City of Washington
NORTH CAROLINA

RESILIENCE STRATEGY

CITY OF WASHINGTON

SPRING 2022

INTRODUCTION

The Resilient Coastal Communities Program (RCCP) is funded through the North Carolina General Assembly and the National Fish and Wildlife Foundation and administered by the North Carolina Department of Environmental Quality – Division of Coastal Management. The RCCP is a component of the statewide North Carolina Resilient Communities Program, called for in the North Carolina Climate Risk Assessment and Resilience Plan.

The RCCP was established with the objectives of providing financial grants and technical assistance to support a proactive, locally driven, and equitable approach to coastal resilience planning and project implementation. The RCCP provides a phased framework to assess coastal risks and vulnerabilities, engage community stakeholders, and develop projects to strategically improve the resiliency of communities and their natural and built infrastructure. The RCCP consists of four phases:

- Phase 1 – Community Engagement/Risk and Vulnerability Assessment
- Phase 2 – Planning, Project Identification and Prioritization
- Phase 3 – Engineering and Design
- Phase 4 – Implementation

In Spring 2021, the City of Washington was selected to participate in the first two phases of the RCCP. The first two phases of the RCCP were completed in Spring 2022 with the development of this Resiliency Strategy document, the main deliverable of the program's initial phases. This Resiliency Strategy consists of a combination of all the Phase 1 and 2 deliverables/materials including those for the defining of the community vision and goals, the Community Action Team Report, the Stakeholder Engagement Strategy, the inventory of existing local and regional plans, the Risk and Vulnerability Assessment Report, and the project profile portfolios. This plan provides a framework to:

- Document the resiliency planning process and outcomes and provide a clarity of purpose
- Identify opportunities for short-term and long-term resiliency actions based on community input
- Set project priorities for Phase 3 – Engineering and Design
- Identify and attract potential funding opportunities to facilitate a 'direct path' to project implementation

VISION & GOALS

A resiliency strategy vision, goals, and objectives were developed to guide the planning process. Existing relevant plans were summarized for the Community Action Team (CAT). Vision statements and goals from each of the local and regional plans were reviewed. Example goals from resiliency plans outside the area were also reviewed. Example vision statements, goals, and themes were identified following review of existing plans. These examples were used to guide the CAT's brainstorming process during the first CAT meeting.

The team was encouraged to consider the triple bottom line approach to resiliency, including environmental, economic, and social factors. Worksheets were provided to CAT members for use in identifying draft vision statements, goals, and objectives. The team worked together during the first CAT meeting to complete the worksheets. Team members also had an opportunity to complete the worksheets following the CAT meeting.

Input from the CAT was used to finalize the resilience vision, goals, and objectives listed below.

RESILIENCE VISION

Washington is a resilient and vibrant community where citizens and visitors alike enjoy recreation and ecotourism activities supported by protection of the natural environment. Local businesses and neighborhoods are diverse and strong, able to quickly rebound from all hazard events due to sound policy and key investments creating a connected community fabric.

RESILIENCE GOALS & OBJECTIVES

Economic

GOAL 1: Protect and maintain critical infrastructure and ensure that critical infrastructure is resilient to anticipated hazards.

Objectives:

- Identify key community assets that will need increased protection (both physical and fiscal) from the major weather events and incremental climate change impacts we will face in the next 20-50 years.
- Protect, maintain, and enhance critical infrastructure.
- Address stormwater and flooding problems at their source, such as excessive impervious surfaces on developed sites, and ditches and drainage systems.
    - Legacy impervious surfaces that are abandoned or unused should be targeted for redevelopment that will not increase stormwater runoff.
    - If not redevelopable due to floodplain or other limitations, then legacy impervious sites should be identified for removal and restoration of pervious surfaces and possible re-vegetation.

- Urban ditches and drainage systems should be targeted for retrofits to ensure that stormwater runoff is treated and minimized before it can damage properties and impair water resources.

GOAL 2: Improve and maintain buildings to support resilience to hazards.
Objectives:

- Incentivize the construction of "flood resistant" homes.
- Elevate more homes in flood prone areas.
- Floodproof more businesses and other non-residential buildings in flood prone areas.
- Promote research and development of building construction and design standards that can better withstand storm damage.
- Provide guidance on how future development can minimize additional damages and recovery costs from hazard events.

GOAL 3: Support strong, resilient local businesses and neighborhoods.
Objectives:

- Invest in community development projects (i.e., bicycle and pedestrian facilities, public parks, affordable and diverse housing options) and create a connected community fabric where residents support thriving local businesses.
- Support and strengthen the local economy.
- Ensure that local businesses are able to reopen quickly following a hazard event.
- Ensure that residents are able to return home, have services, and return to normal life quickly following a hazard event.

GOAL 4: Continue developing the ecotourism industry.
Objectives:

- Continue to maintain and develop the waterfront area.
- Attract more ecotourism related businesses to the city.
- Market the city as an ecotourism destination.

GOAL 5: Identify and obtain funding for resilience projects.
Objectives:

- Develop a list of resilience projects suitable for funding.
- Identify funding and grant opportunities to implement resilience projects.
- Identify funding to reduce repetitive losses from previous hazard events, such as funding for building elevation/floodproofing and equitable buyouts.

Environmental

GOAL 6: Reduce flooding.
Objectives:

- Reduce the potential for flooding of homes and businesses.
- Develop flood mitigation projects, including nature based and sustainable solutions.
- Identify both structural and non-structural solutions to flooding.

GOAL 7: Protect natural resources and locations essential to the ecotourism industry in the area.

Objectives:

- Incentivize reliance on "natural" protective systems as much as possible (i.e., leaving wetlands, forests and marshes as intact as possible to absorb floodwaters and mitigate storm surge).
- Discourage excessive covering of land with impervious surfaces.
- Conserve resources for present and future generations.
- Protect a connected network of green spaces.
- Clean up trash in and along waterways.
- Control illegal dumping.

GOAL 8: Improve water quality.

Objectives:

- Improve water quality of the Tar River, Pamlico River, and its tributaries.
- Protect riparian buffers and encourage intensive development away from riparian buffers.
- Support the Tar-Pamlico Nutrient Management Strategy.
- Partner with the local council of governments, environmental non-profits such as Sound Rivers, and local universities on water quality projects.

GOAL 9: Improve stormwater management.

Objectives:

- Map the city's stormwater system in GIS.
- Maintain and improve the capacity of the stormwater system.
- Conduct planning processes leading to recommendations for stormwater BMPs.
- Improve construction and site design standards to reduce debris caused by flooding and storms.
- Demolish dilapidated homes and remove impervious surfaces as practicable and feasible.
- Encourage the construction of permeable surfaces to reduce flash flooding.
- Ditches and drainage ways such as the Jack's Creek drainage system should be targeted for stormwater projects to reduce runoff and improve water quality.

Social

GOAL 10: Develop effective hazard response and recovery.

Objectives:

- Provide high quality public safety services.
- Minimize damage and loss of life from disasters.
- Restore services quickly and efficiently following a hazard event.
- Establish sound policy to protect life, property and the quality of the natural environment.

- Reduce vulnerability to natural hazards to protect health, safety, welfare and economy of the community.
- Reduce risk and loss from future hazard events.
- Improve emergency management and preparedness, collaboration and outreach.
- Rebound quickly following a hazard event.

GOAL 11: Educate the public on resiliency.
Objectives:

- Educate the public, including the most vulnerable populations, with the tools needed to protect themselves from natural hazards.
- Educate the public on nature-based solutions to flooding.
- Ensure a focus on reaching the most vulnerable and underserved populations.
- Conduct grassroots outreach efforts to share information and engage residents in resiliency efforts.

GOAL 12: Foster and sustain a diverse, vibrant, and resilient community.
Objectives:

- Ensure an adequate supply of safe, affordable, and suitable housing.
- Maintain and enhance the historic downtown as a center of commerce, leisure, arts and entertainment.
- Support a successful local business community.
- Develop the waterfront area and ecotourism activities for enjoyment by residents and visitors alike.
- Ensure that walking and biking within the city is safe and facilities are accessible.
- Provide access to outdoor recreation opportunities and nature for all citizens.

GOAL 13: Develop and nurture strong social networks supporting resiliency and a connected community fabric.
Objectives:

- Continue developing and nurturing partnerships with community and business organizations and non-profit organizations.
- Utilize social networks for hazard resilience education and for recovery following hazard events.
- Improve partnerships with the county and other municipalities in the county.

COMMUNITY ACTION TEAM REPORT

Roles to fill on the Community Action Team (CAT) were based on guidance from the Resilient Coastal Communities Program Handbook. The goal was to build a multi-disciplinary Community Action Team with expertise in planning and community development, hazard mitigation, utility management, engineering, the community's economy, engaging with vulnerable and underrepresented populations, and nature-based solutions. Community Action Team members could include municipal/county managers, planners, elected officials, utility managers, community and economic developers, business community representatives, disaster recovery coalitions/groups, councils of governments (COGs), state and federal land managers, non-governmental organizations (NGOs), and others working with the community on resilience planning.

The first CAT member identified was the City Manager. The City Manager worked with the contractors to identify CAT members to fill the roles detailed above. Potential members were contacted by phone and/or email either by the contractors or the City Manager. The need for CAT member was announced to the public at a City Council meeting. An elected official was selected to serve from the City Council as well.

The selected Community Action Team members are listed below.

COMMUNITY ACTION TEAM MEMBERS

- Adam Waters, City of Washington, Public Works Director
- Betsy Kane, City of Washington, City Council Member
- Heather Deck, Sound Rivers, Executive Director
- Jill Howell, Sound Rivers, Environmental Projects Manager
- Jonathan Russell, City of Washington, City Manager
- Mike Dail, City of Washington, Planning Director
- Randy Roark, Plant Manager, IDX Impressions

Refer to Appendix A for Community Action Team Materials.

STAKEHOLDER ENGAGEMENT STRATEGY

Existing Conditions, Issues, and Opportunities

In fall 2021, a public survey was developed in partnership with the Community Action Team (CAT). Questions were based around resiliency to flooding and sea level rise. The survey was designed to be completed in 5 - 15 minutes depending on how much the respondent had to share. The public survey was available online and was also available in hard copy format.

The survey was advertised online via the city's website and Facebook page, and via Sound Rivers' website Facebook page and Twitter. Hard copies of the survey were available at Washington City Hall, the Washington-Beaufort County Chamber of Commerce, the Washington Senior Center, and the BHM Regional Library Headquarters. Surveys were also distributed to underserved neighborhoods in partnership with faith-based organizations. A total of 54 residents responded to the survey.

Public input from the survey was used to identify existing conditions, issues, needs, and opportunities to enhance resiliency. Information was gathered on how residents' home and business properties have been affected by flooding, flooding seen in the community, how the respondents' personal lives have been affected by flooding, and what measures they have taken to prevent or avoid flooding. This information was used to recommend strategies for flooding resilience. For example, contractors reviewed specific areas where people had noticed flooding issues in the community to recommend strategies for those areas as appropriate, and program recommendations such as public education campaigns were recommended based on survey responses.

Draft Resiliency Actions

In spring 2022, an online storymap was created using ArcGIS Online and was posted at BeaufortCountyResiliency.org. The storymap reviewed Resiliency 101, Washington's vision statement, CAT members, building upon previous plans, the public survey, the risk and vulnerability assessment, the top flood related hazards, the STAPLEE analysis, and draft actions, all in an interactive storymap format. There was a comment form at the end of the storymap that the participant could fill out if desired, allowing them to comment on the draft actions and other elements of the City of Washington's Resilient Coastal Communities Program. The storymap was advertised in conjunction with the public open house, detailed below.

Two public open house events were held, one in person on Feb. 15, 2022 and one virtually on Feb. 21, 2022. These events, along with the storymap at BeaufortCountyResiliency.org, were advertised through a press release, an article in the Washington Daily News, via the City's website and Facebook page, via Sound Rivers' website, Facebook page and Twitter, and via flyers hung at public locations in Washington.

The virtual open house utilized the storymap to engage participants. For the in-person open house, posters were displayed which duplicated the information contained in the online storymap, including the following:

- What is resiliency?
- Flooding in Beaufort County
- What does resiliency mean to you? (interactive)
- North Carolina Resilient Coastal Communities Program
- A Community Plan – Resiliency Vision, Community Action Team, Building Upon Previous Plans
- Public Survey Results
- Risk and Vulnerability – Vulnerable Community Assets and Top Flood Related Hazards
- Map – Critical Assets overlaid with Category 3 Storm Surge
- Map – Critical Assets overlaid with 1 ft. Sea Level Rise
- Projects and Priorities – Suite of Potential Solutions
- Preliminary Strategies and their Feasibility
- Action Strategy Areas
- Provide input on your top (3) preferred actions (interactive)
- Provide input on your top (1) nature-based or hybrid action (interactive)

In addition to the interactive posters, there were comment forms available at the public open house to solicit feedback on preferred projects and other aspects of the community's resiliency program. There was also a resource table with handouts on topics such as flood readiness, stormwater education, creating home rain gardens, septic maintenance, mold remediation, etc. Some of these materials were made available in Spanish. Contractors and CAT members were available to interact with the public during the in person and virtual events.

Comment forms could be submitted at the open house event and could be submitted online or by postal mail until February 25, 2022.

Public input indicates that the most popular projects for the community are the "Jack's Creek Floodplain and Greenway Improvements" and the "Jack's Creek Drainage Project Expansion". "Jack's Creek Floodplain and Greenway Improvements" is a hybrid project with nature-based elements.

ENGAGEMENT TOOLS

- Public Survey
- Webpage/Online Storymap
- Notifications (news release, social media ads, flyers)
- Public Open Houses (In-person and Virtual)

Refer to Appendix B for Stakeholder Engagement Materials.

REVIEW OF EXISTING LOCAL & REGIONAL EFFORTS

To avoid the duplication of work and to build upon and remain consistent with previous resiliency efforts, existing resources/plans/policies/ordinances were reviewed, incorporated, and augmented as part of the community driven RCCP. The Pamlico Sound Hazard Mitigation Plan contains a baseline vulnerability and risk assessment and served as a reference point for conducting the RCCP Phase I and II assessment while considering additional factors and the local context.

RELEVANT PLANS, ORDINANCES, POLICIES, AND PROGRAMS

- **Albemarle-Pamlico Comprehensive Conservation and Management Plan (CCMP) (2012)**
  The CCMP considers and analyzes four basic questions: 1) What is a healthy Albemarle-Pamlico system, 2) What is the current condition of the system, 3) What are the most significant challenges facing the system over the next 10 years, and 4) What actions should be implemented to best achieve a healthy system?

- **Beaufort County Economic Development FY 21-22 Work Plan (2021)**
  The purpose of the Beaufort County Economic Development Work Plan is to provide tools, strategies, and guidance to increase economic development through collaboration, resources, knowledge, flexibility, and innovation.

- **City of Washington CAMA Core Land Use Plan (2021)**
  The purpose of the plan is to help the city to manage growth and development, ensure that new land uses are compatible with land use plans/visions, plan for the expansion of services, and protect and conserve essential coastal resources.

- **City of Washington Comprehensive Plan (2013)**
  The current Comprehensive Plan is an update to the 2006 plan. The purpose of the plan is to develop a vision for the community's future and establish implementation steps. The plan is a strategic document that compiles information, public input, and preferred public policy and provides policy guidance for coordinating growth and infrastructure, highlighting economic development pursuits, and protecting environmental resources.

- **City of Washington Comprehensive Bicycle Plan (2014)**
  The City of Washington Comprehensive Bicycle Plan provides a framework for the city, NCDOT and other regional planning partners to build an improved bicycle network. It provides detailed recommendations for bicycle facilities, programs, policies, and implementations to improve mobility, safety, health, the economy, the environment, and overall quality of life.

- **City of Washington Pedestrian Plan (2016)**
  The City of Washington Comprehensive Pedestrian Plan is an update to the existing 2006 plan. The plan was developed to support sustainable growth and development goals, promote healthy living habits, expand tourism, improve multi-modal mobility, expand network connectivity, and improve pedestrian safety.

- **City of Washington Parks and Recreation Comprehensive Master Plan (2014)**
  The main purpose of the plan is to improve recreational opportunities and the overall quality of life for all citizens by identifying existing needs. The Plan assesses the existing system of city parks, facilities and programs and makes recommendations for future development. The plan is intended to be used as a working guide or framework which will evolve over time through regular updates and public input.

- **City of Washington Streetscape Master Plan (2017)**
  This plan represents a continuation of the 2009 reinvestment strategies and incorporates public input, design best practices and site analysis with the goals of 1) identifying and utilizing streetscape space for pedestrians, 2) enhancing connections to the waterfront, 3) identifying potential open spaces, 4) prioritizing pedestrian activities, and 5) unifying and enhancing downtown identity.

- **City of Washington Harbor District Master Plan (2009)**
  This plan was developed as an outgrowth to downtown revitalization efforts outlined in the Downtown Washington Strategic Plan and Implementation Projects (1996) to address new challenges. The plan incorporates public input to establish a downtown reinvestment strategy that is implementable, promotes the downtown 'brand' and the contributes to economic growth and the expansion of the tax base.

- **Hurricane Matthew Resilient Redevelopment Plan – Beaufort County and Northeast Region Plans (2017)**
  The purpose of the plan is to provide a roadmap for community rebuilding and revitalization assistance for the communities that were damaged by the hurricane. The program empowers communities to prepare locally driven recovery plans to identify redevelopment strategies, innovative reconstruction projects, and other needed actions.

- **Pamlico Peninsula – Building Resilient Regions Report (2016)**
  The International Economic Development Council (IEDC) contracted to assist Beaufort County and nine other Pamlico Peninsula Counties (PPCs) with developing and implementing resiliency measures. The IEDC provided specific advice on how to strengthen existing programs and develop new programs or strategies so that the county and region can be more resilient from an economic perspective to future crises.

- **Pamlico Sound Regional Hazard Mitigation Plan (2020)**
  The HMP ensures that all possible activities are reviewed and implemented so that the problem is addressed by the most appropriate and efficient solutions. This plan provides a framework for all interested parties to work together toward mitigation. It establishes the vision and guiding principles for reducing hazard risk and proposes specific mitigation actions to eliminate or reduce identified vulnerabilities.

RISK AND VULNERABILITY ASSESSMENT REPORT

To assess risk and vulnerability, contractors identified critical assets within Washington. These critical assets included community assets, natural infrastructure, and vulnerable populations within the communities. (See Appendix C for the list of identified critical assets.)

MAPPING ASSETS, NATURAL INFRASTRUCTURE, AND VULNERABLE POPULATIONS

Community Assets

Contractors worked with the Community Action Team (CAT) at the 2nd CAT meeting to identify community assets in list format, then researched what GIS data was available. In some cases, there was already a data layer available, while in some cases, the GIS data was created by the contractors based on CAT input on which assets to include. In sources below, "data created" is used to designate data that was developed by the contractor.

Sources:

- Fire and EMS Stations – NC Office of State Fire Marshall
- Government Services – data created
- Food – data created
- Water and Wastewater – NC Department of Environmental Quality, Division of Water Resources
- Lift Stations and Elevated Storage Tanks – City of Washington
- Transportation – NC Dept. of Transportation, Beaufort County, some data for local transportation assets created
- Medical – data created
- Schools – data created
- Libraries – data created
- Community Response Partners – Beaufort County Emergency Management
- Community Buildings and Facilities – data created
- Hazardous, Leaking Underground Storage Tanks – NC Department of Environmental Quality
- Hazardous, Toxic Release Inventory – US Environmental Protection Agency
- Hazardous, Hazardous Waste Sites – NC Department of Environmental Quality

Natural Infrastructure

Contractors researched existing natural infrastructure data and shared an initial list with the CAT. The team helped to add additional natural assets to the list. Contractors also worked with the team to identify local public land and private land used for public recreational purposes.

Sources:

- Wetlands – US Fish and Wildlife Service
- Working Forest Lands – NC Natural Heritage Program
- Rural Forest Landscape – NC Natural Heritage Program
- Urban Forest Landscape – NC Natural Heritage Program
- 100-year Floodplain – FEMA
- 500-year Floodplain – FEMA
- Rivers and Streams – NC Department of Environmental Quality
- High Quality Waters – NC Department of Environmental Quality
- Primary and Secondary Fishery Nursery Areas – NC Dept. of Environmental Quality
- 303(d) Listed Waters – US Environmental Protection Agency
- Parks and Public Land – data created
- Public Boat Ramps – NC Wildlife Resources Commission
- Managed Areas – NC Natural Heritage Program
- Natural Areas – NC Natural Heritage Program

Vulnerable Populations

Maps of vulnerable populations were downloaded from the Center for Disease Control including the overall Social Vulnerability Index, Socioeconomic Status, Household Composition/Disability, Race/Ethnicity/Language, and Housing Type/Transportation. The CAT reviewed the series of vulnerable populations maps. The team felt that the Social Vulnerability Index Maps were fairly accurate.

Sources:

- Social Vulnerability Index – US Center for Disease Control

Identifying and Mapping Hazards

The Community Action Team chose to evaluate flooding, storm surge and sea level rise as community hazards to assess risk and vulnerability within the community.

Floodplains

The Coastal Flood Risk model, 100-year floodplain, and 500-year floodplain data from the Federal Emergency Management Agency (FEMA) were used to identify potential flooding scenarios within the community. By selecting three flooding scenarios, the contractors were able to assign each scenario a high, medium, and low threshold to evaluate vulnerability to critical assets.

Sources:

- North Carolina Emergency Management Floodplain Mapping program

Storm Surge

The potential storm surge flooding data from the National Oceanic and Atmospheric Administration (NOAA) was used to identify potential storm surge scenarios within the community. The contractors evaluated storm surge data from Hurricane Florence, which is known to be one of the most devastating storms that impacted the City of Washington in decades. This data was broken down to three scenarios; greater than 9ft, 9-3ft, and less than 3ft to evaluate storm surge vulnerability within a high, medium, and low threshold.

Sources:

- NOAA Hurricane Center and Central Pacific Hurricane Center – National Hurricane Center Data in GIS Formats

Sea level rise

Sea level rise (SLR) data from the National Oceanic and Atmospheric Administration (NOAA) was used to identify and map potential 1ft, 2ft, and 3ft SLR scenarios within the community. By selecting three scenarios we were able to assign each scenario a high, medium, and low threshold to evaluate vulnerability to critical assets.

Sources:

- NOAA Sea Level Rise Data Download

ASSESSING VULNERABILITY

Vulnerability = Exposure + Sensitivity - Adaptive Capacity

Exposure refers to the probability of physical contact between an asset and a hazard.

Sensitivity is the degree to which an asset is impacted by a hazard.

Adaptive Capacity is the ability of an asset to change its characteristics or behavior in response to a hazard.

To assess vulnerability, contractors developed multiple vulnerability indexes which combined exposure, sensitivity, and adaptive capacity to estimate cumulative vulnerability of critical assets within four categories: Building Infrastructure, Natural Resources, Transportation Infrastructure, and Utility System Infrastructure.

Exposure and sensitivity were objective factors within the vulnerability equation.

For exposure, contractors analyzed direct effects of different coastal hazards (flooding, storm surge and sea level rise) on the community critical assets by categorizing each hazard exposure as high, medium, or low. For example, if a critical asset was exposed to a 1ft sea level rise (SLR) it would fall under the highly vulnerable category, while a 2ft. and 3 ft. SLR would indicate medium and low exposure, respectively.

For sensitivity, contractors analyzed the cumulative effects of the critical assets within each category by assigning a percent threshold or indicating a high/low need for that asset within the community. For example, high sensitivity for building infrastructure indicates that greater than 66% of the community asset building – within a certain subcategory (i.e., police stations) - were affected by the coastal hazard or that a particular building was highly sensitive to the function of the community.

Adaptive capacity was a subjective factor within our assessment that used objective data and community input to evaluate. Factors such as: Social vulnerability, feasibility of relocation, feasibility of retrofit, and possible alternatives were evaluated to give each critical asset an adaptive capacity score. Contractors relied on input from the Community Action Team to evaluate the adaptive capacity of each critical asset.

Asset	Exposure score 0-3	Sensitivity score 0-3	Adaptive Capacity 0-3	Vulnerability Score 0-6
Asset name	*0 = no exposure* *1 = low* *2 = medium* *3 = high*	*0 = no sensitivity* *1 = low* *2 = medium* *3 = high*	*0 = no adaptive capacity* *1 = low* *2 = medium* *3 = high*	*0 - 2 = Low* *3 - 4 = Medium* *5 - 6 = High*

Critical assets were given a score based on the average exposure, sensitivity, and adaptive capacity scores. These scores were then used in the vulnerability equation to calculate cumulative vulnerability. The thresholds for each category are listed below:

Building Infrastructure

- Exposure
  - High: Coastal Flood Risk (FEMA Model) / 9+ft Surge / 1ft SLR
  - Medium: 100YR floodplain / 3-9 ft Surge/ 2ft SLR
  - Low: 500 floodplains / >3ft Surge / 3ft SLR
- Sensitivity
  - High: >66%+ Facilities affected / Highly sensitive to community operations
  - Medium: 33%-66% Facilities affected / Alternative facilities available
  - Low: <33% Facilities affected / Facility not needed for community operations
- Adaptive Capacity
  - Social vulnerability index
  - Ability to relocate building infrastructure (Ex. From 25yr to 50yr floodplain)
  - The ability to raise structure
  - Accessibility to residents once moved
  - Land availability
  - Ability to Retrofit for flooding (Rise generator/sensitive components)
  - Another facility can be used in its place
  - Facility is not needed to operate

Natural Resources (Streams, Wetlands, Managed Areas, Natural Areas)

- Exposure
  - High: Coastal Flood Risk (FEMA Model) / 9+ft Surge / 1ft SLR
  - Medium: 100YR floodplain / 3-9 ft Surge/ 2ft SLR
  - Low: 500 floodplains />3ft Surge / 3ft SLR
- Sensitivity (Inundation from SLR with no ability to migrate of evolve)
  - High: 1 Ft / 25ft from structure / 50% effected
  - Med: 2 Ft / 50 ft from structure / 25%-50%
  - Low: 3+ ft / 100 ft form structure / >25%
- Adaptive Capacity
  - Restorative capacity
  - Ability to increase flood capacity
  - Alternative use capacity (Ex. Park and floodplain)

Transportation Infrastructure

- Exposure
  - High: Coastal Flood Risk (FEMA Model) / 9+ft Surge / 1ft SLR
  - Medium: 100YR floodplain / 3-9 ft Surge/ 2ft SLR
  - Low: 500 floodplains / >3ft Surge / 3ft SLR
- Sensitivity
  - High: >50% of structures effected by natural hazards
  - Medium: 25% - 50% effected by natural hazards
  - Low: <25% effected by natural hazards
- Adaptive Capacity
  - Social vulnerability index
  - Ability to relocate transportation infrastructure (Ex. From 25yr to 50yr floodplain)
  - The ability to raise structure (Bridge)
  - Ability to retrofit the infrastructure to be more resilient to flooding

Utility System Infrastructure (Sewer/Water/Electric/Communications)

- Exposure
  - High: Coastal Flood Risk (FEMA Model / 9+ft Surge / 1ft SLR
  - Medium: 100YR floodplain / 3-9 ft Surge / 2ft SLR
  - Low: 500Y floodplains / >3ft Surge / 3ft SLR
- Sensitivity
  - High: >50% of structures effected by natural hazards
  - Medium: 25% - 50% effected by natural hazards
  - Low: <25% effected by natural hazards
- Adaptive capacity
  - Social vulnerability index
  - Ability to relocate utility system infrastructure (Ex. From 25yr to 50yr floodplain)
  - The ability to increase capacity
  - Ability to retrofit the infrastructure to be more resilient to flooding

ESTIMATING RISK

Asset Values

Infrastructure assets were valued based on the total tax evaluation (structure and land). This methodology helped alleviate concerns voiced by the Community Action Team related to data used in the evaluation. Hazardous assets were also based on the total tax value of the property which acted as a mitigation proxy value. Transmission easement values were based on the property tax values of which the easement intersected. Natural and Managed areas were valued based on the total tax value of the properties within these areas. Roads and bridges were valued based on their average replacement rates of $5,088,824/mile and $783,480/bridge, respectively. These values are based on the Federal Highway Administration's average replacement cost per mile of roadway and the North Carolina Department of Transportation's (NCDOT) average replacement cost per bridge. Wetlands and streams were valued based on the mitigation rate set by the NC. Division of Mitigation Services at $67,442.06/ac. and $603.87/ft., respectively.

Call to Action

A call to action was determined based on risk value and vulnerability to the critical asset. From the evaluation of the critical action team these assets called for action:

- Public Works Year and Warehouse
- Washington Utilities Operation Center
- City of Washington WWTP
- Underground Storage Tanks
- Roads
- Bridges
- Wetlands
- Streams

Sources:

- Beaufort County 2021 tax values (GIS / Land Records | Beaufort County, NC)
- Division of Mitigation Services rate schedule (Current Rate Schedules | North Carolina Department of Environmental Quality)
- Federal Highway Administration
- Improving Replacement Cost Data for NCDOT Highway Bridges (Microsoft Word - FinalReportRP2017-09 (ncdot.gov)

Refer to Appendix C for Risk and Vulnerability Assessment Materials.

PROJECT PORTFOLIO

The assembled project portfolio details 6 shovel-ready priority projects, addressing hazards, type of strategy area and approach, priority rating, potential sources of funding, cost and project duration estimates, and action items. These projects were developed to coincide with the top priority solution that would help make the community more resilient to the hazards identified: sea level rise, storm surge, riverine flooding, tidal flooding, and nuisance flooding. One nature-based or hybrid solution project is eligible to move forward into phase three of the Resilient Coastal Communities Program, Engineering and Design. The City of Washington chose to move forward by improving Jack's Creek Floodplain and Greenway Improvements" project. Below we show the steps taken to assemble the project portfolio that led to the communities and the Community Action Team choosing this project.

Identify a Suite of Potential Solutions

The first step to assembling the project portfolio was to identify a suite of potential solutions. The contractors helped the Community Action Team identify 41 potential solutions. The Pamlico Sound Hazard Mitigation Strategies identified an additional 27 potential solutions that could also be carried forward. These solutions were categorized by the 'related asset,' 'strategy area,' and 'strategy approach' and presented to the Community Action Team at the 4th CAT meeting. Each Community Action Team member then identified their top 10 solutions and 17 solutions moved forward to the consolidation and prioritization phase.

Consolidate and Prioritize Projects

The second step in assembling the project portfolio was to consolidate and prioritize the project solutions. The Community Action Team identified 17 solutions from the suite of potential solution that could move forward. The contractor then used the STAPLEE Method and a simple cost/benefit rating system to help consolidate and prioritize all the potential project solutions. The STAPLEE Method takes into consideration the Social, Technical, Administration, Political, Legal, Economic, and Environmental impacts of each project solution. While the cost/benefit rating system used a high/medium/low scoring system to predict benefits and costs of each project solution. Many of the project solutions, identified by the community action team, scored well in both metrics. An additional 3 projects scored well on both metrics and 20 potential priority projects were presented to the community action team during the 5th meeting where the STAPLEE and cost/benefit rating metrics were reviewed and finalized. These projects were then brought to the community for additional feedback. Input from city residents along with the Community Action Team identified 6 priority projects to be presented in the project portfolio.

Priority Projects

- Jack's Creek Floodplain and Greenway Improvements
- Drainage Ditch and Tributary Maintenance Plan
- Green Infrastructure Pilot Project
- Jack's Creek Drainage Project Expansion
- Living Shoreline and Natural Levee
- Nature-Based Stormwater Features

Refer to Appendix D for the Project Portfolios.