazard Mitigation Grant Program (HMGP) and other Hazard Mitigation Assistance (HMA) grants.	S, NS, NP, P	2021	-	County EM Director	2026 - TBC: In general, the county has not received grant funding for brick and mortar projects under the HMGP, but this is still an action the county would like to have in place going forward as it pursues these types of projects. Eligible projects have not been identified.
Tar River – Granville County	Provide backup power for critical facilities.	NS	2021	-	County ES	2026
Tar River – Granville County	Work with local American Red Cross (ARC) officials to develop a plan and implementation goals for ensuring that all county-sponsored shelters meet ARC shelter operations standards for mitigation from all hazards, most especially wind and flood hazards.	P	2021	-	County ES	2026 - TBC: The county has worked with ARC officials to ensure that identified shelters are protected as effectively as possible.
Tar River – Granville County	Implement public education efforts designed to help inform the public of their exposure to natural hazards and to inform them of actions they can take to mitigate the damages to their health and property from all natural hazards.	NS	2021	-	County EM Director	2026 - TBC: The county has implemented several types of public education efforts in the past such as GranvilleAlert.com and the new county website, but as the most effective techniques are constantly evolving, the county will need to evaluate its outreach program in the future and ensure it is communicating effectively with the public.
Tar River – Granville County	Ensure that the local library maintains documents about flood insurance, flood protection, floodplain management, and natural and beneficial functions of floodplains. Many documents are available free of charge from FEMA	NS	2021	-	County EM Director	2026 - TBC: Several libraries in the county have kept information on the flood hazard on hand over the past 5 years, however, this information is likely outdated and should be evaluated and replaced as needed. Therefore, this action will remain in place. Much of this information is available online.
Tar River – Granville County	Encourage buildings, developers, and architects to become familiar with the NFIP land use and building standards by attending annual workshops presented by the NCEM. This can be accomplished by creating a mailing list and providing it to NCEM	NS	2021	-	County EM Director	2026 - TBC: The development community has been made aware of programs from NCEM to some degree, but the county would like to implement

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
	to use for its announcements. This task can be further supported by distributing copies of NCEM's announcement from the county's inspections Dept. when builders and developers apply for permits					a bigger push to let this community know about potential programs/workshops that are available and to encourage attendance. EM and zoning officials attend annual conferences and have input on plans for sites with floodplains.
Tar River – Granville County	Provide information to residents via various communication methods: the name and location of the closest, county-approved shelter, a general identification of the local flood hazard, flood safety, flood insurance, property protection, floodplain development permit requirements, and drainage system maintenance.	NS	2021	-	County EM Director	2026 - TBC: The county has pushed out information to some residents via social media and the county website, but the county has not been able to reach all residents so there will need to be additional efforts to evaluate the best techniques for getting this information out to the public. The county will evaluate this action and try to improve it going forward via online management.
Tar River – Granville County	Provide local real estate agency with handouts that will advise potential buyers to investigate the flood hazard for the property they are considering purchasing	NS	2021	-	County EM Director	2021 - Delete: Only a small portion of the county is in floodplain. Action PEA-4 more effectively addresses this mitigation opportunity.
Tar River – Granville County	Create outreach website for public designed to display risk information for all hazards developed during the Hazard Mitigation Plan process	NS	2021	-	Tar River Region, Granville County	2026 - TBC: A website will continue to be updated and available with information for the community.
Tar River – Granville County –Town of Butner	Development and updated of a Parks and Recreation Master Plan, focusing priority on purchase and development of flood-prone lands for recreational activities.	P	2021	-	Town Planner	2026 - TBC: Plan adopted and will update, as necessary.
Tar River – Granville County –Town of Butner	Apply for funding from the Hazard Mitigation Grant Program (HMGP) and other Hazard Mitigation Assistance (HMA) grant programs for mitigation related project grants	S, NS, NBS, P	2021	-	Town Planner	2026 - In progress: In general, the town has not received grant funding for brick-and-mortar projects under the HMGP, but this is still an action the town would like to have in place going forward as it pursues these types of projects
Tar River – Granville	Implement public education efforts designed to help inform the public of their exposure to all natural hazards and to inform them	NS	2021	-	Town Planner	2026 - In progress: The county and town have implemented several types

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
County –Town of Butner	of actions they can take to mitigate the damages to their health and property from all-natural hazards.					of public education efforts in the past, but as the most effective techniques are constantly evolving, the county and town will need to evaluate their outreach programs in the future and ensure they are communicating effectively with the public
Tar River – Granville County –Town of Butner	Ensure that the local library maintains documents about flood insurance, flood protection, floodplain management, and natural and beneficial functions of floodplains. Many documents are available free of charge from FEMA	NS	2021	-	Town Planner	2026 - In progress: Several libraries in the county have kept information on the flood hazard on hand over the past 5 years, however, this information is likely outdated and should be evaluated and replaced as needed. Therefore, this action will remain in place
Tar River – Granville County –Town of Butner	Encourage buildings, developers, and architects to become familiar with the NFIP land use and building standards by attending annual workshops presented by the NCEM.	NS	2021	-	Town Planner	2026 - In progress: The development community has been made aware of programs from NCEM to some degree, but the town would like to implement a bigger push to let this community know about potential programs/workshops that are available and to encourage attendance.
Tar River – Granville County –Town of Butner	Send a flood protection flyer to all properties in the county through a community newsletter, utility bill, telephone book, or other document that is distributed to all residences. The flyer should include the following information: the name and location of the closest, county-approved shelter, a general identification of the local flood hazard, flood safety, flood insurance, property protection, floodplain development permit requirements, and drainage system maintenance.	NS	2021	-	Town Planner	2026 - TBC: The county and city have pushed out information to some residents via flyers, but they have not been able to reach all residents so there will need to be additional efforts to evaluate the best techniques for getting this information out to the public. The county and city will evaluate this action and try to improve it going forward.
Tar River – Granville County –Town of Butner	Provide local real estate agency with handouts that will advise potential buyers to investigate the flood hazard for the property they are considering purchasing	NS	2021	-	Town Planner	2026 - In progress: Local real estate agents have been given some information that can be passed along to potential home buyers, but the county and town will need to determine if this strategy has been effective and if the information needs

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
						to be updated. This action will remain in the plan
Tar River – Granville County –Town of Butner	Create outreach website for public designed to display risk information regarding all hazards developed during the Hazard Mitigation Plan process.	NS	2021	-	Tar River Region, Granville County, Town of Butner	2026 - In progress: no measurable progress due to lack of funding.
Tar River – Granville County – City of Creedmoor	Continue pursuit of grants and alternative funding sources to increase staff and resources to address current and future hazard mitigation needs	P	2021	-	City Admin.	2026 - In progress: The city has worked to pursue some grants and mitigation funding in the past, but there are still many projects that have not been completed that the city would like to pursue, so this action will remain in place
Tar River – Granville County – City of Creedmoor	As part of the continuing process to review and revise city Zoning and Subdivision Ordinances, primary hazard areas for the city to consider are the floodplains bordering the east and west areas of the city's ETJ. The city should ultimately direct development away from the floodplains, but the following recommendations should be considered 1) increase the minimum vegetative buffer requirements associate with development near perennial and intermittent water sources (streams, creeks, surface waters as identified on USGS maps; and 2) incorporate a minimum 200' vegetative buffer surrounding Lake Rogers, measured at normal lake elevation)	NS	2021	-	City Admin.	Completed - The city has adopted both requirements identified in this action so this action is completed.
Tar River – Granville County – City of Creedmoor	Continued coordination with property owners/business owners to obtain flood insurance (under Community Rating System-CRS of NFIP)	NS	2021	-	City Admin.	2026 - TBC: The city has not joined the CRS program of the NFIP, but it will continue to work on further developing its program so that it is able to qualify for reduced flood insurance rates under the program.
Tar River – Granville County – City of Creedmoor	Maintain/provide current information, services, procedures, and code revisions in relation to all current/future natural human induced hazards within Granville County, the City of Creedmoor area, and State of North Carolina for public consumption.	NS	2021	-	NCEM, Granville County, City Admin.	2026 - In progress: The city has worked in conjunction with the county and the state to provide the necessary services and procedures to reduce risk to hazards, but there is still significant work that can be done to try to prevent damage from these hazards via regulatory means and the city would

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
						like to keep this action in place going forward
Tar River – Granville County – City of Creedmoor	Obtain computer and paper copy of current FEMA flood maps for the Neuse River Basin	P	2021	-	NCEM	Completed - Through this planning process flood maps are now available to the city and will continue to be available in the future through NC Floodplain Mapping Program's website.
Tar River – Granville County – City of Creedmoor	Consider revisions to the city's Flood Ordinance for the following (more stringent than the state minimum requirements): raise finished flood elevation requirements for new structures where the Base Flood Elevation (BFE) has been determined per updated Floodplain Zones (FEMA 2003-established by the National Flood Insurance Rate Maps); structures located within zones where BFE are identified, are required to elevate two (2) feet above base flood elevation (state minimum-allows for ductwork and wiring to be below this elevation); and to increase the opportunity for ductwork and wiring to be out of range for damage in the event of potential future flood event, the following medication is recommended: increase BFE by one (1) foot, total of three (3) feet	NS	2021	-	City Admin.	2026 - TBC: The city has introduced revisions to the Flood Ordinance to address some of the regulatory standards identified in this action, however, the city would like to integrate additional updates to its ordinance as well, so it will keep this action in the plan.
Tar River – Granville County – City of Creedmoor	Review and update the City's Comprehensive Development Plan to ensure that development is occurring in a pattern that best suits the needs of the changing population for the city, with consideration to areas prone to hazard (such as floodplains).	P	2021	-	City Admin.	2026 - TBC: Although the city has developed a Comprehensive Development Plan that considers areas prone to hazards, the city will need to update this plan to ensure that it continues to address this area of concern by limiting development in high hazard areas.
Tar River – Granville County – City of Creedmoor	Consider revising local ordinances to require new manufactured housing units (after adoption of this ordinance) to have permanent foundations	NS	2021	-	City Admin.	2026 - TBC: The city has not revised its local ordinance to require new manufacture housing units have permanent foundations. This action will remain in the plan as the city continues to consider this requirement
Tar River – Granville County – City of Creedmoor	Apply for funding from the HMGP (FEMA) and HMA (FEMA) for mitigation projects.	P	2021	-	City Manager	2026 - In progress: In general, the city has not received grant funding for brick-and-mortar projects under the HMGP, but this is still an action the city would like to have in place going

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
						forward as it pursues these types of projects.
Tar River – Granville County – City of Creedmoor	Consider developing ordinances to protect natural resources and use them as natural greenways, limiting the opportunity for damage from hazards (floodplains, large open areas prone to wind damage). Use of floodplains as green space and greenways preserved for these uses and not developed through development of a Natural Resources Protection Ordinance. Used to protect the natural resources of Creedmoor and incorporate practices that will still allow of managed development. Include sections in this ordinance for best management practices (control runoff), erosion/sediment controls ordinance, and floodplain regulations. Included in this process would be incorporation of a greenway system.	NS, NBS	2021	-	City Admin.	2026 - In progress: The city has developed some ordinances that protect natural resources and thus mitigate hazards such as flooding. However, the city would like to keep this action in place as it continues to pursue ordinances that can preserve natural areas.
Tar River – Granville County – City of Creedmoor	Review and update EM plans/operations on a yearly basis or as circumstances dictate with regards to natural and human induced hazards.	P	2021	Annual updates	City Admin.	2026 - TBC: The city has updated its EOP on an annual basis and will work to enact its next update of the plan within one year to incorporate improvements to the plan and ensure it addresses any new issues.
Tar River – Granville County – City of Creedmoor	Implement public education efforts designed to help inform the public of their exposure to natural hazards and to inform them of actions they can take to mitigate the damages to their health and property from all natural hazards.	NS	2021	-	City Manager	2026 - TBC: The county and city have implemented several types of public education efforts in the past, but as the most effective techniques are constantly evolving, the county and city will need to evaluate their outreach programs in the future and ensure they are communicating effectively with the public.
Tar River – Granville County – City of Creedmoor	Ensure that the local library maintains documents about flood insurance, flood protection, floodplain management, and natural and beneficial functions of floodplains. Many documents are available free of charge from FEMA.	NS	2021	-	City Manager	2026 - TBC: Several libraries in the county have kept information on the flood hazard on hand over the past 5 years, however, this information is outdated, should be evaluated, and replaced as needed. Therefore, this action will remain in place.
Tar River – Granville	Encourage buildings, developers, and architects to become familiar with the NFIP land use and building standards by	NS	2021	-	City Manager	2026 - In progress: The development community has been made aware of

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
County – City of Creedmoor	attending annual workshops presented by the NCEM. This can be accomplished by creating a mailing list and providing it to NCEM to use for its announcements. This task can be further supported by distributing copies of NCEM's announcement from the county's inspections Dept. when builders and developers apply for permits					programs from NCEM, but the city would like to implement a bigger push to let this community know about potential programs/workshops that are available and to encourage attendance.
Tar River – Granville County – City of Creedmoor	Send a flood protection flyer to all properties in the county through a community newsletter, utility bill, telephone book, or other document that is distributed to all residences. The flyer should include the following information: the name and location of the closest, county-approved shelter, a general identification of the local flood hazard, flood safety, flood insurance, property protection, floodplain development permit requirements, and drainage system maintenance.	NS	2021	-	City Manager	2026 - TBC: The county and city have pushed out information to some residents via flyers, but they have not been able to reach all residents so there will need to be additional efforts to evaluate the best techniques for getting this information out to the public. The county and city will evaluate this action and try to improve it going forward.
Tar River – Granville County – City of Creedmoor	Provide local real estate agency with handouts that will advise potential buyers to investigate the flood hazard for the property they are considering purchasing.	NS	2021	-	Creedmoor Manager	2026 - TBC: Local real estate agents have been given some information that can be passed along to potential home buyers, but the county and city will need to determine if this strategy has been effective and if the information needs to be updated. This action will remain in the plan.
Tar River – Granville County – City of Creedmoor	Provide public education forums, workshops, and related meetings regarding required methods and materials for hazard mitigation for all hazards	NS	2021	-	City of Creedmoor, Granville County, NCEM	2026 - TBC: The city has held some public education forums on how to mitigate and has passed out materials to citizens on this subject. However, there is still significant public outreach work that needs to be conducted through workshops and meetings so this action will remain in the plan
Tar River – Granville County – City of Creedmoor	Create and update outreach website for public designed to display risk information for all hazards developed during the Hazard Mitigation Plan process.	NS	2021	-	Tar River Region, Granville County, City of Creedmoor	2026 - In progress: No measurable progress due to lack of staff and funding.
Tar River – Granville	Development of a Parks and Recreation Master Plan, focusing priority on purchase and development of flood-prone lands for recreational activities	NS, P	2021	-	Town Mayor	2026 - In progress: Although the city has many parks and recreational facilities, it has not developed a Parks and

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
County – Town of Stem						Recreation Master Plan that focuses on purchase of flood prone lands. The town will pursue this action going forward
Tar River – Granville County – Town of Stem	Apply for funding from the HMGP (FEMA)	P	2021	-	Town Mayor	2026 - TBC: In general, the town has not received grant funding for brick-and-mortar projects under the HMGP, but this is still an action the town would like to have in place going forward as it pursues these types of projects.
Tar River – Granville County – Town of Stem	Implement public education efforts designed to help inform the public of their exposure to all natural hazards and to inform them of actions they can take to mitigate the damages to their health and property from natural hazards.	NS	2021	-	Town Mayor	2026 - TBC: The county and town have implemented several types of public education efforts in the past, but as the most effective techniques are constantly evolving, the county and town will need to evaluate their outreach programs in the future and ensure they are communicating effectively with the public.
Tar River – Granville County – Town of Stem	Ensure that the local library maintains documents about flood insurance, flood protection, floodplain management, and natural and beneficial functions of floodplains. Many documents are available free of charge from FEMA.	NS	2021	-	Town Mayor	2026 - TBC: Several libraries in the county have kept information on the flood hazard on hand over the past 5 years, however, this information is outdated, should be evaluated, and replaced as needed. Therefore, this action will remain in place.
Tar River – Granville County – Town of Stem	Encourage buildings, developers, and architects to become familiar with the NFIP land use and building standards by attending annual workshops presented by the NCEM. This can be accomplished by creating a mailing list and providing it to NCEM to use for its announcements. This task can be further supported by distributing copies of NCEM's announcement from the county's inspections Dept. when builders and developers apply for permits.	NS	2021	-	Town Mayor	2026 - In progress: The development community has been made aware of programs from NCEM, but the city would like to implement a bigger push to let this community know about potential programs/workshops that are available and to encourage attendance.
Tar River – Granville County – Town of Stem	Send a flood protection flyer to all properties in the county through a community newsletter, utility bill, telephone book, or other document that is distributed to all residences. The flyer should include the following information: the name and location	NS	2021	-	Town Mayor	2026 - TBC: The county and city have pushed out information to some residents via flyers, but they have not been able to reach all residents so there

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
	of the closest, county approved shelter, a general identification of the local flood hazard, flood safety, flood insurance, property protection, floodplain development permit requirements, and drainage system maintenance					will need to be additional efforts to evaluate the best techniques for getting this information out to the public. The county and city will evaluate this action and try to improve it going forward.
Tar River – Granville County – Town of Stem	Provide local real estate agency with handouts that will advise potential buyers to investigate the flood hazard for the property they are considering purchasing	NS	2021	-	Town Mayor	In progress: Local real estate agents have been given some information that can be passed along to potential home buyers, but the county and town will need to determine if this strategy has been effective and if the information needs to be updated. This action will remain in the plan.
Tar River – Granville County – Town of Stem	Create outreach website for public designed to display risk information developed during the Hazard Mitigation Plan process.	NS	2021	-	Tar River Region, Granville County, Town of Stem	2026 - In progress: no measurable progress due to lack of funding and staff

Table 48. RHMP – Cape Fear Region (5.4.3)

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Cape Fear – Harnett County – Town of Angier	Create and define suitable areas for growth by updating existing land use plan or creation of a new land use plan that considers mitigation of all hazards	P	2020	Further updates of the land use plan will be required	Zoning/Planning Administrator, Town Administrator	2025 - TBC: The town has updated its existing land use plan to identify areas suitable for growth. The Town adopted a Comprehensive Land Use Plan in 2017. The Land Use Map was updated in 2019 to account for the proposed NC 55 Bypass and encourage growth on the West side of Town.
Cape Fear – Harnett County – Town of Angier	Create a yearly checklist that will help monitor and protect infrastructure and existing structures from all hazards	NS, P	2020	Reviewed annually	Public Works Director, Building Inspector	2025 - TBC: The town has developed a checklist that will help it to monitor its infrastructure and existing structures.
Cape Fear – Harnett County – Town of Angier	The town will involve county officials with future growth plans and patterns and hold community-visioning meetings to educate the public and	P	2020	-	Town Administrator, Planning Director,	2025 - TBC. Planning Staff is in periodic communication with County Planners to be sure County officials are aware of growth projections in Angier. The Town has also held public input

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
	developers about future growth and hazard mitigation planning for all hazards				Town/County Boards	sessions for various growth-related initiatives including updates to the Ordinance and the 2019 Land Use Plan update.
Cape Fear – Harnett County – Town of Angier	Create new ordinances and/or strengthen existing ordinances to protect and preserve environmentally sensitive areas and open space.	NS	2020	-	Town Administrator, Planning/Zoning Administrator, Town/County Boards	2025 - TBC. Planning Staff has recently overhauled the Open Space chapter of the Unified Development Ordnance (UDO) to ensure adequate open space is dedicated in new development, ensure recreational opportunities are widely available, and to protect wetlands and flood plains as vacant land is developed. Ordinances have been developed in a way that attempts to minimize degradation to environmentally sensitive areas and to preserve open space. There are still revisions that could be made to the town's ordinances that would further reduce risk and the town will investigate making those changes going forward.
Cape Fear – Harnett County – Town of Angier	Pursue state and Federal grants that would help improve ES along with mitigation planning for all hazards.	P	2020	-	Town/County Manager, Planning Director, Finance Director	2025 - TBC: Town staff will continue to monitor and apply for grants, as it relates to identified mitigation projects.
Cape Fear – Harnett County – Town of Angier	Try to set aside monies for long range Capital Improvement Projects that would help protect public health and safety from all hazards.	NS, P	2020	-	Town/County Manager, Planning Director, Finance Director	2025 - TBC. Through the collection of System Development Fees for new development, the Town has and will continue to set aside money for long-range capital improvement projects such as partnering in the future expansion of the Northwest Harnett Regional Treatment Plant to serve the needs of new development.
Cape Fear – Harnett County – Town of Angier	Provide backup power for critical facilities	NS	2020	-	Town/County Manager, Planning Director	2025
Cape Fear – Harnett County – Town of Angier	Make a list available for distribution at the Inspections Dept. of contractors and consultants knowledgeable or experienced in retrofitting/construction techniques for mitigation of all hazards.	P	2020	-	Chief Building Inspector, Harnett County Planning and Inspections Dept.	2025 - TBC: The town has developed a list of contractors that are knowledgeable in retrofitting homes and other structures. This list is available at the Inspections Dept. but needs to be reviewed and updated annually.

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Cape Fear – Johnston County	Johnston County will apply to reduce their National Flood Insurance Program (NFIP)-CRS (Community Rating System) score.	NS, P	2020	-	ES Coordinator, Environmental Protection Administrator	2025 - TBC: Johnston County Planning Dept. continues to work on floodplain management program that will facilitate reducing the CRS score.
Cape Fear – Johnston County	Conduct a county dam safety inventory. People downstream of hazardous dams would be notified. Owners would be notified of ways to reduce the risk of their dams.	P, S	2020	-	Public Utilities Director	2025 - In progress: Not sufficient funding or resources to complete at this time.
Cape Fear – Johnston County	Relocation of four server boxes located in the basement of the Johnston County courthouse and/or increase from one to multiple servers at the Johnston County Health Dept. to increase redundancy	NS	2020	-	Technology Services Director	2025 - TBC: the county continues to work to increase redundancy in all its systems and will replace as funding becomes available.
Cape Fear – Johnston County	Replace generator at Pine Level wastewater pump station.	NS	2020	-	Public Utilities Director	2025 - In progress: No measurable progress due to a lack of funding
Cape Fear – Johnston County	Provide auxiliary heating and cooling capability and generator connections to shelter sites at North Johnston Middle School, West Johnston High School, and First Baptist Church Smithfield.	NS	2020	-	ES Director, Johnston County School System	2025 - TBC: identifying ways to facilitate generator power to critical structure such as shelter during disasters for specified locations
Cape Fear – Johnston County	Provide backup power to critical facilities.	NS	2020	-	ES Director	2025
Cape Fear – Johnston County	Flood damage prevention ordinance	NS	2020	Reviewed and updated regularly.	Town Admin.	2025 - TBC: 2009 flood prevention ordinance updated and re-adopted June 4, 2018
Cape Fear – Johnston County	Complete rehabilitation work on three gravity sewer outfalls to reduce system infiltration	S	2020	-	Public Utilities Director	2025 - In progress: No measurable progress due to a lack of funding.
Cape Fear – Johnston County	Replace bridge No. 40 located on US 70 Business (Market St.) over Neuse River	S	2020	-	ES Director	2025 - In progress: No measurable progress due to a lack of funding
Cape Fear – Johnston County	The Johnston County Continuity of Operations Plan (COOP) will be upgraded	P	2020	Updated annually	ES Director	2025 - In progress: COOP was updated in 2019
Cape Fear – Johnston County	Establish a site for supporting an NCOEMS Medical Support Shelter. (CapRac).	NS	2020	-	ES Dept.	2025 - In progress: JCES, CapRac and NC Emergency Management (NCEM) have worked with C3 church to use their facility for a Special Medical Needs Shelter

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Cape Fear – Johnston County	On an annual basis, the FEMA repetitive loss property list will be obtained from NCEM. At that time, letters will be sent to the owners of the repetitive loss structures to notify them of their status and to offer information on programs that could help.	NS	2020	-	GIS Application Analyst, Emergency Services Coordinator	2025 - TBC: The county continues to update its repetitive loss list and, will continue to attempt to notify property owners to institute mitigation.
Cape Fear – Johnston County	Update and maintain educational information and links on County website for the public to access to stay informed regarding all natural hazards.	NS	2020	-	ES Dept.	2025 - In progress: The county website includes information for hazard and mitigation for the public.
Cape Fear – Johnston County	Develop and print a brochure outlining wind proofing methods above and beyond Code. This will be offered in the Inspections Dept. receptionist area.	NS	2020	-	Steven Finn (Planning and Inspections Director)	2025 - TBC: The county continues to work to develop a brochure concerning wind proofing methods
Cape Fear – Johnston County – Town of Archer Lodge	Provide backup power to critical facilities.	NS	2020	-	Public Works	2025
Cape Fear – Johnston County – Town of Archer Lodge	Work with Johnston County to upgrade COOP.	P	2020	-	ES Director	2025 - TBC: continually working with county to meet goal.
Cape Fear – Johnston County – Town of Archer Lodge	Collaborate with Johnson County EM (emergency medical services [EMS]) by reviewing and suggesting applicable updates to available information on Johnston County's EMS Website for the public to access/stay informed on natural hazard risks and mitigation techniques	NS	2020	Annual review	Town Admin.	2025 - TBC: 2020 Annual Review completed of applicable information on Johnston County's EM Website.
Cape Fear – Johnston County – Town of Archer Lodge	Make available to public any brochures/materials that may be available from the county, state, or federal level that outline homeowner mitigation techniques for all hazards.	NS	2020	-	Town Admin.	2025 - TBC: Dissemination of information occurs regularly. 2020 Archer Lodge Website updated. Under local Information Tab installed link to connect to: Johnston County EM web page
Cape Fear – Johnston County –Town of Benson	Propose a stormwater drainage study.	P	2020	Updated every 5 years	Planning, Public Works	2025 - TBC: Baseline model completed
Cape Fear – Johnston County –Town of Benson	Maintain list of residents with special needs.	P		-	Admin.	2025 - TBC: This information is kept in the utility software and updated as needed

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Cape Fear – Johnston County –Town of Benson	Maintain a list of contractors to assist town in emergencies	P		Annual	Admin.	2025 - TBC: Public Utilities has this information updated annually and submitted to the State with permits
Cape Fear – Johnston County –Town of Benson	Maintain all utility rights-of-way by trimming trees around power lines and maintain right-of-way of water/sewer lines.	NS		Annual	Electric Dept., Public Works Dept.	2025 - TBC: Tree trimming is maintained on an annual basis by Electric & Public Works Depts to ensure all utilities are accessible
Cape Fear – Johnston County –Town of Benson	Conduct smoke testing and camera system of existing sewer lines	NS	2020	Every 10 years	Public Works	2025 - TBC: American Institute of Architects study was performed in 2018
Cape Fear – Johnston County –Town of Benson	Conduct a comprehensive drainage study.	P	2020	Every 5 years	Public Works	2025 - TBC: Baseline model completed
Cape Fear – Johnston County –Town of Benson	Replace three existing pump stations.	NS	2020	-	Public Works	2025 - In progress: Funding not available at this time
Cape Fear – Johnston County –Town of Benson	On pump stations, raise all controls above Base Flood Elevation. Lift Station needs to be 2ft higher.	NS	2020	-	Public Works	2025 - In progress: Funding not available at this time
Cape Fear – Johnston County –Town of Benson	Provide backup power to critical facilities	NS	2020	-	Public Works	2025
Cape Fear – Johnston County –Town of Benson	Continue upgrades of sanitary sewer system	NS	2020	-	Wastewater Treatment, Public Works	2025 - TBC: $875,000 grant applied towards replacement and repairs to sewer system. This project is continuing as funding becomes available.
Cape Fear – Johnston County –Town of Benson	Enter into agreement with Johnston County to use current county hazard notification system.	NS	2020	-	Admin.	2025 - n progress: At one time we had use of Code Red to notify our citizens, we no longer have access to this until funding becomes available.
Cape Fear – Johnston County –Town of Benson	Maintain and update the Town of Benson website	NS	2020	-	Admin.	2025 - TBC: As events occur, we have a staff member that keeps this information updated.
Cape Fear – Johnston County –Town of Benson	Educate public of all potential natural disasters.	NS	2020	-	Admin.	2025 - TBC: The town continues to keep the public well informed. We have a Public Information Officer on staff that continually monitors and educates as events occur

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Cape Fear – Johnston County –Town of Clayton	Develop comprehensive plan.	P	2020	-	Planning Dept.	2021 - In progress, 10% complete. Anticipate completion July 2021
Cape Fear – Johnston County –Town of Clayton	Provide backup power for critical facilities.	NS	2020	-	Fire Dept.	2025
Cape Fear – Johnston County –Town of Clayton	The Johnston County COOP will be upgraded.	P	2020	-	Emergency Services Director	2025 - In progress: no measurable progress due to limited funds.
Cape Fear – Johnston County –Town of Clayton	Conduct Annual Emergency Operations Center (EOC) training.	NS	2020	Annual	Fire Dept.	2025
Cape Fear – Johnston County –Town of Clayton	Develop and print a brochure outlining wind proofing methods above and beyond Code. This will be offered in the Inspections Dept. receptionist area.	NS	2020	-	Steven Finn (Planning and Inspections Director)	2025 - In progress: No measurable progress due to limited funds.
Cape Fear – Johnston County –Town of Clayton	Develop hazard mitigation materials for all hazards for print and/or use on websites/social media.	NS	2020	-	Steven Finn (Planning and Inspections Director)	2025
Cape Fear – Johnston County – Town of Four Oaks	Maintain all utility rights-of-way by trimming trees around power lines and maintain right-of-way of water/sewer line	NS	2020	Annual	Public Works/Duke Energy	2025 - TBC: The town along with Duke Energy automatically has this on their check all the time list.
Cape Fear – Johnston County – Town of Four Oaks	Maintain a list of contractors to assist town in natural hazards.	P	2020	Updated annually	Admin.	2025
Cape Fear – Johnston County – Town of Four Oaks	Digitize copies of town ordinances, polices, and procedures.	NS	2020	-	Admin. and Town Council	2025 - TBC: Working on updates along with the Chapter 160D
Cape Fear – Johnston County – Town of Four Oaks	Town of Four Oaks public power electric system upgrade and relocation of overhead power lines	NS	2020	-	Public Works/Duke Energy	2025 - In progress: no measurable progress due to lack of funding
Cape Fear – Johnston County – Town of Four Oaks	Assess sewer lines due to infiltration issues. Need to address five to six utility access holes per year.	NS, P	2020	-	Public Works	2025 - In progress: no measurable progress due to lack of funding.

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Cape Fear – Johnston County – Town of Four Oaks	Clean street grates before heavy rains and in large drain tiles to accommodate water.	NS	2020	-	Public Works	2025 - In progress: no measurable progress due to lack of funding
Cape Fear – Johnston County – Town of Four Oaks	Install drainage pipe to relieve storm runoff and clean culvert areas.	S	2020	-	Public Works	2025 - In progress: no measurable progress due to lack of funding.
Cape Fear – Johnston County – Town of Four Oaks	Provide backup power for critical facilities.	NS	2020	-	Public Works	2025
Cape Fear – Johnston County – Town of Four Oaks	Develop ordinance to penalize intentional or malicious damage to canal and drainage system.	NS	2020	-	Town Manager, Town Council	2025 - In progress: no measurable progress due to lack of funding
Cape Fear – Johnston County – Town of Four Oaks	Clean out and improve drainage pipe located on CSX Railroad right-of-way.	NS	2020	-	Town Manager, Town Council	2025 - In progress: no measurable progress due to lack of funding
Cape Fear – Johnston County – Town of Four Oaks	Maintain a system for identifying special needs citizens in the town.	P	2020	-	Police Dept., Admin.	2025 - In progress: no measurable progress due to lack of funding
Cape Fear – Johnston County – Town of Four Oaks	Maintain town's website to include links to ReadyNC.org and FEMA	NS	2020	-	Admin.	2025 - In progress: no measurable progress due to lack of funding
Cape Fear – Johnston County – Town of Four Oaks	Provide citizens with educational materials regarding the mitigation of all hazards through a variety of mediums.	NS	2020	-	Admin.	2025
Cape Fear – Johnston County – Town of Four Oaks	Digitize copies of town ordinances, polices, and procedures.	NS	2020	-	Town Manager	2025 - In progress: no measurable progress due to lack of funding.
Cape Fear – Johnston County – Town of Four Oaks	Develop ordinance to penalize intentional or malicious damage to canal and drainage system	NS	2020	-	Town Manager, Town Council	2025 - In progress: no measurable progress due to lack of funding.
Cape Fear – Johnston County – Town of Four Oaks	Clean out and improve drainage pipe located on CSX Railroad right-of-way	NS	2020	-	Town Manager, CSX Officials	2025 - In progress: no measurable progress due to lack of funding.
Cape Fear – Johnston County – Town of Kenly	Remove beaver dam and trap beavers on east side of town to improve drainage and prevent flooding of low-lying areas and streets.	S	2020	-	Town Manager, CSX Officials	2025 - In progress: no measurable progress due to lack of funding

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Cape Fear – Johnston County – Town of Kenly	Conduct study of drainage system to look for ways to improve drainage in southwest part of Town.	P	2020	-	Town Manager	2025 - In progress: no measurable progress due to lack of funding
Cape Fear – Johnston County – Town of Kenly	Conduct smoke test and sewer system audit to study excess water that flows into sewer pipes from groundwater and storm water infiltration and inflow.	NS, P	2020	-	Town Manager, Engineering Firm	2025 - In progress: no measurable progress due to lack of funding
Cape Fear – Johnston County – Town of Kenly	Create a process and infrastructure to backup documents and records on town computers.	NS, P	2020	-	Town Manager, Town Staff	2025 - In progress: no measurable progress due to lack of funding
Cape Fear – Johnston County – Town of Kenly	Provide backup power at critical facilities such as lift stations.	NS	2020	-	Town Manager, Town Council	2025
Cape Fear – Johnston County – Town of Kenly	Acquire or elevate flood prone properties	NS	2020	-	Town Manager	2025
Cape Fear – Johnston County – Town of Kenly	Improve drainage ditches and canal system in Town and other areas located in the ETJ.	S	2020	-	Town Manager, Town Council	2025 - In progress: no measurable progress due to lack of funding
Cape Fear – Johnston County – Town of Kenly	Water/Sewer Main Project – Upgrade and loop water mains to improve water for domestic consumption and fire protection, upgrade sewer lines to prevent infiltration of storm water into sewer system	NS	2020	-	Town of Kenly, Johnston County, Wilson County	2025 - In progress: no measurable progress due to lack of funding
Cape Fear – Johnston County – Town of Kenly	Develop a COOP for the Town of Kenly.	P	2020	-	Town Council, Town Gov.	2020 - Complete
Cape Fear – Johnston County – Town of Kenly	On an annual basis, the FEMA repetitive loss property list will be obtained from NCEM. At that time, letters will be sent to the owners of the repetitive loss structures to notify them of their status and to offer information on programs that could help	NS	2020	-	Town Manager	2025 - In progress: no measurable progress due to lack of funding
Cape Fear – Johnston County – Town of Kenly	Conduct a dam/hog lagoon safety inventory. People downstream of hazardous dams/hog lagoons would be notified. Owners would be notified of ways to reduce the risk of their dams/lagoons.	P, S	2020	-	Public Utilities Director for Johnston County	2025 - In progress: no measurable progress due to lack of funding
Cape Fear – Johnston County – Town of Kenly	Develop and print a brochure outlining wind proofing methods above and beyond code. This	NS	2020	-	Johnston County Planning and Inspections	2025 - In progress: no measurable progress due to lack of funding

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
	will be offered in the Inspections Dept. receptionist area					
Cape Fear – Johnston County – Town of Kenly	Provide education materials on preparedness/mitigation measures for all hazards and display at the Town Hall, Town Library, and Town Website	NS	2020	-	Town Staff	2025 - In progress: no measurable progress due to lack of funding
Cape Fear – Johnston County – Town of Micro	Adopt and maintain NFIP compliance.	NS	2020	-	Town Board	2025 - TBC: The town is a participating member of the NFIP and will continue to maintain
Cape Fear – Johnston County – Town of Micro	Improve drainage in Micro.	S, NS	2020	-	Town Board	2025 - In progress: The town is working to improve drainage throughout the town in many ways, but there are still several projects that need to be completed to improve drainage further.
Cape Fear – Johnston County – Town of Micro	Create a process and infrastructure to backup documents, forms, and utility records on town computers.	NS	2020	-	Town Staff	2025 - TBC: Water and Sewer Dept. has paper copies. Keeps for 5 years.
Cape Fear – Johnston County – Town of Micro	Provide for a secondary means of power for wells and sewer lift stations through the installation of appropriate electrical connections and purchase of 40 KW generator	NS	2020	-	Town Staff	2025 - In progress: Town has backup generator for sewer pump stations but not wells.
Cape Fear – Johnston County – Town of Micro	Provide backup power for critical facilities	NS	2020	-	Town Boards	2025 - In progress: No measurable progress due to lack of funding.
Cape Fear – Johnston County – Town of Micro	Upsize culvert located on CSX Railroad right-of way to handle storm water drainage from the new North Johnston Middle School	S	2020	-	Town Board, CSX Railroad	2025 - In progress: No communications with CSX.
Cape Fear – Johnston County – Town of Micro	On an annual basis, the FEMA repetitive loss property list will be obtained from NCEM. At that time, letters will be sent to the owners of the repetitive loss structures to notify them of their status and to offer information on programs that could help	NS	2020	Annual update	GIS Application Analyst, ES coordinator	2025 - In progress: The town currently has an up-to-date repetitive loss list, and it will annually work to update that list and attempt to encourage property owners to take action to mitigate
Cape Fear – Johnston County – Town of Micro	Develop and print a brochure outlining wind proofing methods above and beyond Code. This will be offered in the Inspections Dept. receptionist area.	NS	2020	-	Steven Finn (Planning and Inspections Director)	2025 - In progress: The town will work to develop a brochure concerning wind proofing methods and will offer help from the Inspections Dept..
Cape Fear – Johnston County – Town of Micro	Provide education materials on Preparedness/mitigation measures for all	NS	2020	-	Town Staff	2025 - In progress. No measurable progress due to lack of funding.

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
	hazards and display at the Town Hall, and Town Website.					
Cape Fear – Johnston County – Town of Pine Level	Adopt a flood ordinance that is more restrictive on construction within a 100-year flood zone	NS	2020	-	Zoning Administrator, Board of Commissioners	2025 - The town has adopted an ordinance that is more restrictive on construction within the 100-year flood zone. This action will be removed from the next update as a capability.
Cape Fear – Johnston County – Town of Pine Level	Develop a systematic inspection process of the Town's public facilities and utilities to prevent or minimize potential damage.	P	2020	Update annually	Director of Public Works	2025 - TBC: The town has developed a systematic inspection process for its public utilities, but this process will need to be carried out, reviewed, and updated on at least an annual basis, so it will remain in the plan
Cape Fear – Johnston County – Town of Pine Level	Improve drainage in southern part of town based on comprehensive drainage study	S, NS	2020	Occurs annually	Public Works	2025 - TBC
Cape Fear – Johnston County – Town of Pine Level	Provide backup power for critical facilities.	NS	2020	-	Public Works	2025
Cape Fear – Johnston County – Town of Pine Level	Upgrade lift station located on the East Side due to its location being in a low point in the flood plain	NS	2020	-	Public Works	2025 - In progress: Will be upgraded during the water and sewer project to be completed by 2021.
Cape Fear – Johnston County – Town of Pine Level	Increase public awareness of risk and mitigation measures for all hazards available through a series of informative news articles.	NS	2020	Updated annually	Zoning Administrator, Town Clerk	2025 - TBC: In the past, the town has developed and published articles on risks and mitigation for its citizens, but the town is planning to continue this process by developing these articles at least annually
Cape Fear – Johnston County – Town of Pine Level	On an annual basis, the FEMA repetitive loss property list will be obtained from NCEM. At that time, letters will be sent to the owners of the repetitive loss structures to notify them of their status and to offer information on programs that could help	NS	2020	Updated annually	GIS Application Analyst, ES coordinator	2025 - TBC: The town will annually update its repetitive loss list and, will continue to attempt the property owners to institute mitigation
Cape Fear – Johnston County – Town of Pine Level	Develop and print a brochure outlining wind proofing methods above and beyond Code. This will be offered in the Inspections Dept. receptionist area	NS	2020	-	Steven Finn (Planning and Inspections Director)	2025 - TBC: The town will work to develop a brochure concerning wind proofing methods and will offer help from the Inspections Dept..

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Cape Fear – Johnston County – Town of Princeton	Maintain a list of contractors to assist town in emergencies.	P	2020	-	Admin.	2025 - TBC: occurs on a regular as needed basis.
Cape Fear – Johnston County – Town of Princeton	Maintain town ordinances, policies, and procedures for the Town of Princeton on their website.	NS	2020	-	Admin.	2025 – TBC: list is updated as needed.
Cape Fear – Johnston County – Town of Princeton	Maintain Moccasin Creek and right away from erosion.	NS, NBS	2020	-	Public Works	2025 – Permitting nearing completion. Expect bids in Fall 2020 with completion Fall 2021.
Cape Fear – Johnston County – Town of Princeton	Conduct annual smoke testing of existing sewer lines. Ten percent of lines to be tested annually	NS	2020	Testing occurs annually	Public Works	2025 – TBC
Cape Fear – Johnston County – Town of Princeton	Install stationary 75kw generator for Town Hall	NS	2020	-	Public Works	2025 – In progress: no measurable progress due to lack of funding.
Cape Fear – Johnston County – Town of Princeton	Provide backup power at critical facilities	NS	2020	-	Admin.	2025
Cape Fear – Johnston County – Town of Princeton	Upgrade existing manual bar screen with an automatic bar screen at Wastewater Treatment Facility.	NS	2020	-	Public Works	2025 – In progress: Project is funded. Expected to be permitted and bid in 2021
Cape Fear – Johnston County – Town of Princeton	Upgrade grit removal system at Wastewater Treatment Plan	NS	2020	-	Public Works	2025 – In progress: Project is funded. Expected to be permitted and bid in 2021.
Cape Fear – Johnston County – Town of Princeton	Maintain a system at Town Hall for identifying towns' special needs citizens within the Princeton area.	P	2020	-	Police Dept., Admin.	2025 – In progress: no measurable progress due to lack of funding
Cape Fear – Johnston County – Town of Princeton	Provide warning communications to citizens for all hazards.	NS	2020	-	Police Dept., Admin.	2025
Cape Fear – Johnston County – Town of Princeton	Develop and print a brochure outlining wind proofing methods above and beyond code. This will be offered in the Inspections Dept. receptionist area.	NS	2020	-	Steven Finn (Planning and Inspections Director)	2025 – TBC: Johnston County is currently handling building inspections and providing this information.

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Cape Fear – Johnston County – Town of Princeton	Educate public on all potential natural disasters by maintaining town's website to include links to ReadyNC.org and FEMA –www.dhs.gov/ready.	NS	2020	-	Town Admin.	2025 – In progress: no measurable progress due to lack of funding
Cape Fear – Johnston County – Town of Selma	Update Town Development Code with latest hazard mitigation measures; revise floodplain and stormwater regulations	NS	2020	-	Planning and Inspections	2025 – In progress: no measurable progress due to lack funding
Cape Fear – Johnston County – Town of Selma	Incorporate latest NC Building Code regulations	NS	2020	-	Planning and Inspections, Admin.	2025 – TBC: will update as necessary
Cape Fear – Johnston County – Town of Selma	Provide Cloud access for government software and date.	NS	2020	-	Admin.	2019 – completed
Cape Fear – Johnston County – Town of Selma	Develop a fuel back up plan.	P	2020	-	Public works, Fire	2025 – In progress: no measurable progress due to lack funding
Cape Fear – Johnston County – Town of Selma	Maintain a list of contractors to assist in town emergency recovery.	P	2020	-	Public works	2025 – TBC: will update as necessary
Cape Fear – Johnston County – Town of Selma	Improve Storm water drainage.	S, NS	2020	-	Public works	In progress: no measurable progress due to lack funding.
Cape Fear – Johnston County – Town of Selma	Complete storm water GIS mapping project	P	2020	-	Public works	In progress: no measurable progress due to lack funding.
Cape Fear – Johnston County – Town of Selma	Complete sewer inspection to eliminate inflow and infiltration	NS	2020	-	Public Works	2025 – In progress: no measurable progress due to lack funding
Cape Fear – Johnston County – Town of Selma	Install emergency power back up to all critical facilities	NS	2020	-	Admin.	2025 – In progress: no measurable progress due to lack funding
Cape Fear – Johnston County – Town of Selma	Install emergency power back up to critical wells and lift stations.	NS	2020	-	Admin.	2025 – In progress: no measurable progress due to lack funding
Cape Fear – Johnston County – Town of Selma	Incorporate an EOC into the Town Hall.	P	2020	-	Admin.	2025 – In progress: no measurable progress due to lack funding

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Cape Fear – Johnston County – Town of Selma	Improve drainage ditches and canal system in areas outside of the incorporated area.	S	2020	-	Public Works	2025 – In progress: no measurable progress due to lack funding
Cape Fear – Johnston County – Town of Selma	Increase staff of the Fire Dept. to meet National Fire Protections Association 1710.	NS	2020	-	Fire	2020 – In progress: 80% complete
Cape Fear – Johnston County – Town of Selma	Develop the Fire Dept. Training room into an EOC by adding data, and phone lines	NS	2020	-	Fire, Police	2025 – In progress: no measurable progress due to lack funding
Cape Fear – Johnston County – Town of Selma	Develop a list of special needs citizens in need of assistance during a disaster	P	2020	-	Fire, Police	2025 – In progress: no measurable progress due to lack funding
Cape Fear – Johnston County – Town of Selma	Develop and exercise the towns emergency plan annually with all Depts	P	2020	-	Fire	2025 – In progress: no measurable progress due to lack funding
Cape Fear – Johnston County – Town of Selma	Develop a shelter plan for the Town.	P	2020	-	Fire, Police	2025 – In progress: no measurable progress due to lack funding
Cape Fear – Johnston County – Town of Selma	Purchase a mobile Command Center	NS	2020	-	Police	2025 – In progress: no measurable progress due to lack funding
Cape Fear – Johnston County – Town of Selma	Collect education materials on preparedness/mitigation measures for all hazards and display at both the Town Hall and Town Library.	NS	2020	-	Planning and Inspections, Admin.	2025 – In progress: no measurable progress due to lack funding
Cape Fear – Johnston County – Town of Selma	Advertise and promote the availability of flood insurance to town residents and property owners by including such information in the Town's water billing at least once a year	NS	2020	-	Planning and Inspections Admin.	2025 – In progress: no measurable progress due to lack funding
Cape Fear – Johnston County – Town of Smithfield	Complete stormwater GIS mapping project, with elevations showing where deficiencies exist in the storm water system.	P	2020	-	Director of Public Works	2025 – In progress: no measurable progress due to lack of funding and due to past budget constraints.
Cape Fear – Johnston County – Town of Smithfield	The development of a (COOP for the Town of Smithfield.	P	2020	-	ES Director, Town Manager	2025 – The Town of Smithfield adopts the County's COOP which was update last year.

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Cape Fear – Johnston County – Town of Smithfield	Install generators to at least two, possibly three, critical sewer lift stations within the Town of Smithfield	NS	2020	-	Director of Public Works	2025 – In progress: 15 of 19 Town lift stations are equipped with Generators. Two of the four without generators have "overflow" lines.
Cape Fear – Johnston County – Town of Smithfield	Provide backup power to critical facilities.	NS	2020	-	Director of Public Works	2025
Cape Fear – Johnston County – Town of Smithfield	Complete the Spring Branch Wetlands Restoration Project to improve the quality of stormwater runoff before it enters the Neuse River.	NBS	2020	-	Director of Public Works	2025 – In progress: The wetland facility was restored in 2019 and a grant has been applied for to do additional work. They also received grant funding for a constructed wetland and stream bank restoration project along the Spring Branch to be completed in 2022
Cape Fear – Johnston County – Town of Smithfield	On an annual basis, the FEMA repetitive loss property list will be obtained from NCEM. At that time, letters will be sent to the owners of the repetitive loss structures to notify them of their status and to offer information on programs that could help	NS	2020	Annual review and update	GIS Application Analyst, ES coordinator	2025 – TBC
Cape Fear – Johnston County – Town of Smithfield	Develop and print a brochure outlining wind proofing methods above and beyond Code. This will be offered in the Inspections Dept. receptionist area.	NS	2020	-	Steven Finn (Planning and Inspections Director)	2025 – TBC: Town staff will work together to develop a brochure
Cape Fear – Johnston County – Town of Smithfield	Update and maintain educational information and links on website for the public to access to stay informed on all-natural hazard risks and mitigation techniques.	NS	2020	-	Town Admin.	2025 – TBC: The Town of Smithfield will link to the County's website or educational information
Cape Fear – Johnston County – Town of Wilson's Mills	Adopt NFIP.	NS	2020	-	Town Staff	2025 – In progress: no measurable progress due to lack of funding.
Cape Fear – Johnston County – Town of Wilson's Mills	Improve drainage in Wilson's Mills.	S	2020	-	Town Staff	2025 – In progress: no measurable progress due to lack of funding.
Cape Fear – Johnston County – Town of Wilson's Mills	Maintain all utility rights-of-way by trimming trees around power lines and maintain right-of-way of water/sewer lines.	NS	2020	Conducted annually	Public Works/Duke Energy	2025 – In progress: no measurable progress due to lack of funding.

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Cape Fear – Johnston County – Town of Wilson's Mills	Maintain a list of contractors to assist town in emergencies.	P	2020	Updated annually	Admin.	2025 – In progress: no measurable progress due to lack of funding.
Cape Fear – Johnston County – Town of Wilson's Mills	Digitize copies of town ordinances, polices, and procedures	NS	2020	-	Admin. And Town Council	2025 – In progress: no measurable progress due to lack of funding.
Cape Fear – Johnston County – Town of Wilson's Mills	Work with NCEM to acquire grant funding that will be utilized to acquire and locate flood gauges strategically along watercourses impacting the County & Town limits. The goal of this effort will be to provide the pertinent agencies with better information regarding river water levels.	P, NS	2020	-	Public Works	2025 – In progress: no measurable progress due to lack of funding.
Cape Fear – Johnston County – Town of Wilson's Mills	After the establishment of additional stream gauges as noted above, establish a working group including all individuals charged with floodplain and dam management within the County	P	2020	-	Public Works	2025 – In progress: no measurable progress due to lack of funding.
Cape Fear – Johnston County – Town of Wilson's Mills	Install generators to sewer pumps.	NS	2020	-	Public Works	2025 – In progress: no measurable progress due to lack of funding.
Cape Fear – Johnston County – Town of Wilson's Mills	Provide backup power to critical facilities.	NS	2020	-	Public Works	2025
Cape Fear – Johnston County – Town of Wilson's Mills	When appropriate, continue accepting dedication of open space within all new major subdivisions, especially when environmentally sensitive areas are present	NS, NBS	2020	-	Planning	2025 – In progress2025 – In progress: no measurable progress due to lack of funding.
Cape Fear – Johnston County – Town of Wilson's Mills	Maintain a system for identifying special needs citizens in the town.	P	2020	-	Police Dept., Admin.	2025
Cape Fear – Johnston County – Town of Wilson's Mills	Establishment of additional Community Emergency Response Teams (CERT). This effort will so address the ongoing training and support of the eleven teams currently operating within the county.	P	2020	-	Police Dept., Admin.	2025 – In progress: no measurable progress due to lack of funding.

Region - County - Place	Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Cape Fear – Johnston County – Town of Wilson's Mills	Use the Town's Blackboard Connect system to notify town residents and business owners regarding natural and human induced hazard events. Town residents should not rely on this system in taking preparedness measures. The first line of communication should come through a National Oceanic and Atmospheric Administration weather radio system.	NS	2020	-	Admin.	2025 – In progress: no measurable progress due to lack of funding.
Cape Fear – Johnston County – Town of Wilson's Mills	Develop and print a brochure outlining wind proofing methods above and beyond code. This will be offered in the Inspections Dept. receptionist area.	NS	2020	-	Steven Finn (Planning and Inspections Director)	2025 – In progress: no measurable progress due to lack of funding.
Cape Fear – Johnston County – Town of Wilson's Mills	Maintain town's website to include links to ReadyNC.org and FEMA	NS	2020	-	Admin.	2025 – In progress: no measurable progress due to lack of funding.
Cape Fear – Johnston County – Town of Wilson's Mills	Conduct research activities aimed at educating business owners about how to address the issue of continuity of operations in the face of all natural and human induced disasters, since following a disaster, the reopening of commercial operations is critical to recovery efforts	NS, P	2020	-	Planning	2025 (after disaster events) – In progress: no measurable progress due to lack of funding.
Cape Fear – Johnston County – Town of Wilson's Mills	Advertise and promote the availability of flood insurance to town residents and property owners by including such information on the town website as well as through a Blackboard Connect message	NS	2020	Annual review and update	Planning	2025 – In progress: no measurable progress due to lack of funding.
Cape Fear – Johnston County – Town of Wilson's Mills	Update and maintain educational information and links on website for the public to access to stay informed on all-natural hazard risks and mitigation techniques.	NS	2020	Annual review and update	Town Admin.	2025 – TBC: The Town will link to the County's website or educational information

5.4.4 Neuse River Basin Flood Analysis and Mitigation Strategies Study (2018)

Table 49. Neuse River Basin Flood Analysis and Mitigation Strategies Study (5.4.4.)

Investment	Type	Age	Maintenance (30-yr.)	Ownership/ Management	Status & Barriers
New Detention Facilities: Scenarios 1-8	S	Proposed (2018)	Scenario 1 - $5.7M Scenario 2a – $600K Scenario 2b - $9M Scenario 3 - $9.6M Scenario 4 - $1.8M Scenario 5 - $4.5M Scenario 6 - $5.1M Scenario 7 - $600K Scenario 8 - $600K	NC Emergency Management (NCEM) & NC Department of Transportation (NCDOT)	Demand for new municipal water sources and existing wastewater treatment plant restraints may outweigh flood storage needs; TMDL rules; rare and endangered species
Channel Modification at Kinston: Scenario 9	S	Proposed (2018)	Scenario 9: Dredging would be required 180 approx. every four years ($12M)	NCEM & NCDOT	Sedimentation and downstream water surface elevation concerns; public buy-in
New Embankment Structure – Levee at Seven Springs: Scenario 10	S	Proposed (2018)	$150K	NCEM & NCDOT	Risk associated with potential failure of the structure, and if overtopping occurs the consequence would be extreme flooding; public buy-in
Clear Span of Floodplain Downstream of Smithfield: Scenario 11	S	Proposed (2018)	-	NCEM & NCDOT	Increased water surface downstream; permitting considerations and interruptions to railroad
Elevation, Acquisition, Relocation: Scenarios (12a-12d)	NS	Proposed (2018)	-	NCEM & NCDOT	Elevation does not remove structures from being at risk; there may be a gap between funds for buyouts and the money needed to acquire comparable living space outside of flood prone areas; stress to infrastructure in new communities

5.4.5 Flood Abatement Assessment for Neuse River Basin (2020)

Table 50. Flood Abatement Assessment for Neuse River Basin (5.4.5)

Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Identify community level and regional resilient transportation routes using a geospatial and systems/network analysis process considering existing infrastructure flood vulnerability; infrastructure upgrade costs and the location of industry, commerce, communities, military bases, and evacuation routes.	P	2020	-	NCDOT	-
Identify, test, and compare costs of new design standards for all roads, bridges, and culverts along the resilient route corridors.	S, NS, P	2020	-	NCDOT	-
Work with NC Emergency Management (NCEM) and USGS to install new flow, stage, and rainfall gages in basin with a focus on improving early warning systems and hydrology model validation.	NS	2020	-	NCDOT	-
Install low costs sensors at bridges throughout the basin to document road and bridge overtopping events.	NS	2020	-	NCDOT	-
Establish an online reporting system for DOT division staff and citizens to report road and bridge flooding.	NS	2020	-	NCDOT	-
Set up alerts for USGS Neuse river gages in Smithfield, Goldsboro, and Kinston (02087570, 02089000 and 02089500) to alert NC DOT hydraulics unit and division staff of impending road/bridge overtopping locations.	NS	2020	-	NCDOT	-
Work with NCEM, Southeast River Forecast Center, and the National Weather Service to establish a terminology and protocol for communicating transportation warnings, road closures and/or recommended transportation corridors to the public.	NS	2020	-	NCDOT	-
Develop a protocol for DOT division staff and/or law enforcement to be notified and deployed to barricade roads, bridges, and culvert crossings as necessary due to overtopping.	NS	2020	-	NCDOT	-
Develop a pilot project that combines hydrologic modeling with machine learning to predict where road overtopping and washout are at risk of occurring based on predicted rainfall and resulting discharge and flooding.	P	2020	-	NCDOT	-
Develop internal policies that assign higher priority (ranking) of transportation upgrades and investments to projects that meet higher standards of resilience and are in communities that have adopted better floodplain management and more stringent floodplain ordinances.	NS	2020	-	NCDOT	-
Develop and adopt policies that accept only private roads that have been built too certain specific flooding standards.	NS	2020	-	NCDOT	-

5.4.6 Improving North Carolina's Resilience to Coastal Riverine Flooding (2021)

Table 51. Improving North Carolina's Resilience to Coastal Riverine Flooding (5.4.6.)

Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Reforestation/Agroforestry Potential • **Neuse River Basin: 97,050 ac.** • **Little River: 2,327 ac.** • **Nahunta Swamp: 885 sc.** • **Bear Creek (HUC10): 3,975 ac.**	NBS	2021	$11/acre/year	Recommended Agency: NC Division of Mitigation Services (NCDMS)	Barriers include landowner participation, crop yield, crop pests, and wildfire risk if not managed properly
Water Farming Potential • **Neuse River Basin: 10,530 ac.** • **Nahunta Swamp: 2,505 ac.** • **Bear Creek: 1,995 ac.**	NBS	2021	$250/acre/year	Recommended Agency: NCDMS	-
Wetland Restoration Potential • **Neuse River Basin: 5,157 ac.** • **Little River: 55 ac.** • **Nahunta Swamp: 605 ac.** • **Bear Creek: 798 ac.**	NBS	2021	$500/acre/year	Recommended Agency: NCDMS	Barriers include landowner participation and flood mitigation benefits that may not be present for decades
Adopt policies that prevent future development and redevelopment within the 100-year floodplain and that severely restricts development in the 500-year floodplain. It should be noted that all encroachment into the floodplain (i.e., elevated structures) reduces the water storage capacity of the floodplain during extreme events.	NS	2021	-	Recommended Agency: NCDMS	-
Continue to pursue buyout and elevation of structures and infrastructure located within the 100-year floodplain to avoid inevitable repeat loss of these structures.	NS	2021	-	Recommended Agency: NCDMS	-
Invest in improving resilience of all critical infrastructure that is vulnerable to flooding (roads, bridges, stormwater systems, reservoirs, water and wastewater treatment facilities and networks, energy supply) to minimize loss of life, emergency rescue, loss of use and negative impacts to commerce and economic impacts during future extreme storm events	S, NS	2021	-	Recommended Agency: NCDMS	-
Develop a pilot flood mitigation program for a targeted sub watershed with documented flooding issues. The program would allow the ecological restoration industry to implement flood mitigation projects. Flood storage benefits could be estimated by comparing model results of the peak flow reduction, peak flow delay and volume of water stored for existing and proposed condition during the several return intervals storms (e.g., 50-, 100-year storm). Track the economic and employment impacts of this program.	NBS, P	2021	-	Recommended Agency: NCDMS	-

Investment	Type	Age	Maintenance	Ownership/ Management	Status & Barriers
Invest in research to develop and monitor a pilot water farming project. The research should focus on evaluating water management systems, storage, and peak flow reductions, impacts to soils and crops and other agricultural management processes, and associated economic factors.	NBS, P	2021	-	Recommended Agency: NCDMS	-
Sponsor research to examine similar flood mitigation potential on other watersheds, and with other measures, and estimate flood and damage reduction impacts at the farm to local to community scales.	NBS, P	2021	-	Recommended Agency: NCDMS	-
Natural Infrastructure (NI) programs can have major, localized environmental economic impacts in rural areas, especially when watersheds undergo sustained investments over many years. Economic impact analyses – including investigations of the extent to which NC is producing a "home grown" ecological restoration industry – should be conducted as part of the evaluation of State NI programs, including those currently administered by NCDMS	NBS, P	2021	-	Recommended Agency: NCDMS	-
Investigate other conservation-based flood mitigation programs (e.g., Iowa, Minnesota) to identify and evaluate program scope, authority, funding, management, intergovernmental agreements, streamlined permitting processes, and implementation options.	NBS, P	2021	-	Recommended Agency: NCDMS	-
Assemble a team of scientists/engineers and stakeholders to develop a state-run Implementation program. The program must include a process for involving landowners early in the program design stage, providing multiple ways to give input and feedback to the program design and implementation.	P	2021	-	Recommended Agency: NCDMS	-

5.5 Other Relevant Information

5.5.1 Financial Risk of Flood Events in Eastern North Carolina (2021)

Table 52. Hurricane Florence Risk Profiles in Counties Contained by the Neuse Watershed (5.5.1.)

Area	NFIP	Property Owners	Lenders/Banks	Local Governments	Total Risk
Carteret	6.32	5.36	2.70	11.30	25.68
Craven	205.93	343.36	80.42	91.02	720.72
Durham	0.77	3.91	0.95	0.00	5.63
Greene	0.00	0.02	0.00	0.00	0.02
Johnston	0.07	0.40	0.04	0.58	1.08
Jones	18.54	13.72	3.53	21.92	57.70
Lenoir	25.58	16.08	5.18	1.34	48.18
Pamlico	63.21	175.92	17.45	166.94	423.53
Pitt	0.00	0.01	0.10	0.06	0.16
Wayne	0.51	0.92	0.12	0.98	2.53
Wilson	0.03	0.28	0.04	0.36	0.71
Neuse (Basin-wide)	320.95	559.98	110.52	294.50	1285.95

*Values in $MM