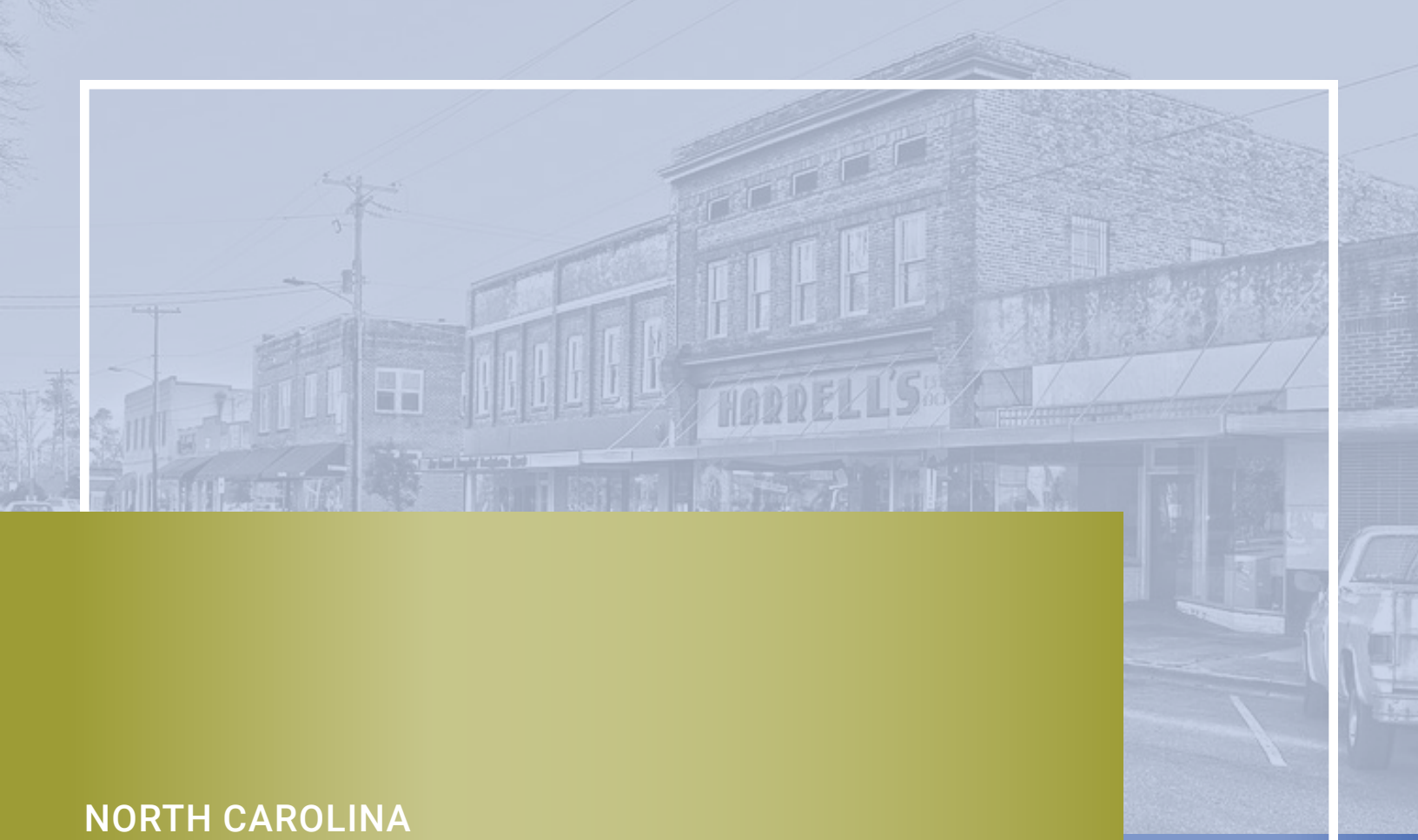

NORTH CAROLINA
RESILIENT COASTAL COMMUNITIES PROGRAM

TOWN OF BURGAW
RESILIENCE STRATEGY

MAY 2024

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Acknowledgments

We would like to thank the Town of Burgaw for its efforts associated with the development of this report and the Project Portfolio. In particular, we would like to thank Jessica Gray, James Gantt, and the rest of the Community Action Team for their honest feedback on the community's needs and the challenges that have been faced historically in addressing these needs. We also thank Mackenzie Todd and Kasen Wally of the N.C. Division of Coastal Management for their guidance and insight provided throughout this process.

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N.C. DIVISION OF COASTAL MANAGEMENT

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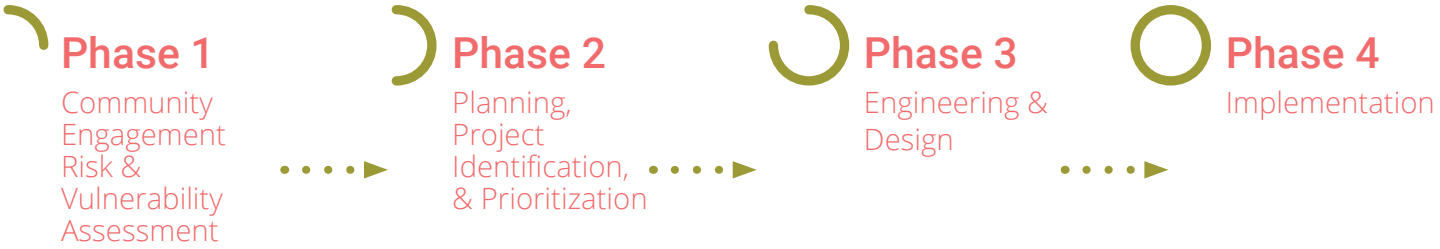
SUMMARY

Summary

The North Carolina Climate Risk Assessment and Resilience Plan (June 2020) called for a statewide North Carolina Resilient Communities Program. Initiated in 2021, the Division of Coastal Management is supporting the advancement of coastal resiliency work through the Resilient Coastal Communities Program (RCCP). In its second round of Phase 1 and Phase 2 for 2023-2024, the Program's objectives are to support a proactive, locally driven, and equitable approach to coastal resilience by:

- Addressing barriers to coastal resilience at the local level
- Assisting communities in the preparation of Risk and Vulnerability Assessments
- Helping communities develop a portfolio of well-planned and prioritized projects
- Advancing priority projects to "shovel-ready" status
- Linking communities to funding streams for project implementation



Project Portfolio Focus

- **Green Infrastructure Stormwater Management**
- **Stormwater Hydrologic & Hydraulic Modeling**
- **Stormwater Ordinance**
- **Stream Restoration**
- **Stormwater Education & Outreach**

The Town of Burgaw, North Carolina was selected to complete Phase 1 and Phase 2 of the RCCP simultaneously in 2023. Kleinfelder, Inc. ('Project Team') was matched with Burgaw to provide technical assistance throughout both phases. Phase 1 involves establishing a Community Action Team (CAT) to guide the entire effort, creating a common vision and set of goals for the Program, and preparing a Risk and Vulnerability Assessment with public engagement. Phase 2 builds from the Risk and Vulnerability Assessment by identifying a long list of potential solutions to address challenges, prioritizing solutions with CAT and public feedback, and presenting a Portfolio of project profiles each with supporting information that can be used in applications for funding.

Using the Risk and Vulnerability Assessment and knowledge of previous flooding events, the CAT identified areas throughout Burgaw at risk for flooding. While flooding from major storm events such as hurricanes and tropical storms cause disruption and damage, more frequent, short-duration heavy rainfall events impact the Town as well. Burgaw is also becoming a desirable destination and attracting more development, with its proximity to I-40 and the greater Wilmington area, highlighting the importance of ensuring appropriate

development regarding stormwater best management practices and employing natural and nature-based solutions where feasible.opportunities for the community. Based on feedback from the community and the CAT, a rain garden demonstration project was determined as desirable to addressing current flooding issues and providing educational opportunities for the community.

Ultimately, the CAT identified five projects for the RCCP project portfolio, which may be implemented under later phases of the RCCP or under other funding strategies. **This report is intended to be a tool for Burgaw to understand local climate hazards and associated risks and use in support of funding applications.**

Background

Burgaw is located in the center of Pender County, approximately 25 miles from Wilmington and the Atlantic Ocean, with two major regional highways (NC Highway 53 and US Highway 117) that bisect the town. Interstate 40 (I-40) is located within a mile east of the town limits, providing convenient access to other areas of interest. Burgaw is in the Cape Fear Watershed, which includes the Northeast Cape Fear River and Burgaw Creek. Within the Town planning area, Osgood Branch flows south to north through the east side of town, draining most of the downtown into Burgaw Creek, which flows south to north and drains to the Northeast Cape Fear River about 4 miles east of Burgaw. The main stem of the Osgood Branch has been channelized through town and is referred to as the Osgood Canal, as tributaries have been historically converted into a series of ditches located along town roads. Burgaw Creek is also channelized through town and is captured by roadside ditches.[1]

In 2018, Burgaw experienced severe flooding from Hurricane Florence. Flood extents from the Northeast Cape Fear River left Interstate 40 and Highway 53 unpassable via car and effectively cut off access into and out of Burgaw for [3 days] until the waters receded. Highway 53 was flooded up to seven feet as the Northeast Cape Fear River crested at 25.58 feet on September 19th following the passage of the storm.[2]

1 Burgaw Comprehensive Land Use Plan (2015)

2 National Weather Service - Hurricane Florence: September 14, 2018

Ash Gardens Memory Care Center was evacuated due to the lack of preparation of adequate food supplies and backup power sources.

Following recovery and cleanup efforts after Hurricane Florence, the Town of Burgaw has continued work to address stormwater management, the Osgood Canal, and ensuring residents are prepared ahead of the next major storm event.

Residents ride boats down N.C. Highway 53 in Burgaw on Wednesday, September 19, 2018. [Matt Born/StarNews Photo]

Community Action Team

The RCCP process requires each community to establish a multidisciplinary group of stakeholders, referred to as a Community Action Team (CAT), to provide local perspectives and to engage the community. Burgaw's CAT was created through input from Town staff and includes members that can best represent the community. Various stakeholder groups were considered, including Town departments, residents, emergency services, transportation services, vulnerable populations, and environmental agencies. **Table 1** lists active CAT members that participated throughout the duration of program.

Table 1. Community Action Team Members

Name	Title	Organization
Jessica Gray	Coordinator, Community Development	Town of Burgaw
James Gantt	Town Manager	Town of Burgaw
Olivia Dawson	Mayor	Town of Burgaw
Gilbert Combs	Director, Planning (former)	Town of Burgaw
Louis Hesse	Director, Inspections	Town of Burgaw
Cody Suggs	Director, Parks and Recreation	Town of Burgaw
Alan Moore	Director Public Works	Town of Burgaw
Jim Hock	Police Chief	Town of Burgaw
Jim Taylor	Fire Chief	Town of Burgaw
Cathy Guidry	Director, Pender AmeriCorps Seniors	Pender County Adult Services
Michael Pearsall	Resident	Town of Burgaw
Mike Taylor	Resident	Town of Burgaw
Adrienne Cox	Planning Engineer	North Carolina Department of Transportation, Division 3
Michelle Howes	Corridor Development Engineer	North Carolina Department of Transportation

Name	Title	Organization
Daniel Adams	Director, Planning	Pender County
Amy Mead	Area Agent	North Carolina Cooperative Extension
Mariko Polk	Coastal Processes Specialist	North Carolina Sea Grant
Sarah Spiegler	Coastal Resilience Specialist	North Carolina Sea Grant

The Project Team held a series of six CAT meetings from October 2023 through May 2024, in a combination of in-person and virtual settings. The Kickoff meeting with CAT members introduced the RCCP steps and objectives, providing an overview of involvement, and general timeline. Subsequent meetings will be detailed below.

Review of Existing Local & Regional Efforts

To comprehensively evaluate planning efforts at the local and regional level, a review of existing plans and ordinances helped document completed projects, ongoing efforts, and previously identified needs still waiting to be addressed. **Table 2** provides a summary of relevant information that supported the RCCP.

Table 2. Existing Local and Regional Plans

Year	Title	Asset Locations	Hazard Information	Potential Resilience Projects	Resilience Strategies in Place	Link
2023	NCDOT Climate Strategy Report			X		Link
2022	Climate Change and Natural Hazards Vulnerability Assessment for the Cape Fear Region		X	X	X	Link
2022	Climate Resilience Projects for the Cape Fear Region		X	X		Link
2022	Burgaw Economic Development Assessment and Plan	X		X		N/A
2022	Osgood Canal Greenway and Urban Trail	X	X			N/A
2022	Burgaw FY2022-2023 Annual Operating Budget & Capital Improvement Plan			X		Link
2021 (Amendment 2022)	Flood Damage Prevention Ordinance – Chapter 14		X		X	Link
2021	Flood Damage Prevention Ordinance				X	Link

Year	Title	Asset Locations	Hazard Information	Potential Resilience Projects	Resilience Strategies in Place	Link
2013 (Amendment 2021)	Burgaw 2030 Comprehensive Land Use Plan	X		X		Link
2021	Southeastern NC Regional Hazard Mitigation Plan		X	X	X	Link
2017	Hurricane Matthew Resilient Redevelopment Plan – Pender County	X	X	X	X	Link
2016	Town of Burgaw Parks and Recreation Master Plan	X				Link
2015	Stormwater Master Plan	X	X	X		N/A
2006	NC 53 Corridor Study	X				Link

The Town's Parks and Recreation Master Plan is actively being updated (2024) and the Stormwater Master Plan is currently scheduled to undergo an update, as of the completion of this report.

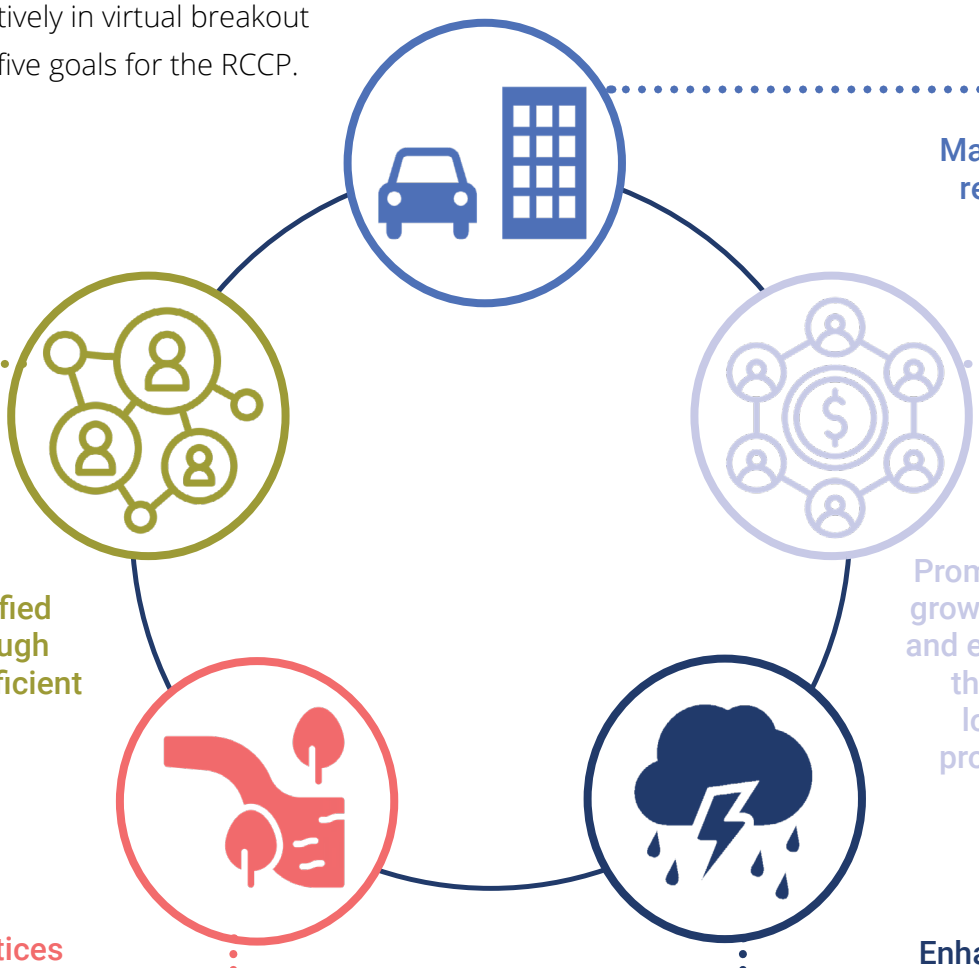
Vision and Goals

During CAT Meeting #1, the group brainstormed a vision and supporting goals for what a Resilient Burgaw will be. Aware of the present changes and challenges the Town has faced in the past, the group was in agreeance about the importance of looking forward and preparing for future challenges. Building from existing visions identified in the review of existing planning documents, the CAT determined Burgaw's vision is to reflect a safe, robust, and adaptive environment, and to remain committed to being a leader in resiliency to protect assets and resources for the benefit and enjoyment of the community.

To support the vision, the CAT reflected on potential actions and steps taken to achieve the vision. Goals are meant to be broad and actionable, and specifically relate to increasing resiliency of the Town. The CAT worked collaboratively in virtual breakout rooms to finalize five goals for the RCCP.

Community Vision

Burgaw is a vibrant community with a rich history and holds pride in its small-town character. The town will reflect a safe, robust, and adaptive environment. Burgaw is committed to being a leader in resiliency to protect assets and resources for the benefit and enjoyment of the community.



Maintain access to resources before, during and after hazards

Promote sustainable growth, development and economic vitality through enhanced local government programs, policies, and practices

Enhance community awareness and education of natural weather hazards and climate

Establish flood mitigation and adaptation practices by designing and implementing stormwater best management practices

Preserve and encourage a unified community through effective and efficient communication

Engagement Strategy

The engagement strategy outlines actions and goals the Town of Burgaw, Community Action Team, and Kleinfelder engaged in to comprehensively gather and evaluate local knowledge and experiences with natural hazards. The approach included a series of meetings with the CAT, community workshops, attendance at the Pender County Spring Fest, and a website. The purpose of an engagement strategy is to ensure inclusivity in the planning process, particularly by involving members of vulnerable and historically underrepresented communities, and to make participation as convenient and meaningful as possible. Additional engagement activities are detailed in the **Appendix**.

CAT Meetings

Following the CAT Kickoff Meeting, a series of six virtual and in-person meetings were held monthly from October 2023 through May 2024. A matrix of meeting topics can be found in **Engagement Strategy** in the **Appendix**. Most CAT meetings were discussion-based and included review and confirmation of findings.

In December, following CAT Meeting #2, the Town hosted a site visit for interested members to gain a visual understanding of problem areas throughout Burgaw. During the site visit, the CAT observed critical assets and natural infrastructure, such as industrial parks, recreation areas, lift stations, roadways, neighborhoods, and culverts along the Osgood Canal.

Photo Credit: Julia Maron, Kleinfelder, 2024

Public Engagement

Public engagement efforts included two online surveys – the first gathered responses to background information and personal experience with natural hazards; the second asked respondents to rank their preference for projects identified in the Portfolio. The surveys were hosted online and cascaded via the Town's newsletter, Facebook, via CAT members, to places of worship, and posted as a QR code around town.

A project website was designed to encourage consistent engagement with the RCCP and disseminate information about upcoming events: Resilient Coastal Community Program – Burgaw. A similar page was created on the Town of Burgaw's website to document participation in the Program and provide another platform for engagement: https://burgawnc.gov/483/Resilient-Burgaw.

Additionally, Kleinfelder designed a logo (see right) based on the Town's current colors and symbols to encourage connection to the project. Stickers were created and handed out at public events, with the goal of messaging about Burgaw's involvement in RCCP and the steps the Town is taking to become a Resilient Burgaw.

Survey #1 was published in January 2024 and a total of 30 responses were received. Flooding, hurricanes, and tropical storms were most common and most concerning impacts to community members. Impacts directly resulting from storm events included power/internet loss, property damage, infrastructure damage, and limited access to services. Respondents noted locations throughout Town that had experienced weather-related issues, most notably flooding. A summary of survey responses is provided for **Public Survey #1** and **Public Survey #2** in the **Appendix**.

Survey #2 received 59 responses from April – May 2024. Respondents were asked to indicate their preference on a scale of one (1 – least favored) to five (5 – most favored) for each of the final five projects identified in the Project Portfolio. Survey results indicated most favorable support for the Osgood Canal

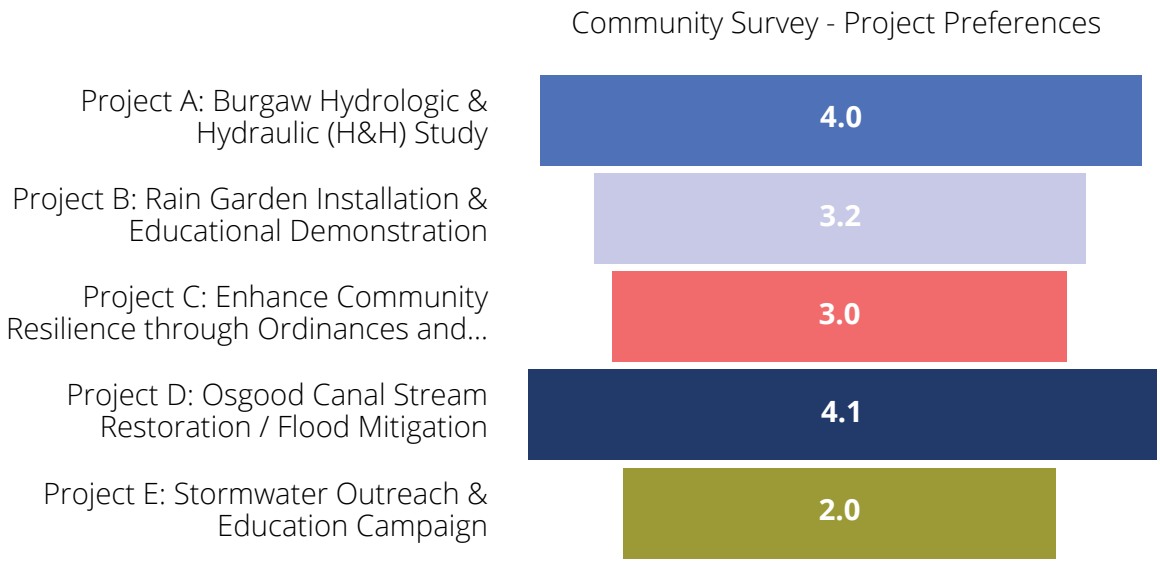
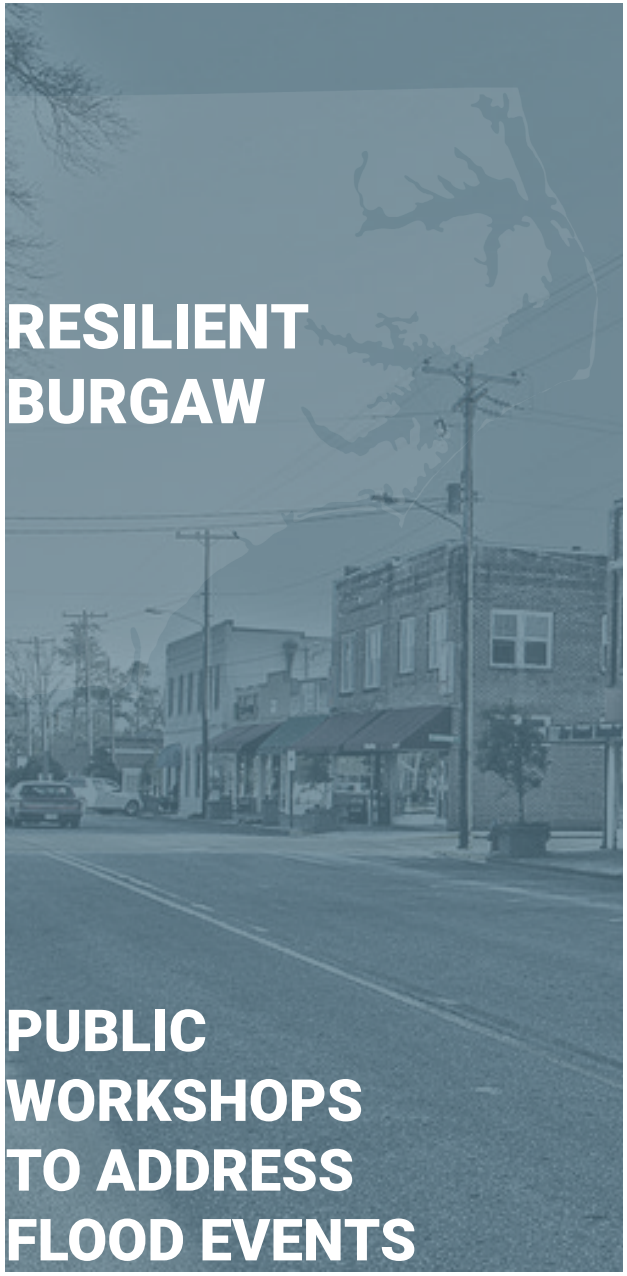


Photo Credits: Cathy Guidry

With coordination from the CAT, a lunch-and-learn style focus group was held at Pender Adult Services in January 2024. The focus group meeting consisted of a presentation about the Resilient Coastal Communities Program and objectives during a luncheon, and a listening session followed where participants were encouraged to share their experiences with natural hazards and desires for a resilient community. Approximately 30 community members attended, representing a potentially vulnerable group.

The evening following the focus group meeting with Pender Adult Services, a broader public workshop was held in the Burgaw Town Center. The workshop was set up as a 'passport'-type activity, where participants were encouraged to visit four different stations (each occupied by a CAT member) to learn more about RCCP and provide feedback on challenges and solutions. Stations included representation from NC Division of Coastal Management, the Town of Burgaw, the NC Department of Transportation, and Kleinfelder. As participants visited each station, they would receive a stamp on their resilience 'passport' and would return to the sign-in table to receive their participation sticker and fill out Survey #1. In total, about 20 community members attended.

The Project Team designed a flyer to promote the public workshop on January 30, 2024.



HOW OFTEN DOES YOUR STREET FLOOD?

HOW OFTEN ARE YOU INCONVENIENCED WHEN IT RAINS?

Come and share your concerns about **flooding and other weather-related hazards** affecting your home and learn more about what Burgaw is doing to prepare for the future!

Hosted by Kleinfelder and the Burgaw Community Action Team as part of the Resilient Coastal Communities Program (RCCP)

North Carolina RESILIENT COASTAL COMMUNITIES PROGRAM

To learn more about the RCCP Program, visit: *https://www.deq.nc.gov/about/divisions/coastal-management/coastal-adaptation-and-resiliency/nc-resilient-coastal-communities-program*

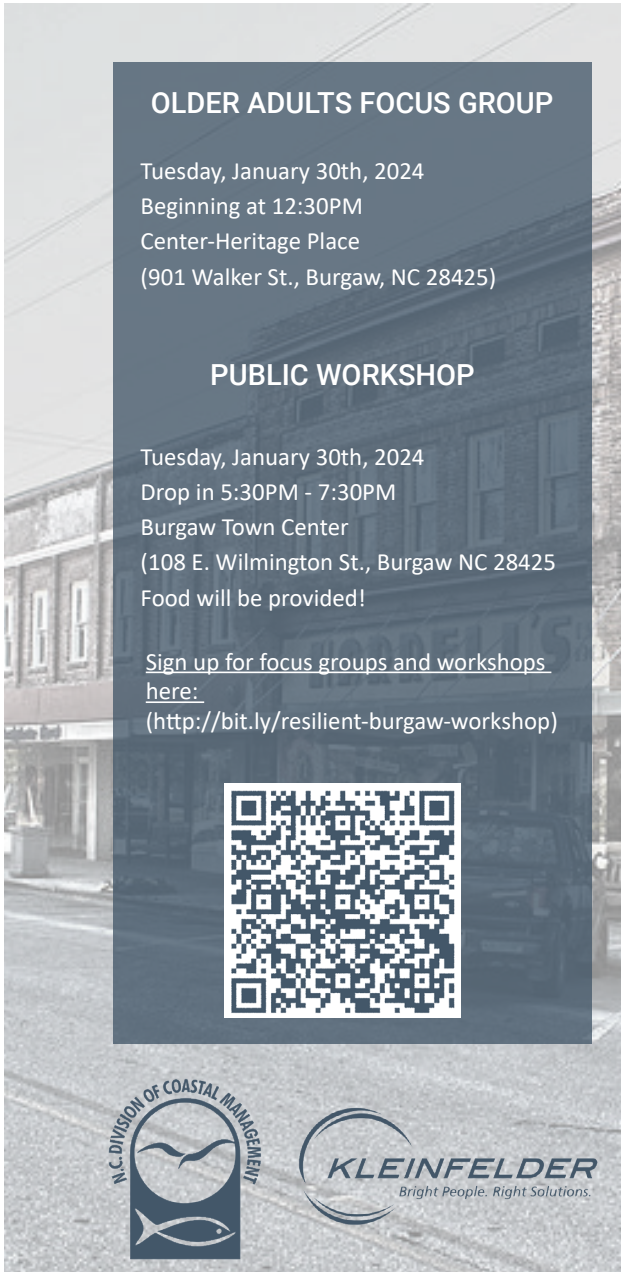


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Photo Credit: Julia Maron, Kleinfelder, 2024

The Project Team attended the annual Pender County Spring Fest, held on May 4th, 2024 in downtown Burgaw. As community members stopped by the table, they were asked which one of the five projects identified in the Project Portfolio would they most like to see implemented in the near future. They would then put a gold star stick underneath their top choice and could learn more about the RCCP and efforts the Town was taking regarding resiliency. Throughout the duration of the community event, about 25 people engaged with the Project Team and voted on their most preferred project.

Photo Credit: Julia Maron, Kleinfelder, 2024

RISK AND VULNERABILITY ASSESSMENT REPORT

Risk & Vulnerability Assessment

To build long-term resilience to current and future impacts of hazards and a changing climate, Burgaw needs to know who and what is vulnerable to maximize resources and minimize future risks. A key component to this effort is the risk and vulnerability assessment, which evaluates risks to people, critical assets, natural infrastructure, and ecosystems from coastal and climate hazards like flooding and severe weather. The RCCP Handbook (August 2023) provides a framework for assessing the risk and vulnerability of Burgaw's assets. The following section is organized based on the three steps outlined in the RCCP Handbook:

1

Identify Critical Assets and Map Hazards

Collect spatial data for critical built and natural assets. Review Southeastern North Carolina Hazard Mitigation Plan (2021) and incorporate additional input from Community Action Team. Map assets and hazard data and create geodatabase.

2

Assess Vulnerability

Vulnerability is a function of exposure, sensitivity, and adaptive capacity. Examine the likelihood that an asset will be affected by natural hazards. Assign sensitivity scores based on asset function. Evaluate an asset's ability to adjust to disruptions. Develop an index to assign vulnerability scores to estimate the susceptibility of an asset to relevant hazards.

3

Eliminate Risk

Determine potential risk to assets to prioritize actions that increase resilience to future hazards.

This assessment intends to focus on natural hazards, including those specific to coastal environments, and potential impacts to Burgaw. The RCCP Handbook considers the following potential hazards: sea level rise, flooding (rainfall, tidal, and riverine), damaging storms, tornadoes and winds, storm surge, shoreline erosion, heat waves, wildfire, and drought. Additional non-climate stressors include aging or potentially undersized infrastructure, population dynamics, economic shifts, increased subsidence, altered drainage patterns, and land cover change.

Flooding is a spatially defined hazard, meaning there is variability in the locations where it is likely to occur. With Burgaw's recent impacts from Hurricane Florence and other severe storms, flooding was identified as the most concerning hazard given Burgaw's proximity to the Northeast Cape Fear River and coastal North Carolina. Other hazards evaluated in the assessment may be more spatially homogenous, meaning their exposure is likely to be more evenly distributed across the Town.

A primary goal of the RCCP is to support the identification and implementation of resilience projects in participating communities. To support that goal, this assessment focuses on potential impacts to critical built assets and natural assets, defined as follows:

Critical Built Assets

The FEMA Community Lifelines Framework identifies assets that provide fundamental services for the community. These are assets that "enable the continuous operation of critical government and business functions and are essential to human health and safety or economic security." For this assessment, Critical Built Assets include:

- Roads/Evacuation Routes
- Water/Sewer Lines (including Lift/Pump Stations and Generators)
- Community Government Service Offices
- Schools/Emergency Shelters
- Health Services
- Public Safety/Emergency Services
- Historic/Cultural Assets
- Day Cares
- Provisions (i.e., Walmart, gas stations, grocery stores, Dollar General, etc.)
- Places of Worship

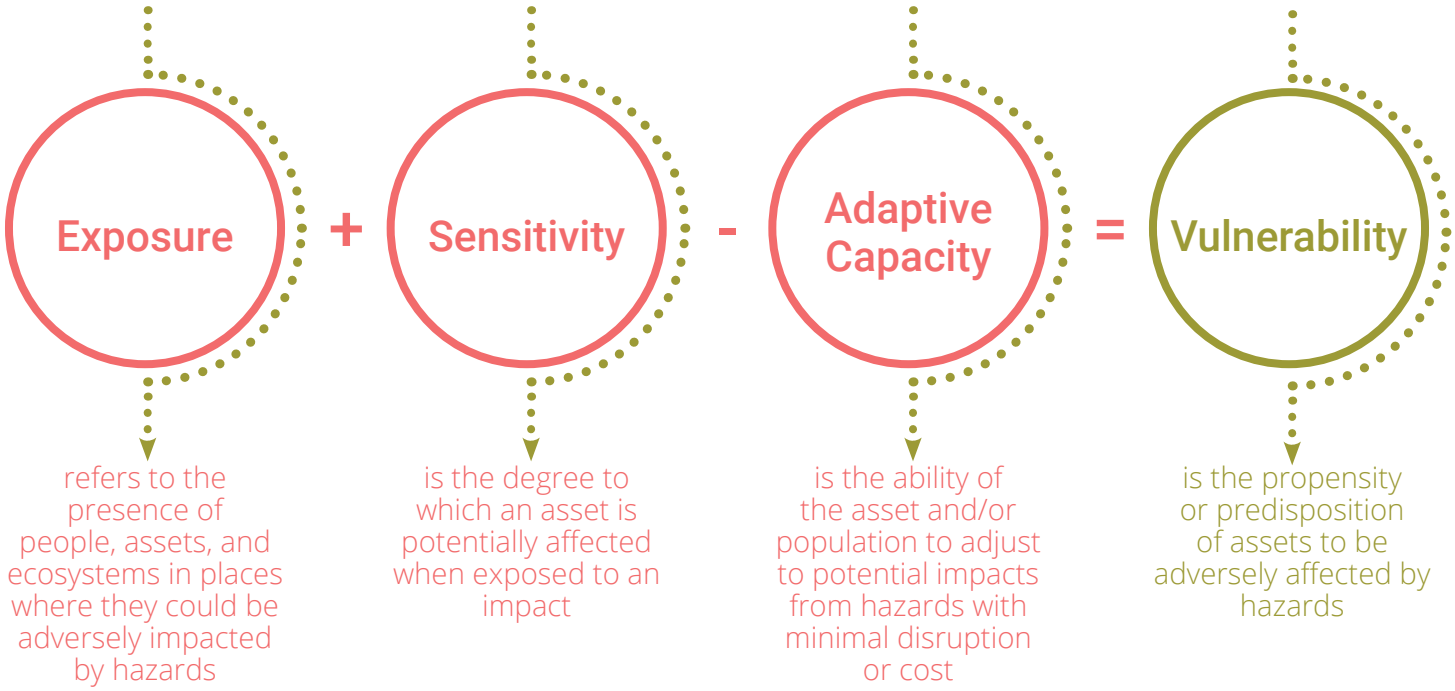
Natural Assets

Natural assets include landscapes and systems that perform ecosystem services that benefit nearby communities, like flood protection, erosion control, and water purification. For this assessment, Natural Assets include:

- Open Space
- Parks
- Game Land
- Wetlands
- Natural Areas
- Managed Areas

After mapping hazards, the assessment determines which critical built assets and natural assets are vulnerable – the degree to which they are expected to experience adverse impacts – to flooding. This framework considers three components that contribute to vulnerability: exposure, sensitivity, and adaptive capacity.

Figure 2. Vulnerability Equation



Metrics are developed for each component and a Vulnerability Index helps assign assets a score from zero to three. **Figure 2** describes how a Vulnerability Score is determined.

Asset Identification

Critical Built Infrastructure

Critical built infrastructure refers to physical structures that house people or perform functions that enable continuous operation of government and business functions and are essential to human health and safety or economic safety. Beyond operational functions, this assessment includes built infrastructure that is community-specific and considered essential by community members for cultural, ecological, public health, social, and/or economic value to the community. The assessment identified critical built infrastructure assets using multiple datasets available on NC One Map and Pender County GIS Online. For this assessment, the Project Team identified assets as building-level structures and the parcel the structure(s) sit on. This method was selected to account for any exposure a hazard might have to an asset, including the land around it. The Federal Emergency Management Agency's (FEMA) Community Lifeline framework and the FEMA Resilience Analysis and Planning Tool (RAPT) served as starting points to identify and categorize critical built infrastructure assets.

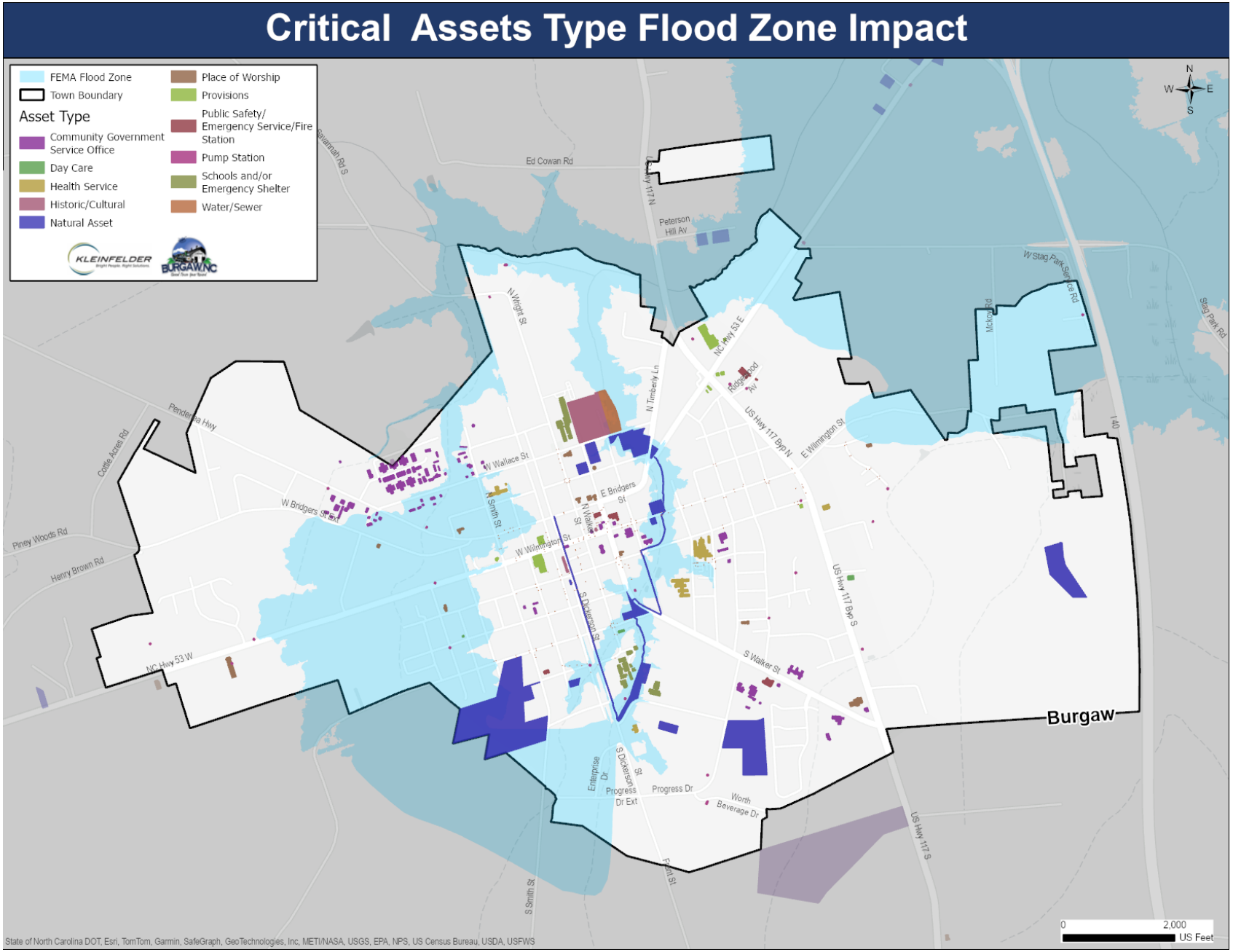
Table 3 summarizes the types of built assets examined within Burgaw.

Table 3. Summary of Critical Built Infrastructure by Type

Asset Type	Includes…	No. of Assets
Community Government Service Office	Locations of government services, town center, public works, board of education, etc.	39
Day Care	Locations of pre-school and day care facilities	4
Health Service	Locations of hospitals, doctor's offices, pharmacies, dialysis, aging/memory care facilities	7
Historic / Cultural	Locations of historical or cultural significance	3
Place of Worship	Locations of churches	14
Power Plant	Locations of solar plant	1
Provision	Locations of gas stations, grocery stores, convenience stores	8
Public Safety/Emergency Service	Locations of emergency medical services, fire, police, public safety	9
School / Emergency Shelter	Locations of elementary, middle, high, and community college; Schools are also identified as temporary shelters during disasters or emergencies	12
Water / Sewer	Locations of stormwater inlets, pump stations, water lines, water and wastewater treatment facilities	232
Roads	Identified evacuation routes	1

Figure 3 below identifies all critical built and natural assets inventoried for this Risk and Vulnerability Assessment in the Town of Burgaw. A one-mile buffer was applied to capture information just outside of the Town's jurisdiction and is noted accordingly.

Figure 3. Critical Assets



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Natural Infrastructure

Natural assets include landscapes and systems that perform ecosystem services that benefit nearby communities, like flood protection, erosion control, and water purification. **Table 4** describes areas such as open space, parks, game land, wetlands, natural areas, and managed areas and were identified from the North Carolina Natural Heritage Program, National Wetlands Inventory, and Burgaw GIS data. Natural areas may be suitable locations for nature-based solutions or green infrastructure projects.

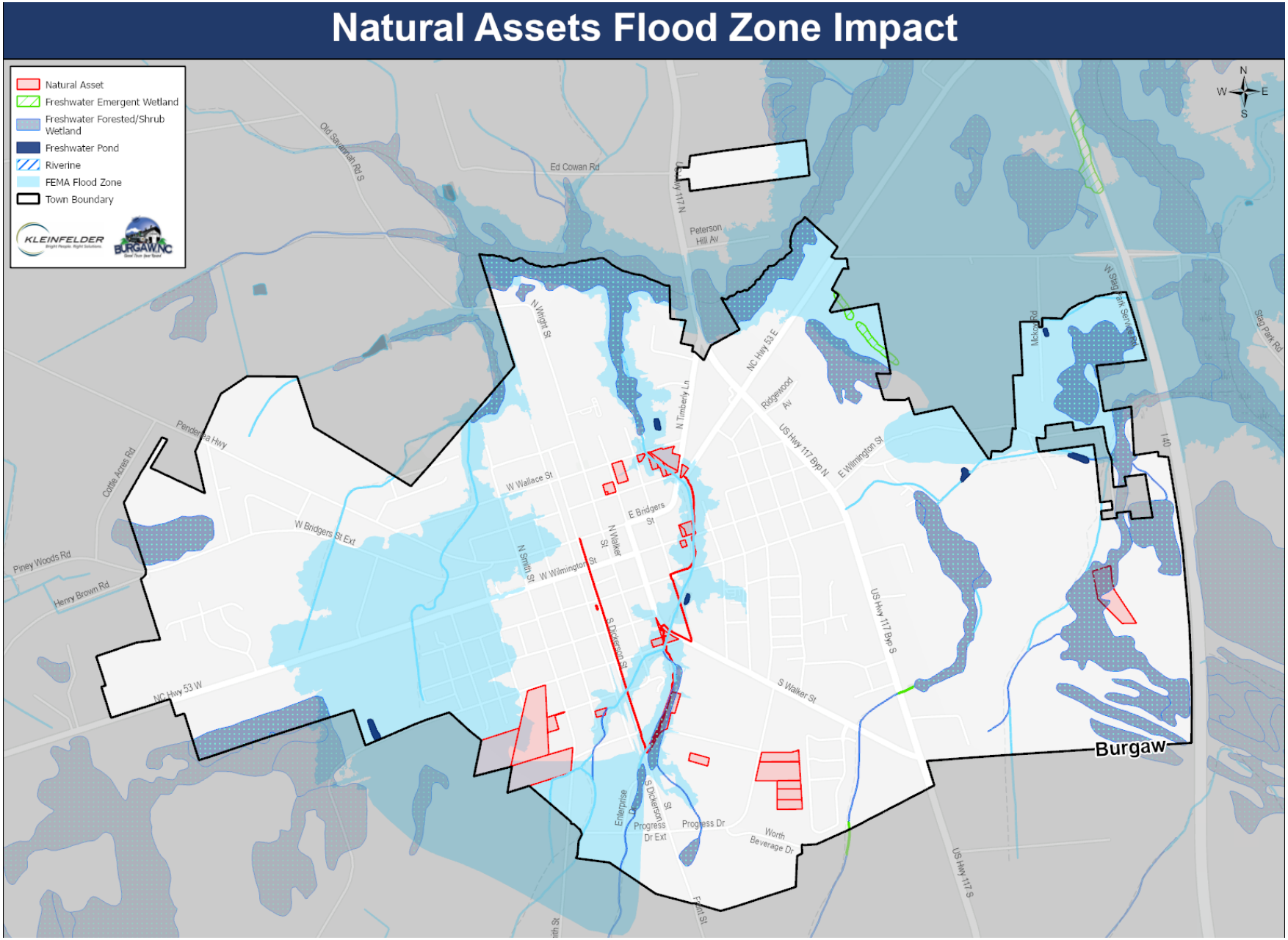
Table 4. Natural Infrastructure in Burgaw

Asset Type	Property Address
Osgood Canal Greenway	Town-wide
Pecan Park	309 E Wilmington St.
Pender Memorial Park	601 S Smith St.
Rotary Park	203 S Dickerson St.
Hankins Park	E Wallace St.
W. Ross Harrell Memorial Park	108 E Ashe St.
Town of Burgaw Open Space	106 E Hayes St.
Town of Burgaw Open Space	506 E Mcrae St.
Pender County Open Space	S Vann St.
Pender County Open Space	NC Hwy 53
Pender County Open Space	148 Peterson Hill Ave
Pender County Open Space	Progress Dr.
Pender County Open Space	Industrial Dr.

Wetlands function like bathtubs during rain events, filling with water and holding it before slowly releasing it back into the ground and recharging the water table. They also provide co-benefits beyond flood mitigation, such as habitat for fish and wildlife, carbon storage, and recreation. Within and around Burgaw, there are four wetland types totaling approximately 2,451 acres.

Figure 4 below depicts natural assets and wetland areas identified within the Town of Burgaw and the one-mile buffer in relation to the FEMA 100-year and 500-year flood zone.

Figure 4. Natural Assets and Wetland Areas



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Hazard Identification

Local Hazard Mitigation Planning

The RCCP Handbook stipulates the most recent hazard mitigation plan for Burgaw should serve as the primary reference for the Risk and Vulnerability Assessment. Burgaw participated in the 2021 Southeastern North Carolina Hazard Mitigation Plan (Pender County) and identified the primary hazards for the area as hurricanes and coastal hazards, tornadoes/thunderstorms, flooding, and wildfires. These primary hazards were used to determine the final list of hazards that will be used for the Vulnerability Assessment.

Hazards

The RCCP Handbook requires that, at a minimum, flooding (rainfall, tidal, and riverine), storm surge, and 30-year sea level rise projections be identified and included in the Risk and Vulnerability Assessment. To create a comprehensive and locally relevant list of hazards, the Project Team supplemented the Hazard Mitigation Plan findings with input from the Community Action Team. For Burgaw, flooding was the primary hazard included in the Vulnerability Assessment. The present exposure and future projections of the following hazards are also discussed qualitatively:

- Sea Level Rise
- Extreme Heat
- Wind / Severe Weather
- Drought
- Wildfire

For the purposes of this Vulnerability Assessment, flooding was the only hazard given an exposure score, as the additional hazards are more spatially homogenous across the Town and no additional modeling was performed as a part of this assessment. Burgaw is also an inland community and is not directly susceptible to sea level rise, storm surge, tidal flooding, or shoreline erosion – however, information is included about sea level rise as it pertains to nearby waterways.

Flooding

According to data from Risk Factor,[3] about 405 properties in Burgaw are at risk of flooding over the next 30 years. About 246 properties are in the FEMA Special Flood Hazard Area (Zone A or V) and about 229 properties were impacted by flooding during Hurricane Florence. The Risk Index for Riverine Flooding, according to the FEMA National Risk Index,[4] is Relatively Moderate for most of Burgaw.

For this assessment, the FEMA 100-year and 500-year floodplain data and validated Hurricane Matthew and Hurricane Florence data was used to assign an exposure score based on the intersection of critical built assets with the flood zones.

3 Burgaw Flooding Risk – Risk Factor

4 FEMA National Risk Index – Burgaw Census Tract

FEMA 100-year and 500-year flood mapping data provide present conditions for riverine flooding for the 100-year and 500-year frequency events. Validated Hurricane Matthew and Hurricane Florence flood data captures flood exposure for those storm events in areas that may be outside of presently designated FEMA flood zones.

Exposure Scores are referenced from low to high exposure, as summarized in **Table 5**.

Table 5. Flood Exposure Score

Asset Exposure	Exposure Score	Description
High	3	100-year and 500-year flood zone
Medium	2	Outside FEMA 100-year and 500-year flood zone; within Hurricane Matthew and/or Hurricane Florence flood extent
Low	1	500-year flood zone
N/A	0	No FEMA flood zone or Hurricane flood extent

Precipitation

Flooding vulnerability approximates the potential impact of future rainfall and storm events. The North Carolina Climate Science Report projects an increase in precipitation across the state as greenhouse gases increase throughout the 21st Century. Across the state, there has been an upward trend in the number of heavy rainfall events (3 inches or more in a day), and it's predicted that extreme precipitation frequency and intensity will increase.[5]

Climate projections from Climate Mapping for Resilience and Adaptation[6] for mid-century (2035-2064) under a higher emissions scenario (RCP 8.5) predict Burgaw will experience about 55.7 inches of average total precipitation annually – which is approximately 2.2 inches more than baseline data from 1976-2005 (**Table 6**).

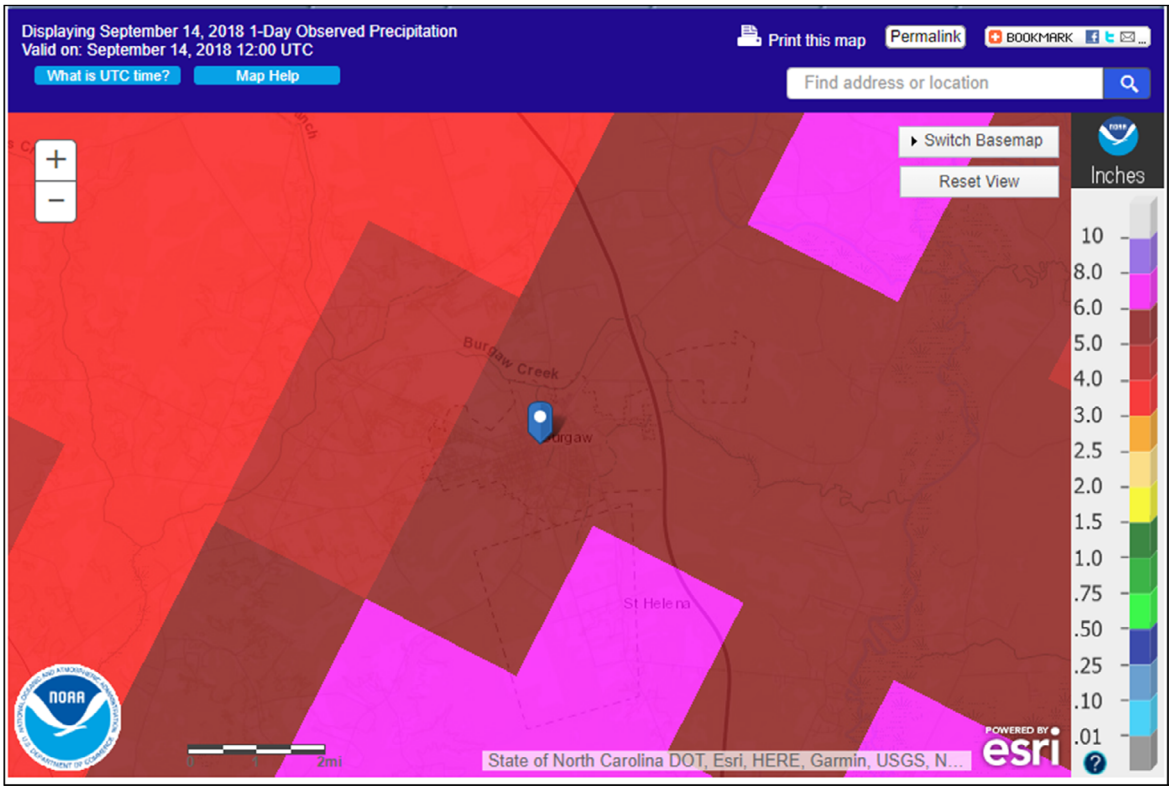
5 NC Climate Science Report (2020)

6 Climate Mapping for Resilience and Adaptation – Burgaw Census Tract

Table 6. Climate Projections for Flooding in Burgaw

Metric	Time Horizon	Baseline (1976-2005)	Projection - Higher Emission Scenario	Change from Baseline
Average annual total precipitation (inch)	Early Century (2015-2044)	53.5	55.2	1.7
	Mid Century (2035-2064)		55.7	2.2
	Late Century (2070-2099)		56.6	3.1
Days per year with precipitation (wet days)	Early Century (2015-2044)	186.6	184.7	-1.9
	Mid Century (2035-2064)		183.2	-3.4
	Late Century (2070-2099)		179.2	-6.7
Annual days with total precipitation > 1 inch	Early Century (2015-2044)	8.8	9.9	1.0
	Mid Century (2035-2064)		10.2	1.4
	Late Century (2070-2099)		11.1	2.2

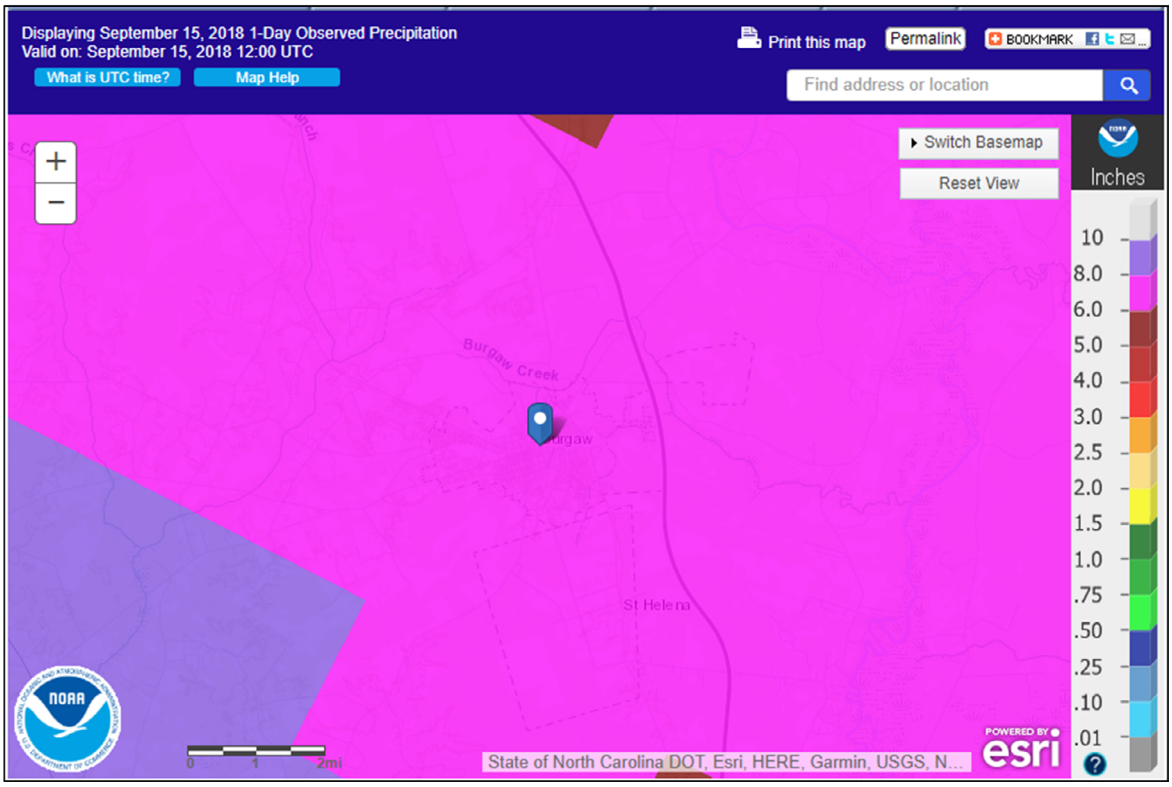
Figure 5. Hurricane Florence 1-Day Observed Precipitation (9/14/2018)



Due to limited available data, rainfall-driven flood hazards were not included in the spatial exposure assessment. As a proxy, data from NOAA National Weather Service Observed Precipitation details the historic precipitation that Burgaw experienced during Hurricane Florence (2018). The National Weather Service sensor 4 miles east of Burgaw recorded 22.06 inches of total rainfall from September 14th – 18th, 2018.[7] CAT members recounted the Town being isolated for 3 days due to major flooding on Highway I-40, effectively disconnecting the Town from resources immediately following the storm.

7 Hurricane Florence (2018)

Figure 6. Hurricane Florence 1-Day Observed Precipitation (9/15/2018)



The Pender County Courthouse, which is listed on the National Register of Historic Places, experienced damage from Hurricane Florence when wind-driven rain penetrated the walls, floor, and ceiling. Required remediation was undertaken shortly after the hurricane and included addressing water damaged walls that also had lead paint. (The Courthouse has now been bolstered to reduce impacts from these types of natural hazards).

Sea Level Rise

Burgaw is roughly 30 miles from the Atlantic Ocean, so the direct threat of sea level rise is not a major concern to the community. However, the NOAA Sea Level Rise Viewer provides data on projected impacts from a range of present day current mean high highest water to ten feet of sea level rise.[8] As you can see in **Figure 7**, two feet of sea level rise is predicted to impact areas around the Northeast Cape Fear River and its tributaries, including lower portions of Burgaw Creek east of I-40. Four feet of projected sea level rise extends the inundation area further as shown in red.

8 NOAA Sea Level Rise Viewer

Figure 7. NOAA Sea Level Rise 2ft and 4ft Projections

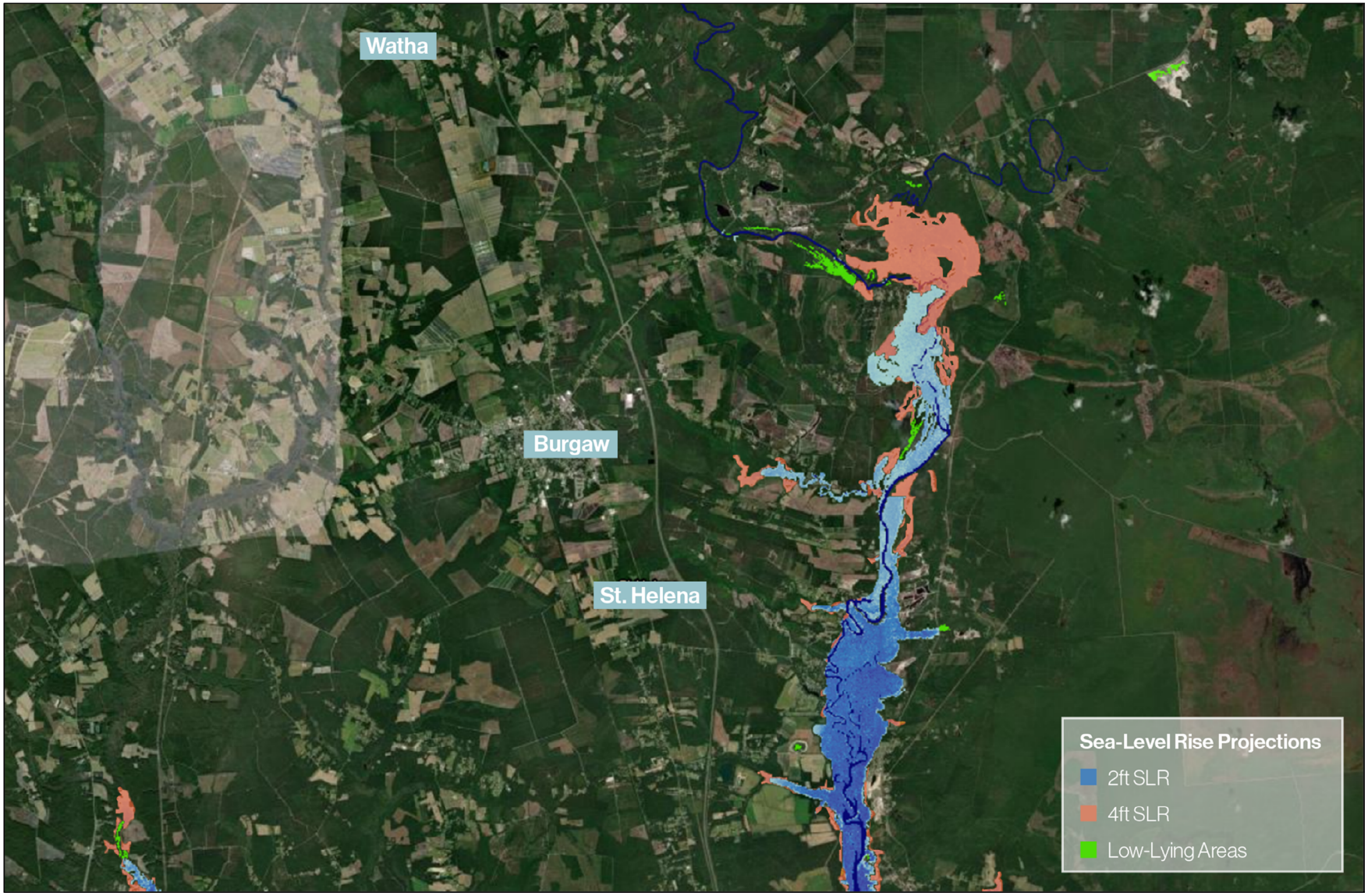


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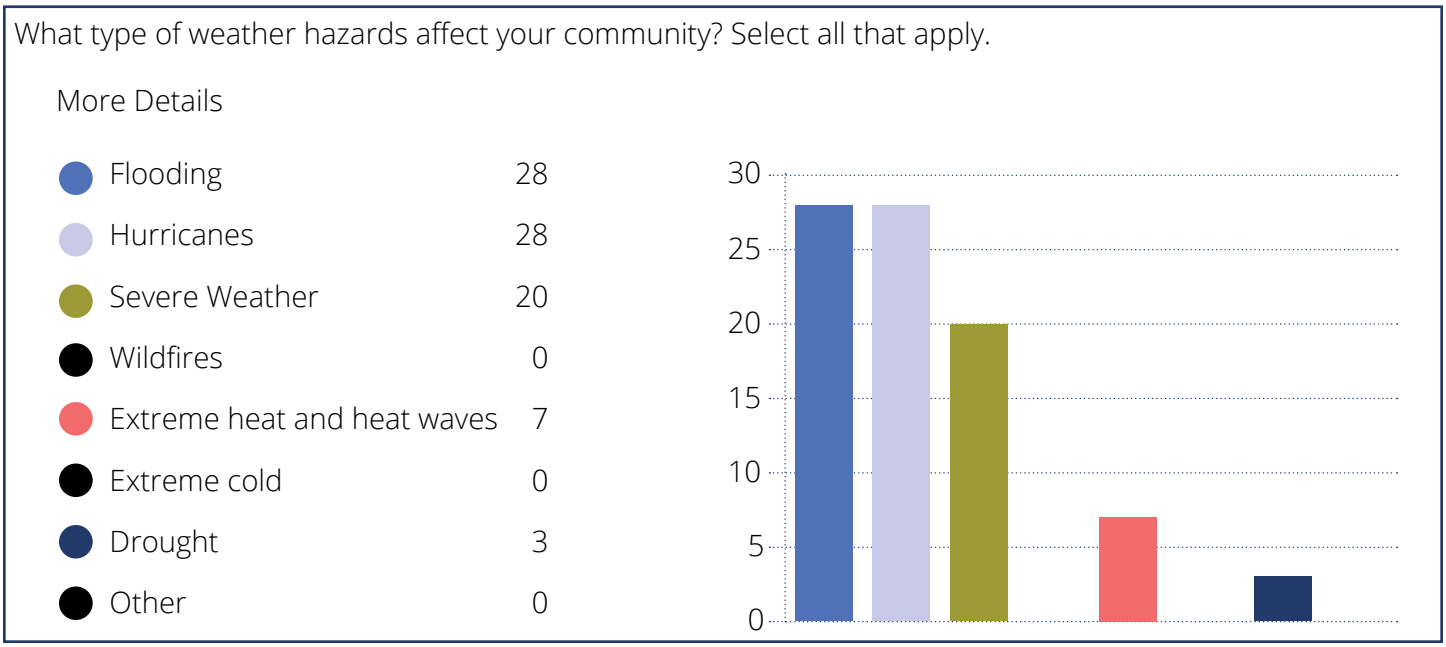
Figure 8. Community Survey Responses - Hazards



In a public online survey, community members answered the question, "What type of weather hazards affect your community? Select all that apply." Most respondents indicated that flooding, hurricanes and tropical storms, and severe weather (thunderstorms, wind, lightning, tornadoes) were the most frequent threats to Burgaw, however some answers also included extreme heat/heat waves and drought.

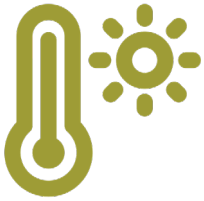
Tools such as Risk Factor,[9] FEMA National Risk Index (NRI)[10], Climate Mapping for Resilience and Adaptation (CMRA),[11] and the Southeastern North Carolina Regional Hazard Mitigation Plan provide risk information for additional hazards that were not directly incorporated into the Vulnerability Assessment. These data sources help comprehensively assess Burgaw's climate hazard vulnerability. Information about exposure and future projections are detailed in the following sections for wind, extreme heat, drought, and wildfire.

Wind

Risk Factor indicates that Burgaw has a severe wind risk based on the projected likelihood and speed of hurricane, tornado, or severe storm winds impacting the Town.[12] Hurricanes present the greatest risk of severe wind and average maximum wind speeds are higher now than they were 30 years ago. Wind can damage properties, knock down trees, bring down utility lines, and scatter debris. Thunderstorms may also spur gusty wind conditions and tornadoes. Burgaw has documented at least 17 thunderstorm-related wind events since 1956 but no deaths or injuries have been reported as associated with those events.[13]

9 Risk Factor (2024)
10 FEMA NRI
11 Climate Mapping for Resilience and Adaptation (2024)
12 Burgaw Wind Risk - Risk Factor
13 Southeast North Carolina Regional Hazard Mitigation Plan (2021), 5:34

Heat



Extreme heat is responsible for the highest number of annual deaths among all weather-related hazards.[13] Changes in daily high temperatures and humidity levels will have compound effects on heat indices and pose greater risk to vulnerable populations like older adults, children, and those with medical conditions. Risk Factor indicates that Burgaw and properties within Town have a severe risk from heat due to the "feels like" temperatures increasing.[14]

The FEMA National Risk Index (NRI) classifies the three census tracts within Burgaw as having Relatively Moderate to Relatively High risk of heat waves.[15] By mid-century under the higher emissions scenario, Burgaw is likely to experience about 97 days per year where temperatures are greater than 90°F, an increase of 53 days since 1976-2005.[16] A heat wave is considered a period of abnormally hot weather generally lasting more than three days and has the potential to impact a large geography.[17] Impacts of extreme heat to infrastructure can deteriorate and buckle pavement, , increase electricity usage and cause a strain on transmission capacity, and cause damage to crops. There have been at least 13 excessive heat events reported across southeastern North Carolina (including Burgaw) between 1996 and 2019, and future occurrences are likely.[18]

Drought

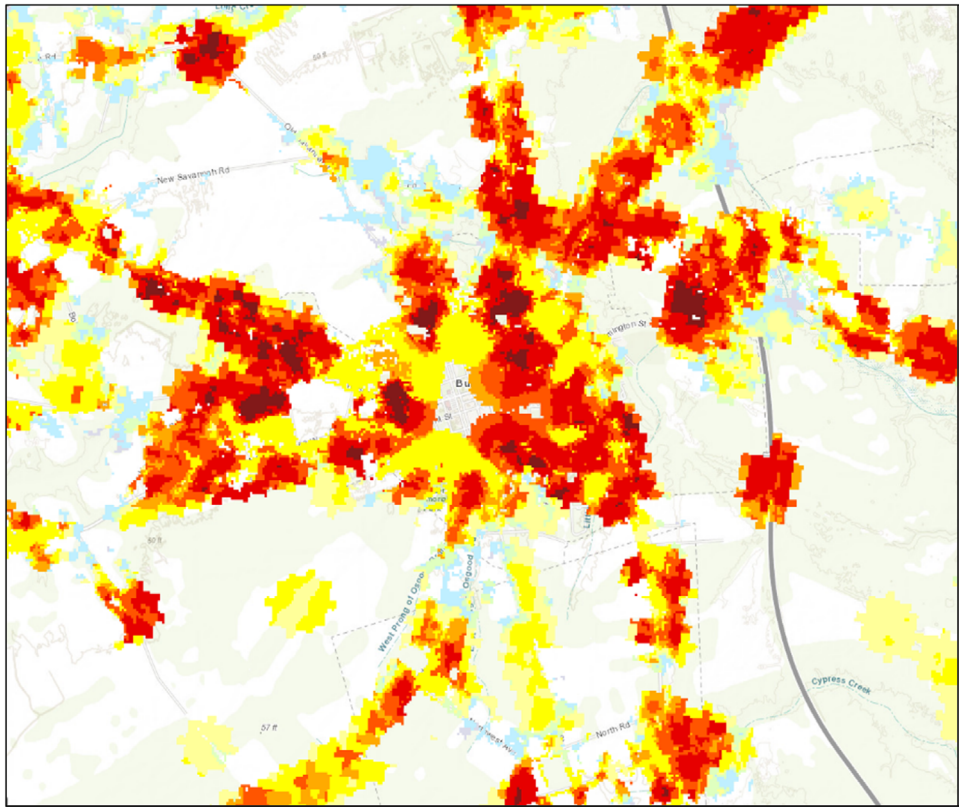
Drought is a normal occurrence throughout a climatic region and is a consequence of the reduction in precipitation over an extended period of time, generally a season or more in length.[19] Droughts are a slow-onset hazard that can be exacerbated by high temperatures, high winds, and low humidity – over time, drought can damage agriculture, water supply, recreational uses, and wildlife. In Southeastern North Carolina, the most intense period of drought occurred in December 2007. During this period, Pender County was declared a disaster area due to losses of important crops like corn, soybeans, and hay and pasture.

The FEMA National Risk Index (NRI) classifies the three census tracts within Burgaw as having Relatively Low to Relatively Moderate risk of drought, however future drought occurrences are still likely. By mid-century under the higher emissions scenario, Burgaw is likely to experience 182 days per year with no precipitation, and a maximum of up to 13 consecutive dry days.[20]

13 Extreme Heat – Ready.gov
14 Burgaw Heat Risk – Risk Factor
15 FEMA NRI – Heat Wave
16 Climate Mapping for Resilience and Adaptation – Extreme Heat (Mid Century, Higher Emissions)
17 NOAA National Weather Service – During a Heat Wave
18 Southeast North Carolina Regional Hazard Mitigation Plan (2021), 2:15
19 Southeast North Carolina Regional Hazard Mitigation Plan (2021), 5:6
20 Climate Mapping for Resilience and Adaptation – Drought (Mid Century, Higher Emissions)

Wildfire

Figure 9. FEMA NRI - Wildfire A



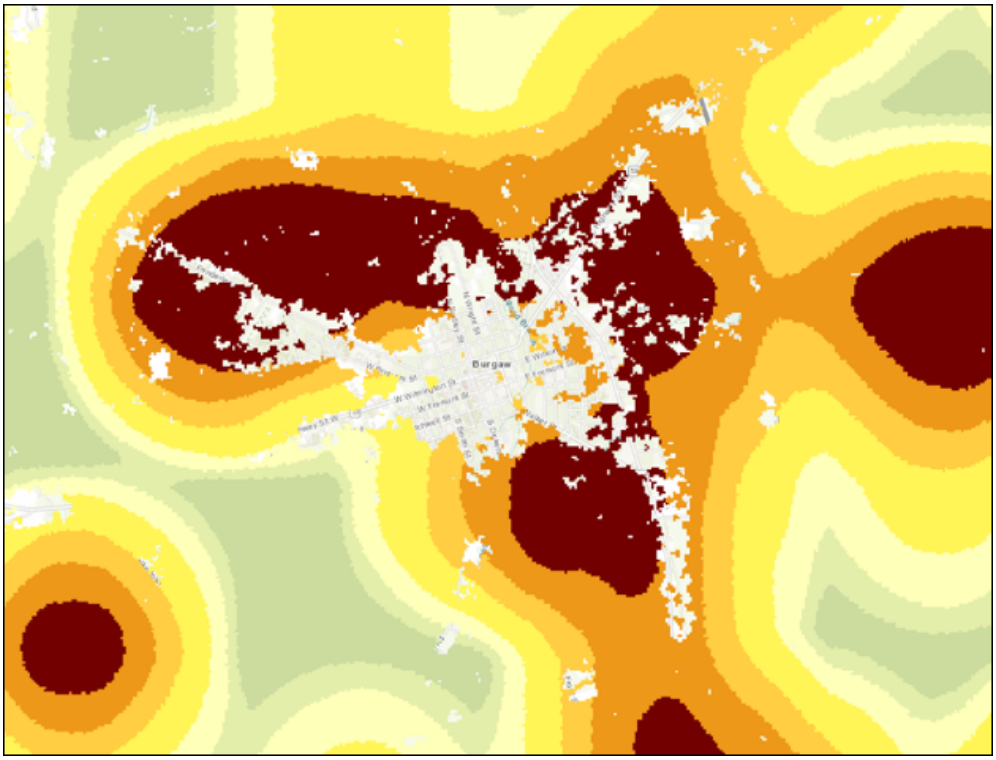
The Wildland Urban Interface (WUI) Risk Index is a rating of the potential impact of a wildfire on people and their homes. Darker red indicates major impacts with yellow indicates moderate impacts. (SGSF Wildfire Risk Assessment Portal)

A wildfire is generally any outdoor fire (i.e., forest, grassland, brushland) that is not under control, supervised, or managed under a prescribed burn.[21] Wildfires are often a useful forest ecosystem management option, however negligent human behavior is responsible for more than 98% of wildfires in North Carolina. Dependent on local weather conditions, outdoor activities like campfires, construction, and other natural hazards are likely to produce fuel and may increase the probability winds may increase the risk of fire spreading. Individual homes, cabins, recreational areas, and industries are located within high wildfire hazard areas and an increasing demand for outdoor recreation may put people who are unprepared in areas where wildfires are more likely to occur.

21 Southeastern North Carolina Regional Hazard Mitigation Plan (2021), 5:66

From 2001 to 2018, there have been 4 wildfire incidents recorded for Burgaw with a total of 31 acres burned.[22] The FEMA National Risk Index (NRI) classifies the three census tracts within Burgaw as having Relatively Moderate to Relatively High risk of wildfire.[23] Risk Factor indicates the Town has an overall moderate risk of wildfire and there are approximately 1,802 properties in Burgaw that have some risk of being affected by wildfire over the next 30 years.[24] It is likely that wildfire events will occur in the future, and the frequency may increase during drought and abnormally dry conditions.

Figure 10. FEMA NRI - Wildfire B



The Wildfire Ignition Density is the likelihood of a wildfire igniting in an area. Occurrence is derived by modeling historic wildfire ignition locations to create an average ignition rate map. Darker red represents the Very High average ignition rate class, while green represents the Very Low average ignition rate class. (SGSF Wildfire Risk Assessment Portal)

22 Southeast North Carolina Regional Hazard Mitigation Plan (2021), 5:74
23 FEMA NRI - Wildfire
24 Burgaw Fire Risk – Risk Factor

Vulnerability

Critical Built Assets

Critical built assets were assigned a vulnerability score for Exposure, Sensitivity, and Adaptive Capacity to calculate the Overall Vulnerability of an asset. This is a simple additive model (**Exposure + Sensitivity – Adaptive Capacity = Overall Vulnerability**) combining the scores into a single Overall Vulnerability score.

Exposure

Critical built assets were scored 0-3 for exposure to the 100-year and 500-year flood zone and validated flood extents from Hurricane Matthew and Hurricane Florence. A score of 3 represents the highest level of exposure to flooding, while a score of 0 represents the lowest level of exposure to flooding.

Sensitivity

A sensitivity score evaluated the degree to which an asset is potentially affected when exposed to a hazard. The Project Team determined scoring (1-3) based on the categories of asset types and their criticality to remain functioning before, during, and after a hazard to serve the community. A score of 3 represents the most sensitive types of assets that are most critical to remain functioning to serve the community, while a score of 1 represents lesser sensitive types of assets that are still critical to the community but less so to remain functioning for health and safety during a hazard.

Adaptive Capacity

The ability of an asset to adjust to potential impact is based on differences in location, structure design, and cost to repair. Adaptive capacity scores an asset 1-3 based on the ability of that asset to adjust to the impacts from a hazard with little disruption or cost. The Project Team also considered structural integrity of the critical built assets when assigning a score for adaptive capacity. A score of 3 represents the greatest level of adaptive capacity, meaning an asset may already have components that increase its resilience to hazards, while a score of 1 represents a lesser level of adaptive capacity, meaning the asset will likely need modification to make it more resilient.

Vulnerability Matrix

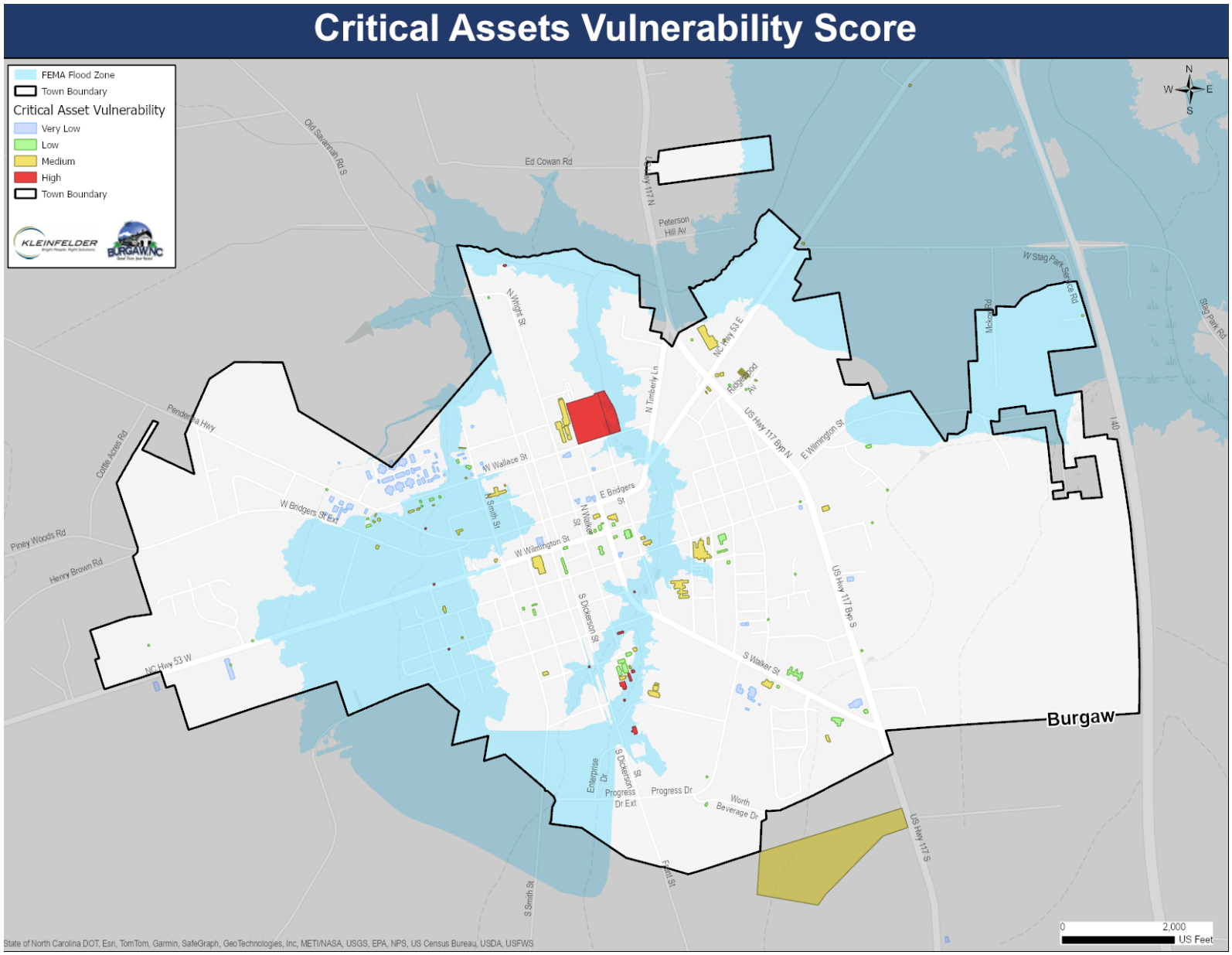
The Vulnerability Matrix (**Table 6**) details how built assets were assigned a score. Each building on a given parcel was scored independently to determine a more accurate vulnerability to flooding. Using the Vulnerability Equation (Exposure + Sensitivity – Adaptive Capacity), each critical built asset in Burgaw received a score ranging from -2 (Very Low) to 4 (High) for Overall Vulnerability.

Table 6. Vulnerability Matrix

Year	Exposure + (Flood)	Sensitivity + (Asset Type)	Adaptive Capacity - (Adjust to Impact)	Overall Vulnerability
3	100-year and 500-year flood zone	• Health Service • Provision • Public Safety • Emergency Shelter	Adjust to impacts with little disruption or cost (greatest structural integrity)	3-4 (High)
2	Outside FEMA 100-year and 500-year flood zone; within Hurricane Matthew and/or Hurricane Florence flood extent	• Community Government Service Office • Lift Station • Water/Sewer • Generator • Mobile Home Park • Transportation	Adjust to impacts with some disruption or cost (moderate structural integrity)	1-2 (Medium)
1	500-year flood zone	• Place of Worship • Historic/Cultural • Day Care • Economic	Adjust to impacts with greatest disruption or cost (least structural integrity)	0 (Low)
0	No FEMA flood zone or Hurricane flood extent			<0 (Very Low)

Figure 11 displays the Overall Vulnerability score for all built assets identified as critical to the Town overlaid with the FEMA 100-year and 500-year flood zones.

Figure 11. Critical Built Asset Overall Vulnerability Score



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Full Critical Asset List in the **Appendix** describes all critical built assets, locations, hazard exposure, and their given vulnerability scores.

The assets scoring High Overall Vulnerability are described in **Table 7**.

Table 7. High Vulnerability Critical Built Assets

Asset Name	Location	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
DaVita SEDC Burgaw Dialysis Center	704 S. Dickerson St.	3	3	2	4 (High)
Burgaw Wastewater Treatment Plant/Pump Station #17	300 E. Wallace St.	3	2	1	4 (High)
Burgaw Middle School	604 S. Dickerson St.	3	3	3	3 (High)
Little Town Learning Center	402 S. Wright St.	3	1	1	3 (High)
Town of Burgaw Cemetery	E. Wallace St.	3	1	1	3 (High)
Dudley St (Pump Station)	500 S. Dudley St.	3	2	2	3 (High)
NC Hwy 53 (Pump Station)	708 W. Wilmington St.	3	2	2	3 (High)
Lewis Sausage (Pump Station)	Old Savannah Rd.	3	2	2	3 (High)
Lift Station #12 (Pump Station)	W. Satchwell St.	3	2	2	3 (High)
Burgaw Middle School (Pump Station)	604 S. Dickerson Rd.	3	2	2	3 (High)
Mike Vick (Pump Station)	S. Walker St.	3	2	2	3 (High)
W. Bridges-Penderlea (Pump Station)	600 W. Bridges St	3	2	2	3 (High)

The Town of Burgaw's Public Works Director (also a CAT member) provided comments regarding flood history impacts to water infrastructure located in the FEMA Special Flood Hazard Area (SFHA) or that is of concern.

- The Burgaw Wastewater Treatment Plant is no longer used, as the Town pumps wastewater to Wallace for treatment. It can be used for backup storage, if necessary. Flooding impacted the wastewater treatment plant during Hurricane Florence to a height where the gate could only be opened by standing on the rear bumper of a pickup truck.
- The W. Bridges St-Penderlea pump station, Dudley Street pump station, Stag Park chloride station, and Penderlea Bus Station all experienced flooding during Hurricane Florence. It was noted during a CAT meeting that the W. Bridges/Penderlea Lift Station #2 is collapsing. Water was over waist deep at Dudley

Street and at least 3 feet over the wet well at Stag Park. The Penderlea bus station is impacted when the ditch next to it floods.

- It was noted during a CAT meeting that the Town has funding to elevate the Dudley Street pump station outside of the flood zone.
- The Browns- E. Fremont pump station was elevated 3 feet by risers around 2014. Currently, water stands around the station during heavy rain events but drains when the rain subsides and does not get into the lift station.
- It was noted during a CAT meeting that the Burgaw Middle School pump station has been elevated and has not been known to flood.

Natural Assets

To understand the vulnerability of natural assets within Burgaw, the Project Team analyzed the percentage of the asset parcel that intersected the FEMA 100-year or 500-year flood zone. Existing natural assets in Burgaw include open space, wetlands, parks, floodplain buyout properties, and greenways. Evaluating the vulnerability of natural ecosystems requires complex models that consider multiple factors which affect an ecosystem's ability to adapt to changing conditions. This assessment aims to evaluate the vulnerability of natural infrastructure by estimating the percentage of land that may be exposed to flooding. **Figure 12** details the percentage of each natural asset exposed to the 100-year or 500-year flood zone and **Table 8** describes the name of the asset and its relative location (property address).

This information is useful to understand potential locations to site stormwater best management practices, such as rain gardens, enhanced wetlands, or other natural features that can mitigate the effects of precipitation and flooding. Green spaces and natural infrastructure provide ecosystem services and can provide valuable opportunities for resiliency strategies to mitigate risk.

Figure 12. Natural Asset Flood Vulnerability

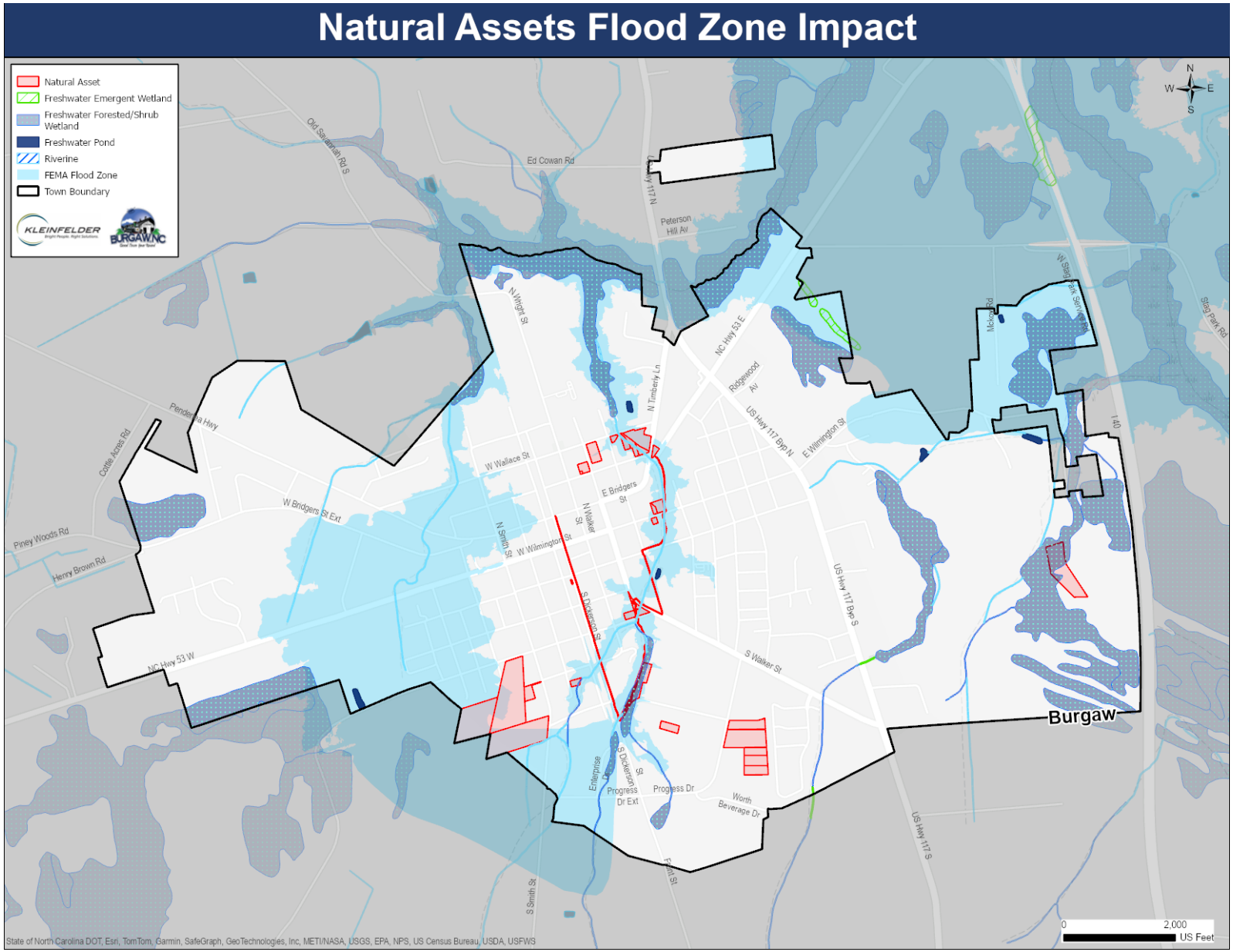

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Table 8. Natural Asset Flood Zone Impact

Asset Name	Property Address	Flood Zone	Flood Zone Percent Coverage
Town of Burgaw Open Space	106 E. Hayes St.	100-year	100%
Pender County Open Space	148 Peterson Hill Ave.	100-year	100%
Pecan Park	309 E. Wilmington St.	100-year	100%
Town of Burgaw Open Space	506 S. Mcrae St.	100-year	100%
Hankins Park	E. Wallace St.	100-year	100%
Pender County Open Space	NC Highway 53	100-year	100%
NC Hazard Mitigation – Buyout Property	E. Wilmington St.	100-year	97%
Pender Memorial Park	601 S. Smith St.	100-year	81%
Pender County Open Space	S. Vann St.	100-year	95%
Osgood Canal Greenway	Townwide	100-year	87%

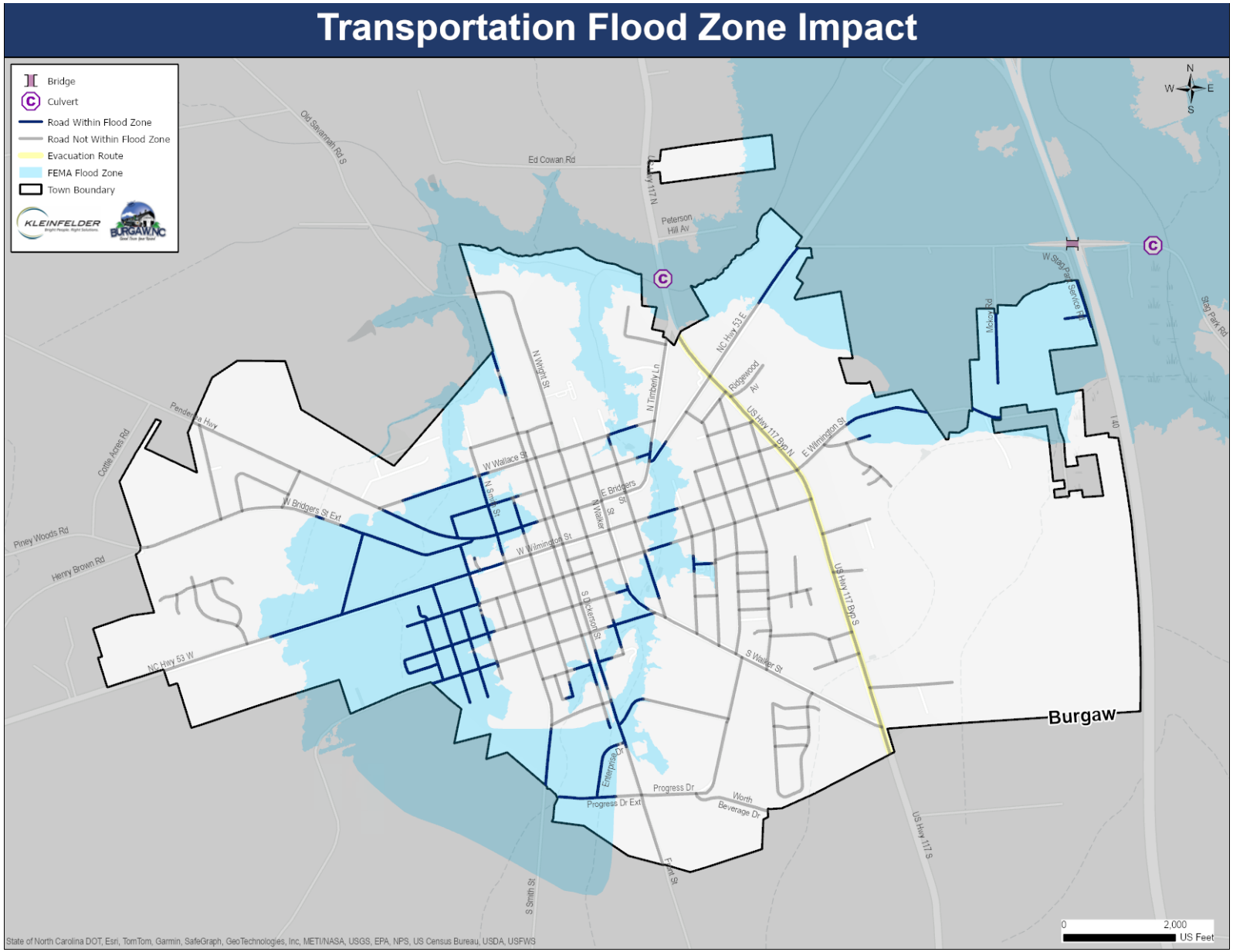
Evacuation Route & Roadway Vulnerability

Burgaw has experience with roadway flooding that has impacted transportation mobility. During and after Hurricane Florence, Interstate 40 (I-40) and NC Highway 53 were inundated and impassible for multiple days, causing Burgaw to be islanded and cut off from receiving timely supplies. US Highway 117 is a designated evacuation route that runs north-south on the eastern side of Burgaw. People evacuating from coastal areas inland, in addition to Burgaw residents leaving town, would likely utilize this route in addition to I-40. To understand areas of potentially vulnerable roadway, the Project Team analyzed the intersection of the FEMA 100-year and 500-year flood zone and roads within Burgaw. **Figure 13** distinguishes roads within the flood zone in blue and the evacuation route (US Highway 117) in yellow.

Specific routes in and around Burgaw that are in the floodplain include US Highway 117 Business (also locally referred to as S. Walker St.) between E. Satchwell St. and E. Hayes St., as well as NC Highway 53 at the split with US Highway 117 Business/E. Bridges St. Other notable roadway flood impacts are located west of N. Dudley St. and along NC Highway 53 W./W. Wilmington St. North Carolina Department of Transportation (NCDOT) is actively working on projects to increase transportation resiliency in the region, such as ongoing work on I-40 (due to its classification as an evacuation route) and assisting Pender County with NC Highway

210 hurricane evacuation route resiliency. The NCDOT Climate Strategy Report (2023) highlights resilience projects that NCDOT is working on that implement strategies identified in the North Carolina Climate Risk Assessment and Resilience Plan (2020). A statewide Resilience Improvement Plan (RIP) is also undergoing development to identify areas of concern due to exposure to natural threats and to develop a criticality map to identify the criticality of the state's highway network. NCDOT also owns a majority of the roads and canals/ ditches that border those sections in Burgaw, meaning Burgaw does not have direct control to address issues arising on these sections. However, NCDOT actively seeks to collaborate with towns and their respective NCDOT divisions to identify projects to include on the State Transportation Improvement Plan (STIP), which prioritizes projects for allocation of state funding.

Figure 13. Transportation System Flood Vulnerability



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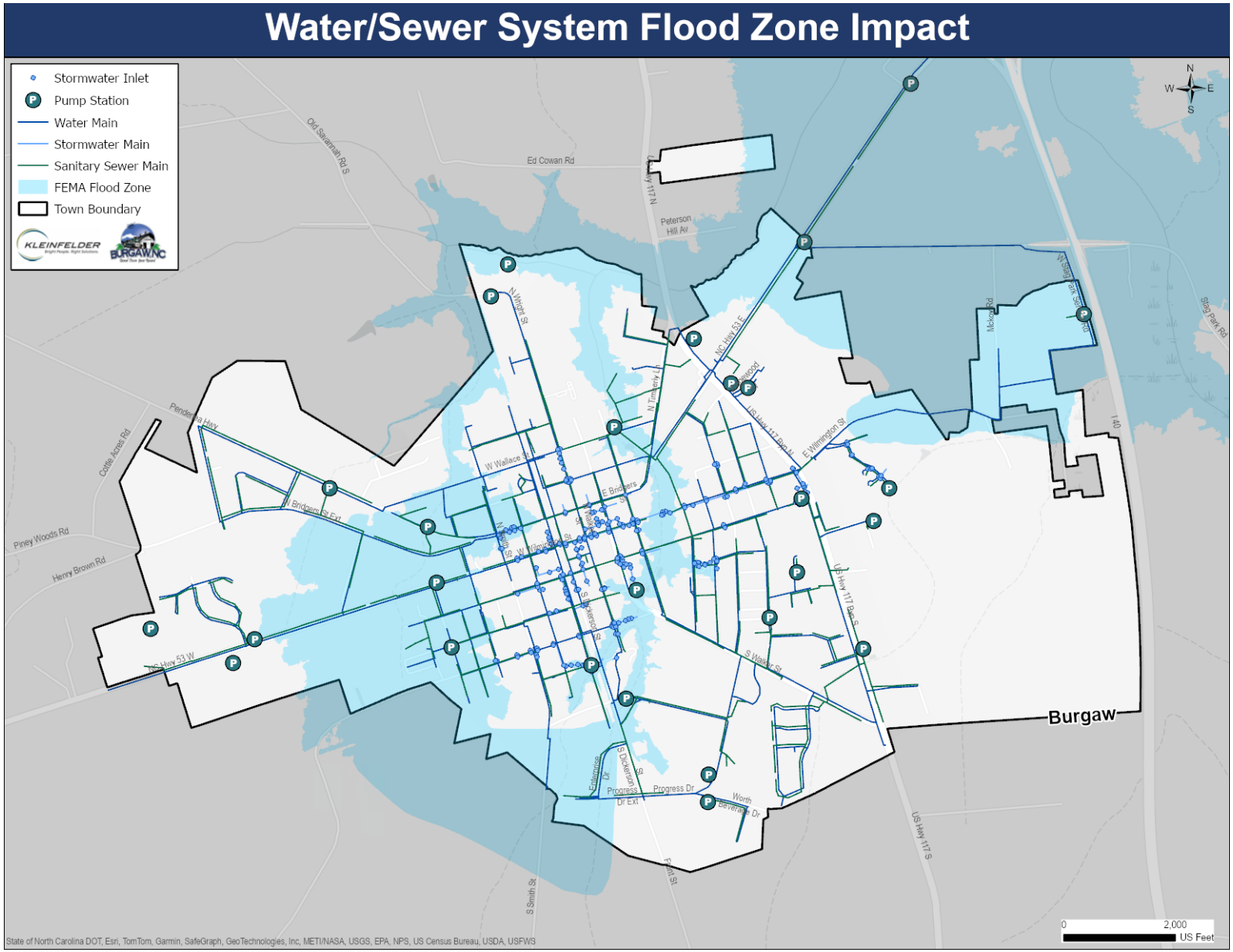
Water and Sewer System Vulnerability

The water, stormwater, and sewer system can be particularly vulnerable to hazards like flooding. Burgaw completed a stormwater master plan in 2015 with the goals of determining the existing capacity of culverts within known flooding areas and identifying improvement projects for water infrastructure in town. The Plan identified seven known existing flooding areas throughout Burgaw, and since the completion of the plan and following Hurricane Matthew and Florence, some of the areas of concern have been addressed.

Wastewater for Burgaw is pumped north to the Town of Wallace. The former Burgaw Wastewater Treatment Plant, however, remains adjacent to the Osgood Canal. Stormwater inlets and pump stations are at or above ground infrastructure potentially susceptible to floodwaters. Pump stations and wastewater treatment plants were included as critical built infrastructure and given a vulnerability score. Most pump stations have been elevated as of this assessment, according to the Town. **Figure 14** describes the water and sewer system in relation to the FEMA 100-year and 500-year flood zone.

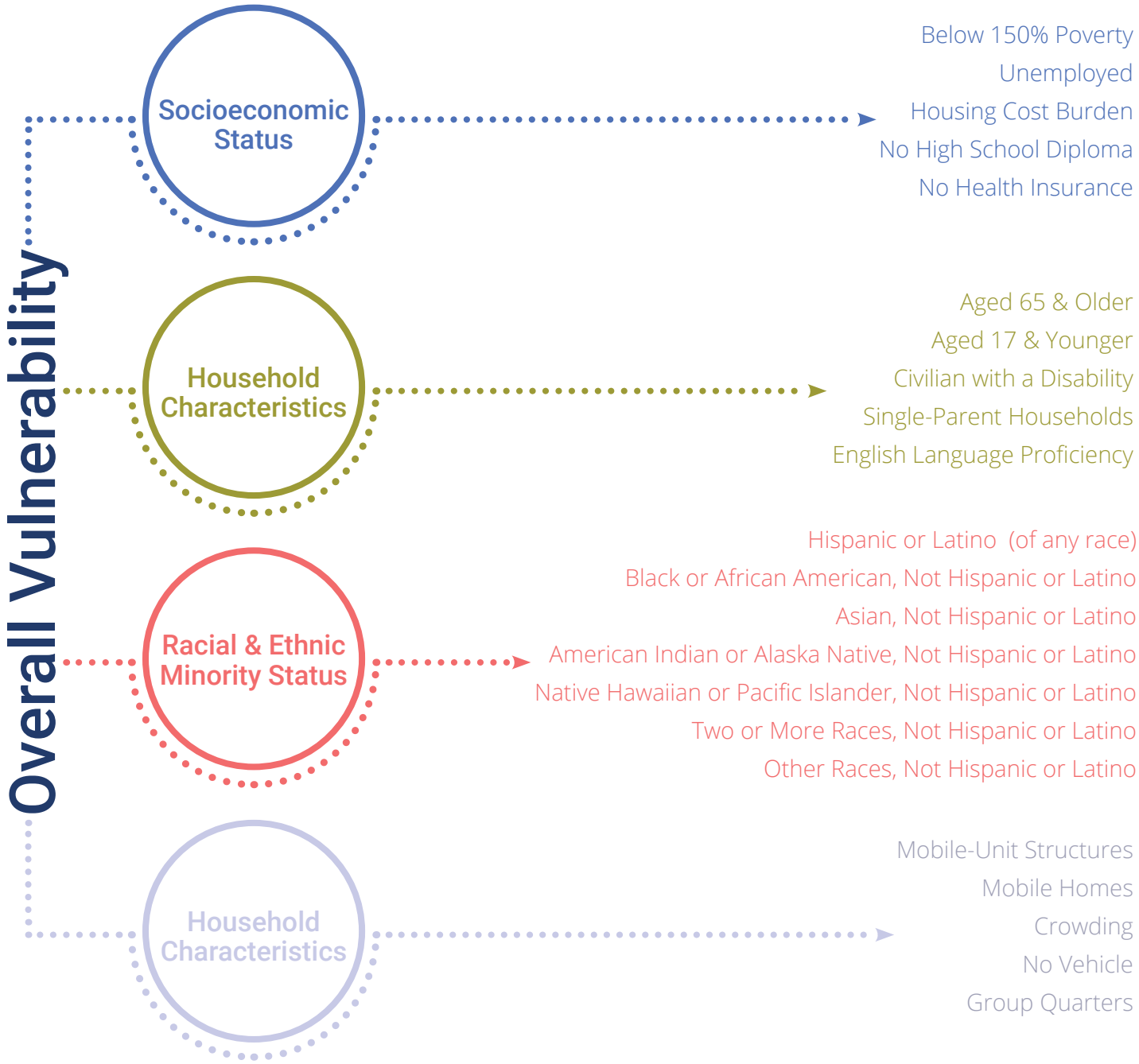
Figure 14. Water & Sewer System Flood Vulnerability



Social Vulnerability

Socially vulnerable people are often those who can be impacted "first and worst" by climate hazards given a variety of social factors. The degree to which a community exhibits certain social conditions may affect that community's ability to prevent human suffering and financial loss in the event of a disaster.[25] The Center for Disease Control and Prevention (CDC)/Agency for Toxic Substances and Disease Registry Social Vulnerability Index (SVI) uses U.S. Census data to determine the social vulnerability of census tracts based on 16 social factors, grouped into four themes:

Figure 15. CDC Social Vulnerability



25 CDC/ATSDR Social Vulnerability Index (2020)

Figure 16 below depicts the overall social vulnerability score, using data downloaded from the CDC/ATSDR SVI tool, for the three census tracts within Burgaw: tract 37141920403, tract 37141920402, and tract 371419204031. Darker red indicates high overall social vulnerability, which applies to tracts 37141920403 and 371419204031.

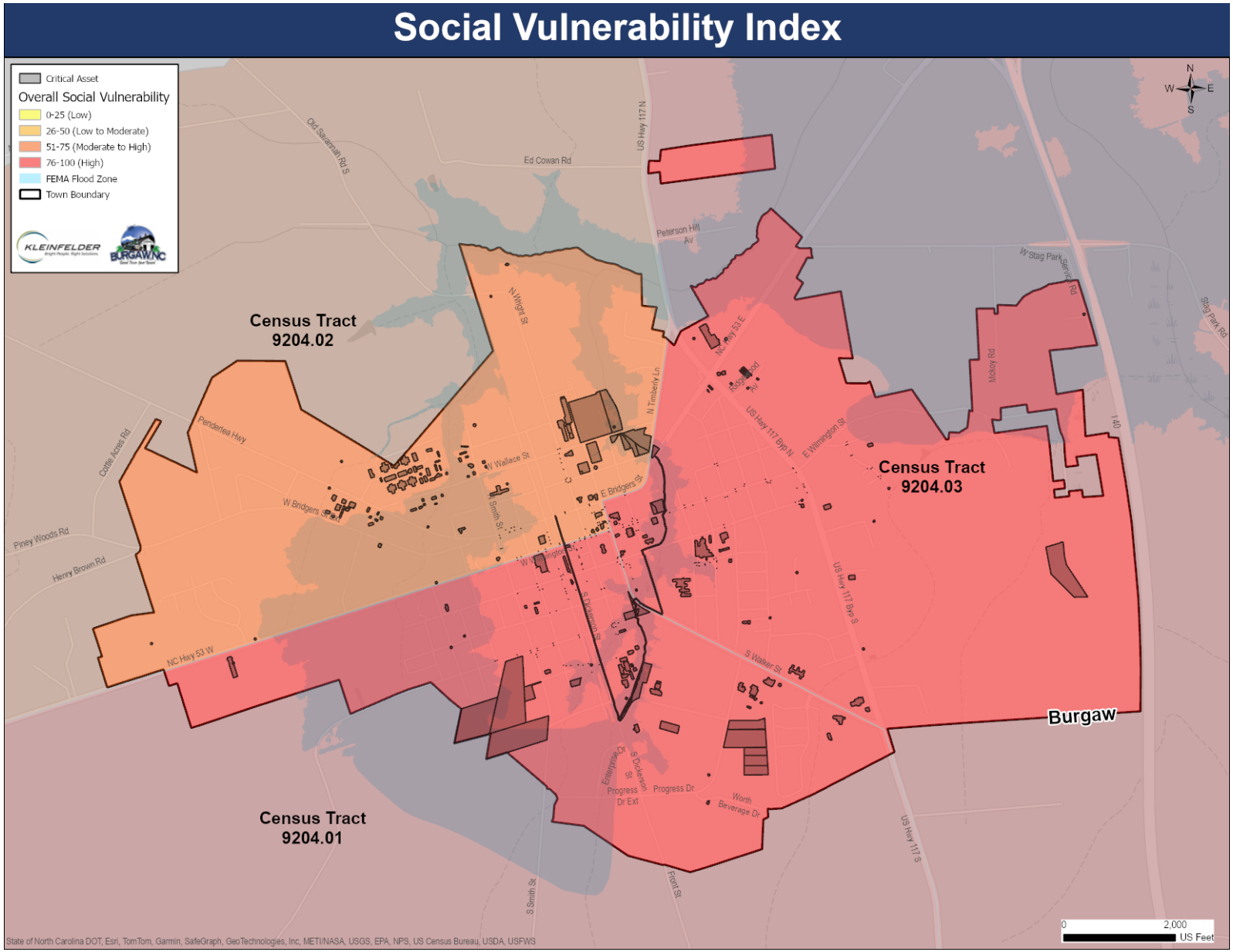
The 2022 American Community Survey 5-year estimates Burgaw's total population at 3,207, up from 3,116 in 2021 but still less than the 2010 estimate of 3,831.[26] **Table 9** details Census data often used to determine social vulnerability.

Table 9. Demographic Information for Burgaw, NC

Indicator	Estimate	Percent (of total population)
Total Population (2022)	3,207	-
Below age 17	516	18%
Above age 65	671	21%
Speak language other than English	200	7%
With a disability	700	27%
Below poverty level (past 12 months)	550	21%

26 US Census Bureau (2024)

Figure 16. Social Vulnerability Index Score



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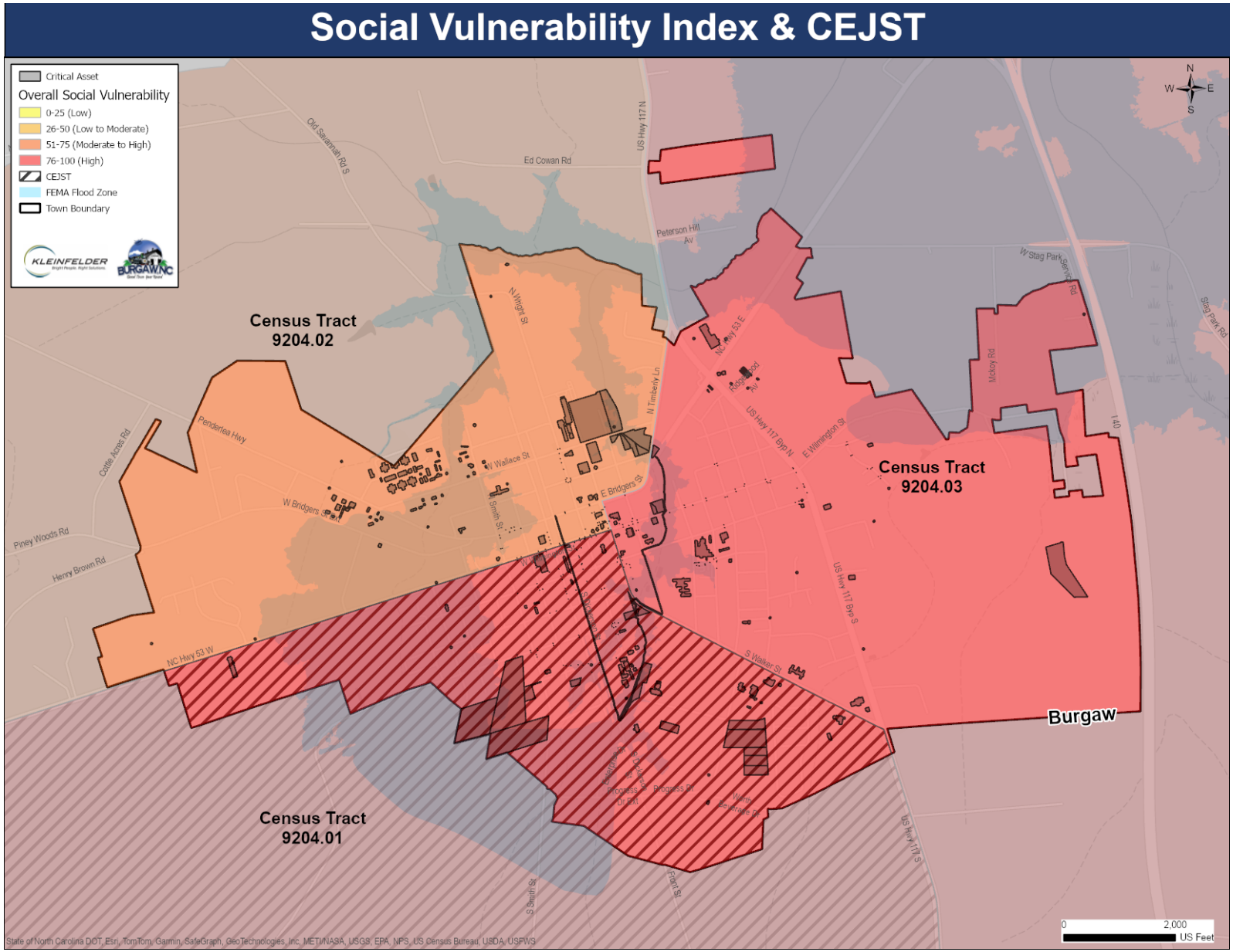
An additional social vulnerability tool created by the U.S. Council on Environmental Quality is the Climate and Economic Justice Screening Tool (CEJST). This tool supports the Justice40 Initiative, a Federal government goal of ensuring 40% of the overall benefits of certain Federal climate, clean energy, affordable and sustainable housing, and other investments flow to disadvantaged communities that are marginalized by underinvestment and overburdened by pollution.[27] The CEJST highlights disadvantaged census tracts using datasets as indicators of burdens. A community is considered disadvantaged if a census tract is 1) at or above the threshold for one or more environmental, climate, or other burdens, and 2) at or above the threshold for an associated socioeconomic burden. In addition, a census tract that is completely surrounded by disadvantaged communities and is at or above the 50% percentile for low income is also considered disadvantaged.[28] Categories of burdens include:

1. Climate Change
2. Energy
3. Health
4. Housing
5. Legacy Pollution
6. Transportation
7. Water and Wastewater
8. Workforce Development

CEJST is an indicator tool that municipalities may use in grant applications to demonstrate they are overburdened and underserved. **Figure 17** depicts the overall social vulnerability score (CDC/ATSDR SVI) and disadvantaged census tracts (CEJST) within Burgaw. Census tract 37141720401, which includes the areas southwest of Burgaw from NC Highway 53 W and US Highway 117 Business/S. Walker St., is a tract identified as disadvantaged (by CEJST) and highly vulnerable (by CDC/ATSDR SVI tool). Critical assets located in this tract identified as disadvantaged and highly vulnerable include Pender Adult Services, Burgaw Middle School, DaVita SEDC Burgaw Dialysis Center, Cape Fear Community College (Burgaw), Little Town Learning Center, and Pender County Courthouse, among others.

27 Justice40 Initiative (2022)
28 Climate and Economic Justice Screening Tool (2024)

Figure 17. Overall Social Vulnerability and Disadvantaged Census Tracts



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Risk

Understanding the financial loss communities experience when hazards occur is critical in determining what level(s) of risk call for immediate action. Risk is defined as the overall potential for negative consequences. The Southeastern North Carolina Hazard Mitigation Plan (2021) provides approximate numbers of parcels and the value of buildings exposed to 100-year and 500-year flood zones (**Table 10**).

Table 10. Estimated Exposure of Parcels to the Flooding Hazard

100 Year (1% Annual Chance) Flood Zone				500 Year (0.2% Annual Chance) Flood Zone		
Location	Approx. Number of Parcels	Approx. Number of Improved Buildings	Approx. Improved Value of Buildings	Approx. Improved Value of Buildings	Approx. Number of Improved Buildings	Approx. Improved Value of Buildings
Burgaw	396	209	$56,724,795	572	323	$93,582,823

(Southeastern NC Hazard Mitigation Plan, 2021)

This assessment has also identified critical built assets that are exposed to the 100-year or 500-year flood zone and the associated building value and building replacement value (**Table 11**). Building and replacement values were derived from North Carolina Building Footprints data set published by North Carolina Emergency Management for the Floodplain Mapping Program.

Table 11. Building Value and Replacement Value for Critical Built Assets Exposed to Flooding Hazard (NCEM, 2021)

Asset Type	Asset Name	Property Address	Flood Zone	Total Building Value	Total Building Replacement Value
Community Government Service Office	Board of Education	925 Penderlea Highway, Burgaw NC 28425	100-Year	$309,973	$4,092,235.26
Community Government Service Office	NC Department of Transportation	513 W. Wallace St., Burgaw NC 28425	100-Year	$358,347.19	$1,112,249.46
Community Government Service Office	Pender County - NC Department of Transportation	402 N. Smith St., Burgaw NC 28425	100-Year	$483,155.30	$757,641.34
Community Government Service Office	Tax Office/ Register of Deeds	300 E. Fremont St., Burgaw NC 28425	100-Year	$453,853	$841,310.40

Asset Type	Asset Name	Property Address	Flood Zone	Total Building Value	Total Building Replacement Value
Community Government Service Office	Heritage House	108 S. Cowan St., Burgaw NC 28425	100-Year	$84,664	$177,704.04
Day Care	Children of World	700 W. Satchwell St., Burgaw NC 28425	100-Year	$118,715	$122,760.16
Health Service	DaVita SEDC Burgaw Dialysis Center	704 South Dickerson St., Burgaw NC 28425	100-Year	$668,182	$957,171.60
Place of Worship	Burgaw Seventh-Day Adventist Church	715 W. Bridges St, Burgaw NC 28425	100-Year	$207,055	$298,139.40
Place of Worship	St. John United Holy Church	706 W. Fremont St., Burgaw NC 28425	100-Year	$215,825	$452,445.24
Place of Worship	Gateway Community Church	416 W. Bridges St., Burgaw NC 28425	100-Year	$302,722	$539,963.58
Place of Worship	Kingdom Connection Church Ministries	1104 Club Way, Burgaw NC 28425	100-Year	$546,211	$546,211

The FEMA National Risk Index (NRI) provides information at the census tract level for Expected Annual Loss (EAL), which represents the average economic loss in dollars resulting from natural hazards each year.[29] This value is calculated through a multiplicative equation that includes exposure to a natural hazard, the annualized frequency of the hazard, and the historic loss ratio of a hazard (FEMA NRI, 2024).

Burgaw town limits span three census tracts; however, **Table 12** describes the Expected Annual Loss for relevant potential hazards across the area.

Table 12. Expected Annual Loss Estimates by Hazard

Census Tract	Riverine Flooding	Hurricane	Wildfire	Tornado	Strong Wind	Heat Wave	Drought
37141920403 (East)	$59,546	$3,696,491	$146,846	$167,832	$40,796	$30,371	$15,574
37141920401 (South)	$47,794	$2,699,748	$131,768	$128,444	$32,561	$27,564	$10,768
37141920402 (North)	$18,473	$2,271,906	$23,592	$118,352	$28,274	$20,666	$9,136

Risk and Vulnerability Assessment Conclusions

Key Findings

- Critical assets exposed to flooding in Burgaw include pump stations, a dialysis healthcare facility, the Little Town Learning Center daycare, and portions of the Burgaw Middle School. It has been noted by Town officials that most of the pump stations have had mitigation actions taken to reduce the risk of flooding.
- Approximately 396 parcels are located in the 100-year flood zone with a total improved value of $56 million, which are at a greater risk of flooding and damage.
- Portions of roadways on the east and west side of town are currently within the FEMA 100-year and 500-year flood zones, and flood events are likely to restrict access into and out of Town.
- As development increases, stormwater will need to be comprehensively managed to ensure there is no further risk to critical built and natural assets and neighborhoods within Town.
- Extreme heat events and heat waves are likely to increase over the next decades and vulnerable populations such as older adults, children, and people with medical conditions will likely be at greater risk of negative impacts.
- Socially vulnerable populations are concentrated in the southern and western areas of town, parts of which are prone to flooding during storm events and where medical facilities are located.

Implications

The final vulnerability scores serve as guidance to developing the Project Portfolio, where Burgaw identified solutions to challenges highlighted through the Assessment, in previous planning documents, and through discussions with the CAT and community. By applying a vulnerability score for critical assets, the Town can better understand where to direct efforts first as capacity and funding allows.

29 FEMA Expected Annual Loss (2024)

Considerations for Future Assessments

This assessment may serve as a starting point for future analyses and research efforts. Key areas to consider in future work include:

- Hazard Projections – consider how future projections for climate hazards such as extreme heat, precipitation, and drought can be integrated into the vulnerability and risk equation.
- Natural Infrastructure – incorporate ecosystem modeling to understand the impact of hazards to ecosystem services such as diminishing water quality, damaging forests, and impacting agricultural yield.
- Building Characteristics – specific building characteristics such as base floor elevation (BFE), construction year, foundation type, and other site-specific information can be incorporated into the Vulnerability Assessment to supplement adaptive capacity determinations.
- Rainfall Analysis – conduct H&H modeling of precipitation-driven flooding that considers varying intensities, durations, and return frequencies to understand localized future exposure to critical infrastructure.

PROJECT PORTFOLIO

Project Portfolio

Utilizing feedback from the CAT, existing planning documents, and results of the Risk and Vulnerability Assessment, a long list of potential solutions to address hazards was developed over the course of the RCCP. This project list was then refined through iterative working sessions with the CAT and a prioritization methodology was applied to determine the final five highest priority projects to include in the Project Portfolio.

Projects identified offer structural and non-structural hazard mitigation techniques that have co-benefits beyond resiliency. Project prioritization was done first by the CAT, where the group was asked to rank their preferences for projects under four categories of solutions: infrastructure, nature-based, policy-based, and outreach/education. Following this meeting, Kleinfelder applied components of the STAPLEE method to top ranking projects, taking into account attributes of cost-benefit, internal capacity, RCCP goal alignment, and identification of a project sponsor/champion. Community members then contributed their feedback about preferred projects at the Pender County Spring Fest and through the online Public Survey #2.

Full Project List in the **Appendix** details the projects that were identified throughout the process but were not selected for inclusion.

Each Project Profile provides information intended to support development of applications for funding opportunities. **Table 13: Proposed Project Summary** highlights the top five priority projects included in the Portfolio.

Table 13. Proposed Project Summary

Project	Description	Estimated Cost	Needs Addressed	Source
Burgaw Hydrologic & Hydraulic (H&H) Study	Conduct an H&H study to identify areas within the town limits vulnerable to flooding and develop strategies for flood mitigation (e.g., increase culvert capacity, improve drainage system, etc.).	$60,000 - $90,000	Stormwater Management, Flooding	Community Action Team
Rain Garden Installation & Educational Demonstration	Identify a strategic location for a small-scale bioretention cell (i.e., "rain garden") to improve water quality, reduce peak runoff flows, and reduce runoff volumes from a small catchment area within Town. Provide conceptual recommendations for design of the rain garden. Conceptualize partnership(s) and program(s) to utilize the rain garden for educational demonstrations about green stormwater infrastructure.	$25,000 - $50,000	Stormwater Management, Flooding, Education	Community Action Team
Enhance Community Resilience through Ordinances and Regulations for Stormwater and Flood Damage Prevention	**Part A:** Develop a set of regulations and local, community-centric solutions to manage stormwater runoff that exceeds minimum State requirements, where possible. To address Town goals for stormwater and flood management, ordinance development should explore provisions for public outreach, integration of green infrastructure and nature-based approaches, and other strategies to advance climate resiliency. **Part B:** Review the current Flood Damage Prevention Ordinances for improved control of flooding hazards and drainage improvements. Revisions should meet or exceed National Flood Insurance Program (NFIP) Minimum Requirements for Safer Development in Flood Prone Areas and include riparian buffer language.	$30,000 - $50,000	Stormwater Management, Education, Development	Community Action Team

Project	Description	Estimated Cost	Needs Addressed	Source
Osgood Canal Stream Restoration / Flood Mitigation Program	Survey the Osgood Canal and update the H&H model of the canal prepared for the 2015 Burgaw Stormwater Master Plan with any changes to crossings or overbank areas. Run the updated model using current and future projected extreme precipitation events. Based on survey of the canal and coordination with the Town of Burgaw, inventory locations where floodplain creation/channel widening is feasible. Develop a 15% design of a restored Osgood Canal based on a nearby reference reach and use the overall design as a basis for a Flood Mitigation Program to prioritize future projects. Stream restoration elements may include culvert and bridge replacement; reshaping and stabilizing eroded streambanks; establishing vegetative cover on critically eroding lands; repairing riparian buffers on any new and existing development; restore native riparian vegetation.	$100,000 - $200,000	Stormwater, Management Flooding, Erosion	Burgaw Comprehensive Plan 2030
Stormwater Education & Outreach Campaign	Collaborate with entities such as NC Sea Grant, NCSU Cooperative Extension, NC Coastal Federation, NC National Estuarine Research Reserve and NC Coastal Reserve, etc. to conduct a public education and outreach campaign regarding community floodplain management activities, flood insurance policies, disaster assistance in Special Flood Hazard Areas, and other site-scale ways to mitigate flooding. Outreach should also include information and resources for property owners related to ditch/ canal maintenance and options for native landscaping. This is also considered a Community Rating System activity. Consider engaging HOAs about stormwater best management practices within neighborhoods.	$35,000 - $45,000	Stormwater Management, Education	Community Action Team

Project A.

Burgaw Hydrologic and Hydraulic (H&H) Study

Project Description

Conduct an H&H study to identify areas within the town limits vulnerable to flooding and develop flood mitigation strategies (e.g., increase culvert capacity, improve drainage system, etc.) culminating in a final report with recommendations.

Location	Locations to focus on will include E. Hayes St/US 117, E Wilmington St Ext., S Dudley St, W. Bridges St Ext, the old golf course and S. Dickerson St.
Source	CAT
Scoping Questions	• Does the Town have an inventory of its existing drainage network (stormwater conveyance, culverts, etc.) and utility locations? • Does the Town have documentation of flooding in problem areas? • What is the goal for flood mitigation (relieve nuisance flooding, maintain access during 100-year storm, etc.)?
Hazard(s) Addressed by the Project	• Flooding / stormwater runoff • Severe weather and heavy rainfall
Supporting Function	• Study / Planning • Stormwater management • Address infrastructure issues
Type of Solution	• Study / Plan • Develop concept-level design recommendations
Project Estimated Timeline	1 year
Responsible Entity	Town Public Works with civil engineer consultant support
Potential Partners	• Local watershed/waterbody groups • Civil engineering consultant to assist with H&H model and mitigation concept development
Existing Funding	None identified by the CAT
Potential Funding Sources	• Resilient Coastal Communities Program • FEMA BRIC (Building Resilient Infrastructure & Communities) • FEMA FMA (Flood Mitigation Assistance) • USACE FPMS (Flood Plain Management Services) • US DOT RAISE (Rebuilding American Infrastructure with Sustainability and Equity) • USDA Rural Development Water & Environmental Programs

Project Estimated Cost	$60,000 - $90,000
Anticipated Benefit	Medium Primary benefits include flood mitigation recommendations to alleviate localized flooding and reduce risk. Conducting an H&H Study is a critical 'first step' action in obtaining additional funding for developing and implementing mitigation measures. Future flood mitigation measures would have the greatest benefit to surrounding areas.
Priority Rating	CAT: 2nd / 8th Public: 4.0/5.0 Overall: High

Project B.

Rain Garden Installation and Educational Demonstration

Project Description

Identify a strategic location for a small-scale bioretention cell (termed "rain garden") to improve water quality, reduce peak runoff flows, and reduce runoff volumes from a small catchment area within Town. Provide conceptual recommendations for design of the rain garden. Conceptualize partnerships and programs to utilize the rain garden for educational demonstrations about green stormwater infrastructure.

Location	To be determined through the project
Source	CAT / Town Staff
Scoping Questions	• Where will project be located? Is there a known problem area in town where a stormwater feature would be beneficial or would be highly visible? • Are there pollutant load reduction or runoff volume reduction targets? • Are public and/or private lands available for the installation? • Are base mapping, soil data, and utility records available for evaluation of possible installation location and conceptual design recommendations? • How large is the area to be reviewed?
Hazard(s) Addressed by the Project	• Flooding / stormwater runoff • Severe weather and heavy rainfall
Supporting Function	• Climate Resiliency • Water Quality and Water Quantity Improvements • Education/Public Outreach • Funding Opportunities
Type of Solution	*Nature-based Solution • Green Infrastructure • Stormwater Management Practice • Educational Programs
Project Estimated Timeline	12 months (or longer if there are multiple installations, partnerships, programs, etc.)
Responsible Entity	Town of Burgaw with engineering consultant

Potential Partners	• Public/private partnerships • NC Sea Grant • NC Coastal Federation • NCSU Cooperative Extension • Local watershed/waterbody organization
Existing Funding	None identified by the CAT
Project Estimated Cost	Cost for conceptual-level location, design, and program recommendations for one rain garden is approximately $25,000 - $50,000 depending on scale of area to be reviewed, available data, and coordination of possible program partners.
Anticipated Benefit	Medium A single rain garden installation will have the greatest impact on a localized drainage area. Multiple installations can be implemented for greater overall impact to watershed area. The demonstration program will educate community members and leaders about the benefits of green stormwater infrastructure, possibly leading to policy changes and greater programmatic impacts.
Priority Rating	CAT: 2nd / 4th Public: 3.2/5.0 Overall: High

Project C.

Enhancing Community Resiliency through Ordinances and Regulations for Stormwater and Flood Damage Prevention

Project Description

Part A: Develop a set of local regulations and community-centric solutions to manage stormwater runoff that exceeds minimum State requirements where possible. To address the Town's goals for stormwater and flood management, ordinance development should explore provisions for public outreach, integration of green infrastructure and nature-based approaches, and other strategies to advance climate resiliency practices.
Part B: Review current Flood Damage Prevention Ordinances for improved control of flooding hazards and drainage improvements. Revisions to ordinances should meet or exceed National Flood Insurance Program (NFIP) Minimum Requirements for Safer Development in Flood Prone Areas and include language about riparian buffers.

Location	Town-wide
Source	CAT / Town Staff
Scoping Questions	• What are examples of other communities that have similar ordinances/language? • Does the Town have capacity and motivation to manage incentives, inspections, and enforcement activities? • What is the local process for ordinance adoption? • Is there grassroots support for ordinance change and adoption?
Hazard(s) Addressed by the Project	• Flooding • Stormwater runoff • Severe weather and heavy rainfall
Supporting Function	• Public health and wellbeing • Public infrastructure • Personal property • Education and outreach: Enhances community knowledge and understanding of hazards and solutions
Type of Solution	• Policy / Ordinances • Incentives for low-impact stormwater control measure (SCM) • Educational efforts and resources

Project Estimated Timeline	1 year Approximate timeline: • 3-months: pre-development and research. Simultaneously build local stakeholder group and set first meeting. • 3-months: conduct local stakeholder meetings to develop draft ordinances • 3-months: engagement with local elected officials and community organizations for ordinance refinement and building support • 3-months: adoption of ordinance and incentives. Pair this activity with additional community outreach to understand the impacts of adopted measures.
Responsible Entity	Town administrator/manager, Planning Department, planning consultant
Potential Partners	• Local hazard mitigation officials • Floodplain administrators • Elected officials • Chamber of Commerce • Economic Development • Planning and Zoning staff/board members • Environmental groups • Realtors/Developers
Existing Funding	None identified by the CAT
Potential Funding Sources	Resilient Coastal Communities Program
Project Estimated Cost	$30,000 - $50,000
Anticipated Benefit	Medium Benefits include an education component for the community, enhanced community pride and ownership, a mechanism to reduce risk and guide new development, and reduce the impacts of new development on existing community infrastructure and resources.
Priority Rating	CAT: 1st / 10th Public: 3.0/5.0 Overall: High

Project D.

Osgood Canal Stream Restoration / Flood Mitigation Program

Project Description

Survey the Osgood Canal and update the H&H model of the canal prepared for the 2015 Burgaw Stormwater Master Plan with any changes to crossings or overbank areas. Run the updated model using current and future projected extreme precipitation events. Based on survey of the canal and coordination with the Town of Burgaw, inventory locations where floodplain creation/channel widening is feasible. Develop a 15% design of a restored Osgood Canal based on a nearby reference reach and use the overall design as a basis for a Flood Mitigation Program to prioritize future projects. Stream restoration elements may include culvert and bridge replacement; reshaping and stabilizing eroded streambanks; establishing vegetative cover on critically eroding lands; repairing riparian buffers on any new and existing development; restore native riparian vegetation.

Location	Osgood Canal from upstream of South Dickerson Street to behind Northwood Apartments.
Source	Stormwater Master Plan (2015)
Scoping Questions	• What is currently scoped under the planned Stormwater Master Plan update (2024)? • What has the Town already implemented from the Osgood Canal flood mitigation alternatives studied in the 2015 Burgaw Stormwater Master Plan? • Are there particular stream restoration options that the Town of Burgaw is interested (or not interested) in pursuing? For example, would the Town be open to floodplain creation on Town-owned land?
Hazard(s) Addressed by the Project	• Flooding • Erosion • Stormwater runoff • Severe weather and heavy rainfall
Supporting Function	• Transportation • Environmental enhancement and ecological benefits • Water quality • Health and safety

Type of Solution	*Nature-based Solution • Planning and initial design This effort would lead to future infrastructure improvements. Pieces of the design (e.g., culvert replacements, restorations of certain stretches of the canal) would be split out into separate projects to target grant applications.
Project Estimated Timeline	12-18 months
Responsible Entity	Town and/or County Planning Department with a consultant
Potential Partners	• Pender County • NCDOT (for any state-owned roads)
Existing Funding	None identified by the CAT
Potential Funding Sources	• Resilient Coastal Communities Program • FEMA HMA grants (Flood Mitigation Assistance, Hazard Mitigation Grant Program, Building Resilient Infrastructure and Communities) • EPA grants • DOT grants
Project Estimated Cost	• Planning and Design: $100,000 - $200,000 • Construction (a later phase): $10M - $15M
Anticipated Benefit	High The 2015 analysis showed five road crossings flooded by the Osgood Canal under the present-day 2-year storm
Priority Rating	CAT: 1st / 4th Public: 4.1/5.0 Overall: High

Project E.

Stormwater Outreach & Education Campaign

Project Description

Collaborate with partners such as NC Sea Grant, NCSU Cooperative Extension, and NC Coastal Federation, NC National Estuarine Research Reserve, and NC Coastal Reserve to develop and conduct a comprehensive outreach and education campaign regarding community floodplain management and stormwater management. The campaign would focus on 1) raising awareness about flood risks, 2) providing materials and tools to prepare for and recover from a flood event (i.e., developing a flood preparedness plan, information on flood insurance policies and disaster assistance in Special Flood Hazard Areas, etc.) and 3) sharing site-scale methods to mitigate flooding (i.e., ditch/canal maintenance, native landscaping).
During this process, the Town and partnering organizations will identify stakeholders (homeowners, renters, business, advocation groups) and deploy specific strategies for

Location	Town-wide and regional
Source	CAT
Scoping Questions	• Has any organization or Town conducted an outreach campaign on stormwater in the past? • What is an effective method for communication? • What are topics that residents are interested in specifically?
Hazard(s) Addressed by the Project	• Flooding • Hurricanes / tropical storms • Severe weather and heavy rainfall
Supporting Function	• Communication • Preparedness • Public Education
Type of Solution	Educational & outreach program
Project Estimated Timeline	12 months to capture seasonal messaging and educational components throughout the year.
Responsible Entity	Town of Burgaw with a consultant

Potential Partners	• NC Sea Grant • NC Coastal Federation • NCSU Cooperative Extension • NC National Estuarine Research Reserve • NC Coastal Reserve
Existing Funding	None identified by the CAT
Potential Funding Sources	Resilient Coastal Communities Program
Project Estimated Cost	$35,000 - $45,000
Anticipated Benefit	Medium-High Benefit A community that is well-informed about the risks of flooding and the tools available for mitigation and recovery is better suited to recover after a flooding event. Building community is a key part of resilience.
Priority Rating	CAT: 1st / 4th Public: 2.8/5.0 Overall: **Medium**

Conclusions

The Town of Burgaw has actively engaged in many previous planning efforts and continues to demonstrate that passion by participating in the 2023-2024 Resilient Coastal Communities Program. By understanding the exposure and future projections for climate hazards, in addition to identifying assets and areas that might be particularly vulnerable to its effects, Burgaw has a clear pathway forward to implement projects that will increase resiliency of the Town.

The strategic Project Portfolio will guide the Town in seeking funding sources and grant opportunities to move projects that meet community needs forward. Phases 3 and 4 of the RCCP provide funding opportunities for engineering, design, and construction – however many additional sources of funding are suitable for projects identified in the Portfolio.

The Risk and Vulnerability Assessment provides baseline information from reputable data sources about present natural hazard exposure and future projections, and it draws conclusions that are pertinent to the Town. The Assessment provides a foundation for developing the Project Portfolio, a list of actions that will address challenges the Town currently faces and may face in the future.

This complete Resilience Strategy for the Town of Burgaw is intended to be a helpful tool that should be actively referenced in years to come in order to create a Resilient Burgaw.

Appendix

Engagement Strategy

Community Engagement Timeline

Activity	Description	Date	Purpose
CAT Kickoff	Kick-off meeting with Community Action Team group members	October 24, 2023	Introduce the program, steps, and objectives.
CAT Meeting #1	Meeting with community representatives to review information and establish sequential actions.	November 8, 2023	Discuss natural hazard challenges experienced in the community and brainstorm visions and goals for the community.
CAT Background Survey	Online survey cascaded to CAT members.	November 2023	Gather input on natural hazard concerns and experiences, and visions and goals for the community.
CAT Meeting #2	Meeting with community representatives to review information and establish sequential actions.	December 19, 2023	Discuss results of the background survey, finalize the vision and goals, review critical and natural asset locations, and discuss hazards and stressors to the community.
Project Website	Website to publicly disseminate information on the program and project.	January 2024	Establish online presence to inform the public on the community's involvement in the program and project objectives.

Activity	Description	Date	Purpose
Public Surveys	Online surveys cascaded to the public.	February 2024; April 2024	Gather information to define project goals and objectives, identify critical assets, hazard risks, and opportunities for adaptation and resilience; collect feedback about project preferences.
Public Workshop Flyer	Flyer to advertise the 1st public meeting/workshop.	January 2024	Advertise information about the 1st public meeting/workshop and encourage public attendance.
Focus Group Meeting	Interactive lunch-and-learn with Pender Adult Services.	January 30, 2024	Introduce the program and project objectives and facilitate a listening session on experiences with natural hazards.
Public Meeting / Workshop #1	Interactive meeting with the public through a series of stations.	January 30, 2024	Publicly introduce the program and project objectives, and gather feedback on natural hazard concerns, challenges, and solutions.
CAT Meeting #3	Meeting with community representatives to review information and establish sequential actions.	February 20, 2024	Discuss results of the public meeting, preliminary results of the Risk and Vulnerability Assessment, and initial review of potential project list.

Activity	Description	Date	Purpose
CAT Meeting #4	Meeting with community representatives to review information and establish sequential actions.	March 13, 2024	Review and rank list of potential projects.
Community Event / Pender County Spring Fest	Interactive meeting with the public through tabling at a Town event (Pender County Spring Fest) held in Burgaw.	May 4, 2024	Publicly present the final list of prioritized projects and gather feedback on projects of high interest.
CAT Meeting #5	Meeting with community representatives to review information and establish sequential actions.	May 7, 2024	Discuss results of the public meeting and address actions for the final project products.

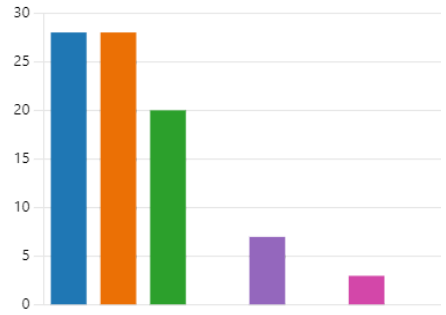
Public Survey #1

Burgaw Resilience Strategy - Public Survey

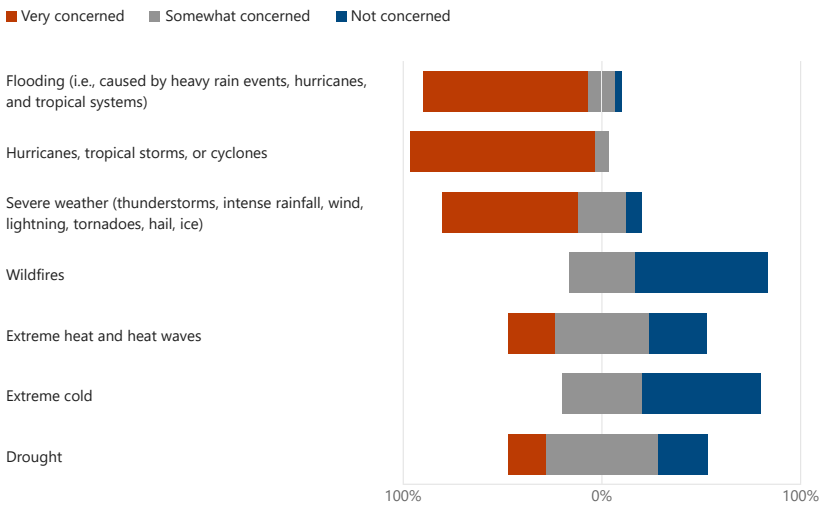
30 Responses | 03:28 Average time to complete | Closed Status

1. What type of weather hazards affect your community? Select all that apply.

Flooding (i.e., caused by heavy r...	28
Hurricanes, tropical storms, or c...	28
Severe weather (thunderstorms,...	20
Wildfires	0
Extreme heat and heat waves	7
Extreme cold	0
Drought	3
Other	0

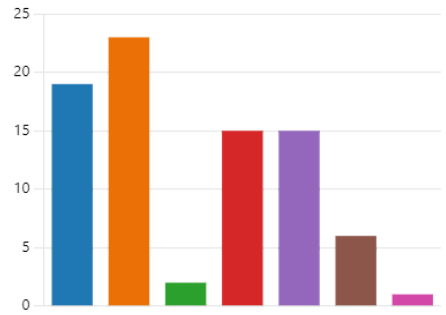


2. How concerned are you about the possibility of your community being impacted by each of these hazards?

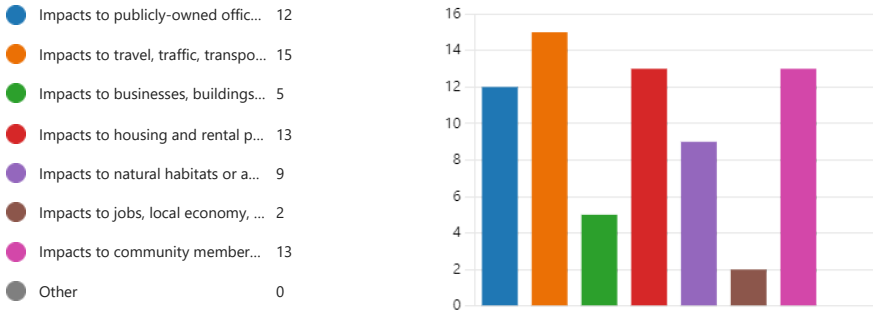


3. What impacts have **you** experienced as a direct result of weather hazards or storm events?

Property damage and/or proper...	19
Power loss, internet loss, no clea...	23
Injury, illness, and/or concerns f...	2
Damage to roads or bridges tha...	15
Limited access to services, such ...	15
Disruption to community activiti...	6
Other	1



4. Which weather-induced impact(s) would be most devastating to your community?



5. Which facilities or buildings, roads/bridges/intersections, or neighborhoods have experienced weather-related issues (i.e., repeated flooding, downed trees, building damage, etc.)? Please specify. We appreciate your local knowledge!

15
Responses

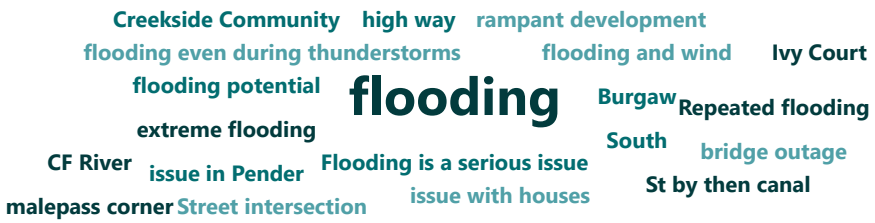
Latest Responses

"No personal experience "

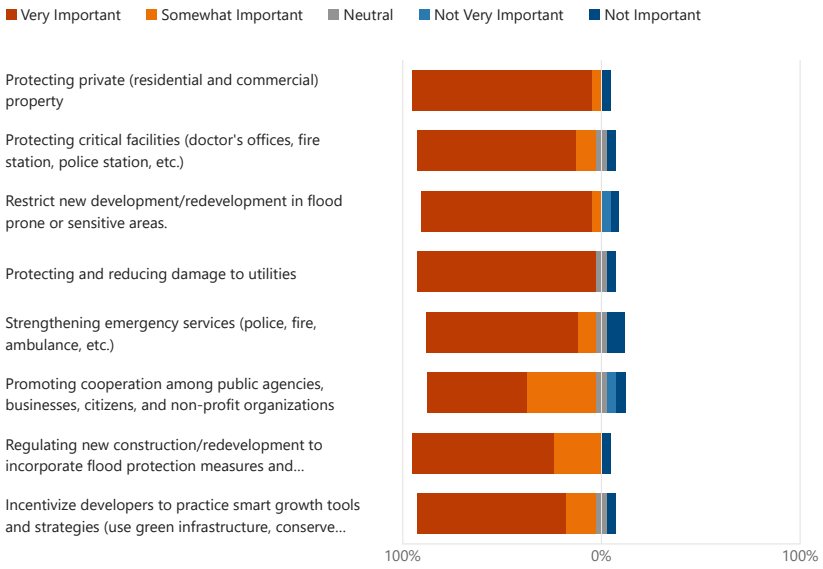
"Osgood Canal, NE CF River and its branches"

"E Wilmington st ext, extreme flooding even during thunderstorms "

6 respondents (**40**%) answered **flooding** for this question.

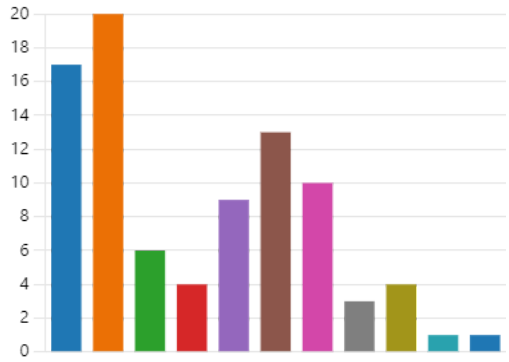


6. Weather hazard planning actions can help lessen the impact of severe weather events. Your responses to the following statements will help us determine the community's priorities when planning for future climate hazards in Burgaw. Please tell us how important each statement is to you.



7. What are your preferred ways to receive information about how to make your home, business, and community more resilient to severe weather events? Select all that apply.

Online websites	17
Text messages/alerts	20
Public meetings or workshops	6
Brochures or flyers in public spa...	4
Word of mouth	9
Social media	13
Town newsletters	10
Print newspaper or mail (includi...	3
Listservs or email lists	4
Community events (e.g., farmer'...	1
Other	1



8. Select the statement that best describes you.

I am a permanent resident of Bu...	22
I live in Burgaw part-time. My pr...	0
I am a visitor of Burgaw.	1
I own property in Burgaw but d...	0
Other	7

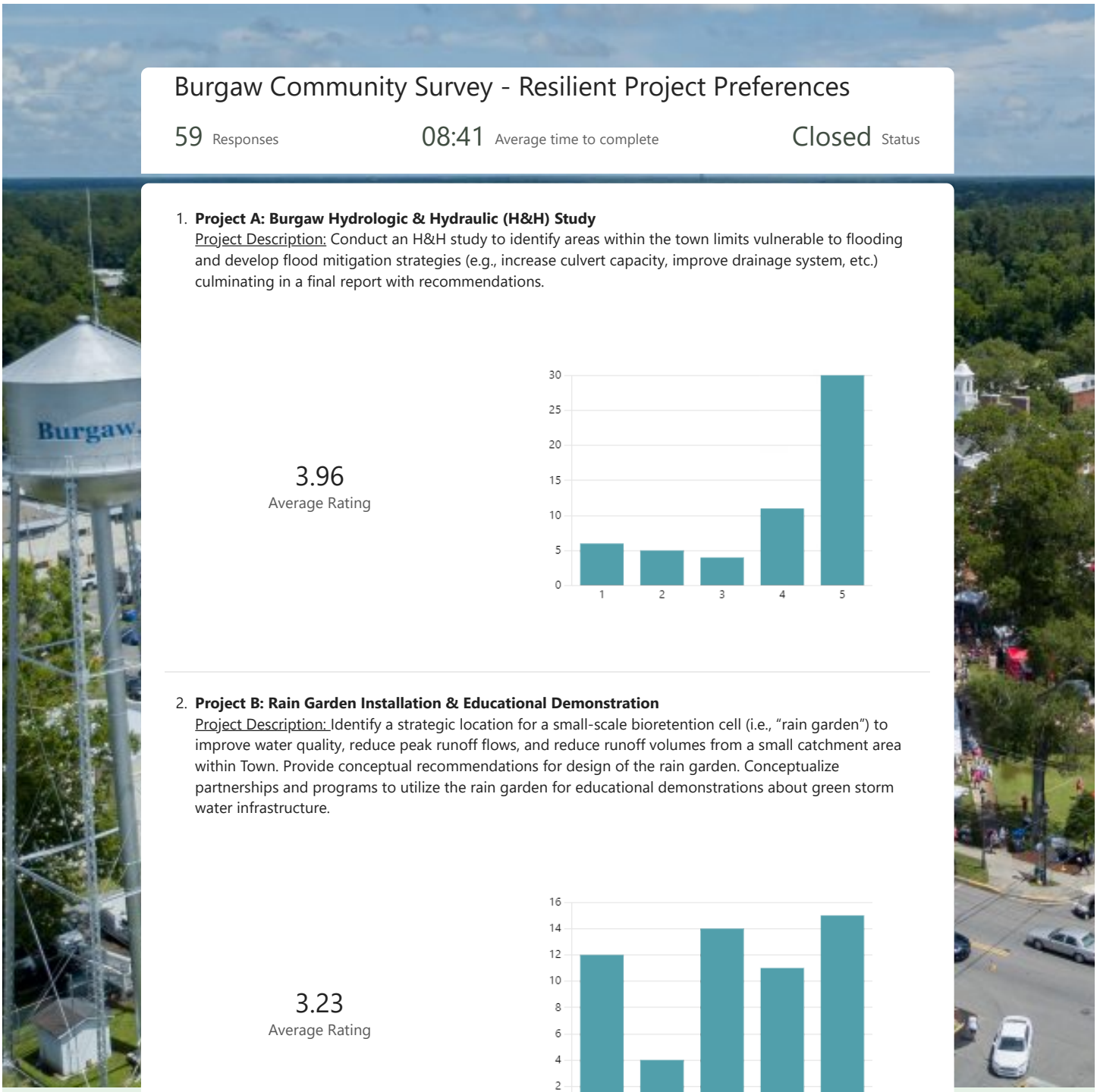
9. How long have you lived in Town?

0-2 years	4
3-10 years	8
11-15 years	2
15+ years	9
N/A	7

10. What is your age range?

18-35	1
36-53	4
54-69	13
70 or older	12
Prefer not to answer	0

Public Survey #2



Burgaw Community Survey - Resilient Project Preferences

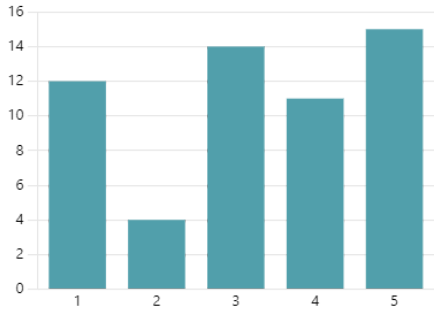
59 Responses | 08:41 Average time to complete | Closed Status

1. **Project A: Burgaw Hydrologic & Hydraulic (H&H) Study**
   Project Description: Conduct an H&H study to identify areas within the town limits vulnerable to flooding and develop flood mitigation strategies (e.g., increase culvert capacity, improve drainage system, etc.) culminating in a final report with recommendations.

3.96
Average Rating

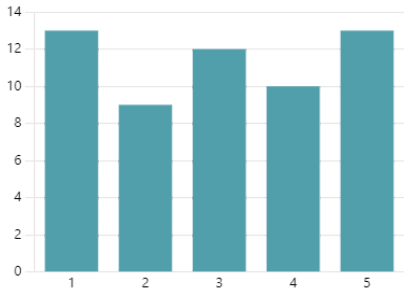
2. **Project B: Rain Garden Installation & Educational Demonstration**
   Project Description: Identify a strategic location for a small-scale bioretention cell (i.e., "rain garden") to improve water quality, reduce peak runoff flows, and reduce runoff volumes from a small catchment area within Town. Provide conceptual recommendations for design of the rain garden. Conceptualize partnerships and programs to utilize the rain garden for educational demonstrations about green storm water infrastructure.

3.23
Average Rating



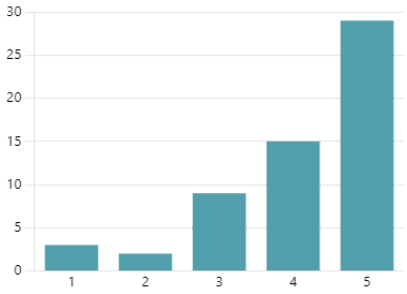
3. **Project C: Enhance Community Resilience through Ordinances and Regulations for Stormwater and Flood Damage Prevention**
   Project Description: Develop a set of regulations and local regulations and community-centric solutions to manage stormwater runoff that exceeds minimum State requirements, where possible. Review and revise the current Flood Damage Prevention Ordinances for improved control of flooding hazards and drainage improvements.

3.02
Average Rating



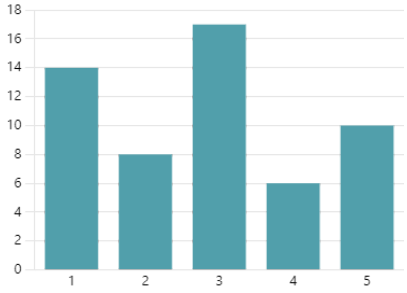
4. **Project D: Osgood Canal Stream Restoration / Flood Mitigation Program**
   Project Description: Survey the Osgood Canal, inventory locations where floodplain creation/channel widening is feasible, and identify appropriate stream restoration activities (e.g., reshaping eroding streambanks, establishing vegetative cover, restoring native riparian vegetation, etc.).

4.12
Average Rating



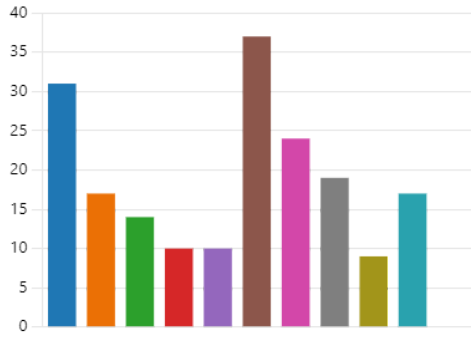
5. **Stormwater Outreach & Education Campaign**
   Project Description: Collaborate with partners such as NC Sea Grant, NCSU Cooperative Extension, NC Coastal Federation, NC National Estuarine Research Reserve, NC Coastal Reserve, etc. to develop and conduct a comprehensive outreach and education campaign regarding community floodplain management and stormwater management. The Town and partnering organizations will identify local stakeholders and deploy specific strategies for education and outreach about flood risk awareness, materials and tools to prepare for and recover from a flood event, and site-scale methods to mitigate flooding.

2.82
Average Rating



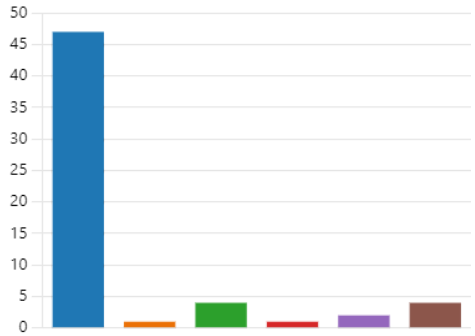
6. What are your preferred ways to receive information about how to make your home, business, and community more resilient to severe weather events? Select all that apply.

Websites	31
Text messages/alerts	17
Public meetings or workshops	14
Brochures or flyers in public spa...	10
Word of mouth	10
Social media	37
Town newsletters	24
Print newspaper or mail (includi...	19
Listservs or email lists	9
Community events (e.g., farmer'...	17
Other	0



7. Select the statement that best describes you.

I am a permanent resident of Bu...	47
I live in Burgaw part-time. My pr...	1
I am a visitor of Burgaw.	4
I own property in Burgaw but d...	1
I do not live in Burgaw.	2
Other	4



8. How long have you lived in Town?

0-2 years	8
3-10 years	20
11-15 years	3
15+ years	18
N/A	10

9. What is your age range?

18-35	13
36-53	21
54-69	18
70 or older	6
Prefer not to answer	1

Community Action Team Report

Kickoff Community Action Team Meeting
October 24, 2023
Burgaw, NC / Virtual

Attendees

- James Gantt –Town Manager, Town of Burgaw
- Jessica Gray – Community Development Coordinator, Town of Burgaw
- Gilbert Combs – Planning Director, Town of Burgaw
- Olivia Dawson – Mayor, Town of Burgaw
- Louis Hesse – Inspections Director, Town of Burgaw
- Jim Hock – Police Chief, Town of Burgaw
- Alan Moore – Public Works Director, Town of Burgaw
- Michael Pearsall – Resident/Commissioner, Town of Burgaw
- Mike Taylor – Resident, Town of Burgaw
- Cody Suggs – Parks and Recreation Director, Town of Burgaw
- Sarah Spiegler – Coastal Resilience Specialist, NC Sea Grant
- Mariko Polk – Coastal Processes Specialist, NC Sea Grant
- Daniel Adams – Planning Director, Pender County
- Mackenzie Todd – Coastal Resiliency Coordinator, NC Division of Coastal Management
- Kasen Wally – Coastal Resiliency Specialist, NC Division of Coastal Management
- Julia Maron – Climate Resiliency Planner, Kleinfelder
- Keely Lane – Project Manager, Kleinfelder
- Montanna Weitzel – Project Specialist, Kleinfelder

Agenda

1.Introductions
2. North Carolina Resilient Coastal Communities Program
    a. Background
    b. Program Objectives & Goals
3. Program Steps & Deliverables
4. Next Steps

Minutes

- New additional CAT participants
- Fire Chief interested in additional fire station in neighboring rural area to serve St. Helena
- West side of Burgaw is more underserved

- Many plans for the Town are outdated and existing vision and goals may not be reflective of current vision and goals
- Scheduling of next CAT meeting, topics of discussion to include vision and goals

Community Action Team Meeting #1
November 11, 2023
Virtual

Attendees

- James Gantt –Town Manager, Town of Burgaw
- Jessica Gray – Community Development Coordinator, Town of Burgaw
- Gilbert Combs – Planning Director, Town of Burgaw
- Olivia Dawson – Mayor, Town of Burgaw
- Louis Hesse – Inspections Director, Town of Burgaw
- Jim Hock – Police Chief, Town of Burgaw
- Alan Moore – Public Works Director, Town of Burgaw
- Mike Taylor – Resident, Town of Burgaw
- Cody Suggs – Parks and Recreation Director, Town of Burgaw
- Jim Taylor – Fire Chief, Town of Burgaw
- Cathy Guidry – Director, Pender Americorps Seniors RSVP
- Adrienne Cox – Planning Engineer, NC Department of Transportation, Division 3
- Michelle Howes – Corridor Development Engineer, NC Department of Transportation
- Amy Mead – Area Natural Resource Agent, NC Cooperative Extension (Pender, New Hanover, and Brunswick Counties)
- Sarah Spiegler – Coastal Resilience Specialist, NC Sea Grant
- David Kanoy – Executive Director, Capital Projects and Facilities, Cape Fear Community College
- Mackenzie Todd – Coastal Resiliency Coordinator, NC Division of Coastal Management
- Julia Maron – Climate Resiliency Planner, Kleinfelder
- Keely Lane – Project Manager, Kleinfelder
- Ariel Patterson – Resiliency Planner, Kleinfelder
- Montanna Weitzel – Project Specialist, Kleinfelder

Agenda

1. Introductions
2. Review North Carolina Resilient Coastal Communities Program
3. What is Resilience?
4. Challenges & Problems
5. Define Vision + Goals + Objectives

6. Visioning Exercise
7. Group Discussion
8. Next Steps

Minutes

- Challenges of Burgaw
  - Flooding roads and lower areas due to failing infrastructure (culverts)
    - Inlet flow needs to be addressed; outlets have been updated
  - Burgaw Creek lacks maintenance
  - Many channels flow within town
  - Previous Stormwater Master Plan completed in 2015 prior to Hurricanes Matthew and Florence
  - Stormwater utility created; fee implemented to gain funding for stormwater projects; actively trying to implement strategies for funding improvements
  - Nursing home on Ashe St. had to evacuate residents during Hurricane Florence
  - Osgood Canal flooding has impacted transportation, particularly during hurricanes
  - Emergency services for Pender County is headquartered in Burgaw
  - Non-resident developers create a feeling that residents are being steamrolled
- Visioning
  - Desire to be attractive to native North Carolinians and attract others that may be raising families and/or growing old in a community with a great quality of life
  - Desire to have best possible stormwater management
  - Desire to have a small town feel with a diverse economy
  - Desire to be a model of resiliency, drawing communities to value Burgaw as a town "doing it right"
  - Desire to increase green space and expand the Osgood Trail
  - Interested in a watershed restoration plan for Burgaw Creek
  - Desire to have clean water, sustainable development including green areas, maintain pride within the community
- Project Needs/Interests
  - Update infrastructure
  - Flood mitigation (nuisance flooding)
  - Make partnerships work and increase connectivity between people and projects
  - Better involve the community so residents understand what is being done on their behalf and how they can contribute to efforts

What does ‘resilience’ or ‘being resilient’ mean?

28 Responses

Community Action Team Meeting #2

December 19, 2023

Burgaw, NC

Attendees

- James Gantt –Town Manager, Town of Burgaw
- Jessica Gray – Community Development Coordinator, Town of Burgaw
- Gilbert Combs – Planning Director, Town of Burgaw
- Olivia Dawson – Mayor, Town of Burgaw
- Louis Hesse – Inspections Director, Town of Burgaw
- Mike Taylor – Resident, Town of Burgaw
- Cathy Guidry – Director, Pender Americorps Seniors RSVP
- Adrienne Cox – Planning Engineer, NC Department of Transportation, Division 3
- Michelle Howes – Corridor Development Engineer, NC Department of Transportation
- Amy Mead – Area Natural Resource Agent, NC Cooperative Extension (Pender, New Hanover, and Brunswick Counties)
- Michael Pearsall – Resident/Commissioner, Town of Burgaw
- Mariko Polk – Coastal Processes Specialist, NC Sea Grant
- Daniel Adams – Planning Director, Pender County
- Julia Maron – Climate Resiliency Planner, Kleinfelder
- Montanna Weitzel – Project Specialist, Kleinfelder

Agenda

1. Review survey results
2. Review vision & goals
3. Finalize vision & goals
4. Review locations of critical assets and natural infrastructure
5. Discuss hazards and stressors
6. Next Steps: Public Meeting

Minutes

- Vision & Goals
  - How is the term "hazard" being used? May be tough for some people to define or understand the term
  - Resiliency is a broad term, what does it mean to other people that don't do what we do?
  - Important to be intentional with the words we use
  - Important to be consistent and use language that will align with grants
  - "Storm events" and "resiliency" are words more widely used in southeastern NC
- Review Critical Asset Map
  - Add Pender County Adult Services (901 S. Walker St.)
  - Nursing home on Ashe St is Ashe Gardens; evacuation occurred during Hurricane Florence due to bad planning; lacked enough fuel for the generator
  - Pump stations in town have been elevated but one is still in the flood plain; however, the Town has funding to elevate it
  - Add prison to map; prison is self-sufficient and has their own emergency operations guidelines
  - Pender County Law Enforcement Center will be constructed soon
  - Consider adding evacuation routes
  - Pender County has a large fuel reserve station
  - None of the Town gas stations have backup generators
  - Burgaw was cut off from every direction during Hurricane Florence; food was airlifted into town and Walmart let the Town and County access food and supplies
  - Add Pender County Emergency Operations Center (also an EMS center) (805 Ridgewood)
- Hazards & Stressors
  - Pender County Long Term Recovery Group has discussed ice storm events
- Does stream bank erosion fall under erosion or flooding/stormwater?
- Public Workshop Planning
  - Consider attending any Parks and Recreation events
  - Meet with Pender County Long Term Recovery Group
  - Consider meeting with seniors at the Senior Center
  - Small focus group meetings with Chamber of Commerce, church groups, Burgaw Rotary, etc.
- Additional Discussion
  - Emergency watershed protection project removed sediment from Burgaw Creek after Hurricane Florence and was completed in 2023
  - Lots of flooding along NC Hwy 53 E but it occurs in the floodway
  - Retention wall was built around an industrial facility
  - Box culvert replaced in 2018 at Fremont St; box culvert replaced on Callan St and Campbell St near the hospital

Community Action Team Meeting #3
February 20, 2024
Virtual

Attendees

- James Gantt –Town Manager, Town of Burgaw
- Jessica Gray – Community Development Coordinator, Town of Burgaw
- Gilbert Combs – Planning Director, Town of Burgaw
- Olivia Dawson – Mayor, Town of Burgaw
- Louis Hesse – Inspections Director, Town of Burgaw
- Adrienne Cox – Planning Engineer, NC Department of Transportation, Division 3
- Julia Maron – Climate Resiliency Planner, Kleinfelder
- Montanna Weitzel – Project Specialist, Kleinfelder
- Ariel Patterson – Resiliency Planner, Kleinfelder
- Quinn Harrison – Project Specialist, Kleinfelder

Agenda

1. Discuss Results of Public Workshop #1
2. Review Preliminary Risk & Vulnerability Results
3. Brainstorm Project Ideas
4. Next Steps: CAT Meeting #4

Minutes

- Public Workshop #1 Debrief
- Feedback from private developments and areas outside of Burgaw Town limits
- Private roads and easements make maintenance challenging
    - NCDOT owns all but 1 road and residents own private property ditches/canals
- Drainage easement along Osgood Canal
- Culverts are being replaced at Cown, Campbell, and Fremont St. through an $11M project
- Drainage at Novant Pender Memorial Hospital is being addressed
- Flooding behind Hwy 117 Business behind Walmart has been addressed
- Plans for new pipes new NC Hwy 53
- NCDOT Hydrology Unit is interested in studying Interstate 40 for flood potential following Hurricane Florence
- Asset Inventory Assessment will be included in the Stormwater Master Plan update
- FEMA bought out property at Ashe St. Park and the town monitors the area for flooding
- The Board has looked at areas of town for stormwater storage, including the old golf course, Pender Memorial Park, and Ashe St. Park
- Dudley St. pump station took on water during 6”-8” of rain and caused issues with existing wastewater…

- **...**infrastructure; storm drains were overwhelmed and caused a sewer backup at Burgaw Middle School; town has funding to elevate Dudley St. station outside of flood zone; all other pump stations are elevated
- Few structures within Burgaw town limits were impacted by floodwaters during Hurricane Florence, including churches initially considered as potentially vulnerable
- Area near W. Bridges St. and W. Ashe St. are within the 500-year flood zone and stormwater recedes quickly during heavy rain
- Burgaw currently has a standard of 2' freeboard
- Heat and wildfire are hazards that are less considered by residents but still may cause issues for the town
- The Board is in favor of obtaining ownership of the old golf course and using the property as flood/ stormwater retention; discussions have been made between private owner and town attorney about easements
- Stormwater ordinance is a high priority for the Planning Department; interest in applying stricter standards for development; residents have posed questions regarding why certain areas in Town are permitted and the impacts that may cause
- Flood Damage Ordinance could use improvements

Community Action Team Meeting #4
March 13, 2024
Virtual

Attendees

- James Gantt –Town Manager, Town of Burgaw
- Jessica Gray – Community Development Coordinator, Town of Burgaw
- Gilbert Combs – Planning Director, Town of Burgaw
- Louis Hesse – Inspections Director, Town of Burgaw
- Jim Taylor – Fire Chief, Town of Burgaw
- Cathy Guidry – Director, Pender Americorps Seniors RSVP
- Adrienne Cox – Planning Engineer, NC Department of Transportation, Division 3
- Amy Mead – Area Natural Resource Agent, NC Cooperative Extension (Pender, New Hanover, and Brunswick Counties)
- Sarah Spiegler – Coastal Resilience Specialist, NC Sea Grant
- Mackenzie Todd – Coastal Resiliency Coordinator, NC Division of Coastal Management
- Kasen Wally – Coastal Resiliency Specialist, NC Division of Coastal Management
- Julia Maron – Climate Resiliency Planner, Kleinfelder
- Ariel Patterson – Resiliency Planner, Kleinfelder
- Montanna Weitzel – Project Specialist, Kleinfelder
- Quinn Harrison – Project Specialist, Kleinfelder

Agenda

1. Quick Recap
2. Project Review & Ranking
3. Next Steps

Minutes

- Infrastructure Project Feedback
  - NCDOT seeks to partner with towns within their division to address challenges and needs; there is a history of collaboration between NCDOT and Burgaw post-Hurricane Florence
  - NCDOT works with American Flood Coalition to prioritize and fund projects across eastern NC
  - Burgaw doesn't have direct control over NCDOT roadways
  - For RCCP, deprioritize projects that involve collaboration between Burgaw and NCDOT
  - NDDOT is leading a resilience study for I-40; project identified in 2023 NCDOT Climate Strategy Report
  - A flood gage has been installed on Burgaw Creek
  - Little Town Learning Center is a privately owned entity; opportunities for floodproofing the building/ HVAC system would require prior dialogue
  - Video evidence of major flooding at Little Town Learning Center
  - Consider opportunity to combine rain garden demonstration with stormwater improvement at Little Town Learning Center
  - NC Cooperative Extension/NCSU have completed rain garden demonstration project in Sunset Beach on town-owned property (in front of town hall)
  - NC DCM feedback: prioritizing projects that have nature-based components and/or hybrid (green/ gray); entire project doesn't need to be nature-based, but will prioritize those with NBS components; DCM cannot fund a project on private property; will prioritize projects that have a community-wide benefit on property that the town owns and/or public areas.

Community Action Team Meeting #5
May 7, 2024
Virtual

Attendees

- James Gantt –Town Manager, Town of Burgaw
- Jessica Gray – Community Development Coordinator, Town of Burgaw
- Olivia Dawson – Mayor, Town of Burgaw
- Ron Meredith – Planning Director, Town of Burgaw
- MaryBeth Kratovel – Fire Marshal, Town of Burgaw
- Sarah Spiegler – Coastal Resilience Specialist, NC Sea Grant
- Julia Maron – Climate Resiliency Planner, Kleinfelder
- Montanna Weitzel – Project Specialist, Kleinfelder

Agenda

1. Overview of Vulnerability Assessment Results
2. Pender County Spring Festival
3. Final Project Portfolio
4. Next Steps – RCCP Phase 3
5. Now What?

Minutes

- Vulnerability Assessment Results
  - Burgaw Middle School hasn't flooded recently
- Project Portfolio
  - Town has posted bid for Stormwater Master Plan (SWMP) update that will move forward soon and likely be complete within a year
  - Studies that H&H and potential stream restoration will likely be tied to components of the SWMP
- Beyond Phases I and II
  - Mayor interested in keeping quarterly working groups with the CAT
  - Rain Garden project may be easiest to complete first and incorporates education and outreach
  - Osgood Stream Restoration may be better aligned with SWMP

Full Project List

Table 14 details the full project list that was presented to the CAT for prioritization.

Table 14. Full Project List

Project Type	Project Name	Project Summary	Source	Rank
Nature-Based Solution	Feasibility Study for Stormwater Improvement at Golf Course	Study feasibility of stormwater management at old golf course.	NCDOT/CAT	3rd
Infrastructure - Study	Feasibility Study for Stormwater Improvement at W. Bridges and W. Ashe St.	Study feasibility of stormwater management and potential drainage improvements to mitigate localized flooding around Penderlea Hwy/W Bridges St near proposed new development at Pender Correctional Institution.	Burgaw Capital Improvement Plan/CAT	4th
Nature-Based Solution	Stormwater Improvement at Little Town Learning Center	Collaborate with the property owner to create a rain garden or LID to mitigate flooding. Consider additional opportunities for floodproofing the building/HVAC system. Examine wastewater infrastructure and identify opportunities for improvements.	Public Workshop	4th
Infrastructure - Study	Develop Inventory of Infrastructure Needs	Identify town-wide infrastructure (i.e., canals, ditches, etc.) that require maintenance from NCDOT and work with NCDOT to address issues.	Town	1st
Outreach/Education	Backyard Streambank Program	Address erosion caused by overflowing ditches with a Backyard Streambank Program. Collaborate with NCSU and NC Sea Grant to administer outreach and education to property owners about stream repair, stabilization for residential homes, and protecting and enhancing native vegetation along streambanks.	CAT/Sea Grant	3rd

Project Type	Project Name	Project Summary	Source	Rank
Outreach/Education	Develop Directory for Drainage Easement Access	Establish a program for residents to sign up for relinquishing access for the Town to maintain public drainage features.	CAT/Hurricane Matthew Resilient Redevelopment Plan	2nd
Policy-Based Solution	Develop Townwide Heat Action Plan	Develop a townwide Heat Action Plan using CDC guidance to define response procedures for emergency managers and other relevant officials when a heat wave is forecasted. The plan can also provide educational materials to inform the public about available resources and actions to take before and during extreme heat events.	Kleinfelder	10th
Policy-Based Solution	Develop Tree Manual and Tree Protection Ordinances	Develop a townwide Tree Manual to provide policy, standards, and guidelines regarding the planting, maintenance, removal, protection, pruning and preservation of trees in Town right-of-way and on Town-owned property. In additional, consider creating tree protection and preservation ordinances to mitigate heat and improve stormwater quality.	Burgaw Parks & Recreation Master Plan	8th
Infrastructure - Study	Study Culverts at US Hwy 117 and E Hayes St	Collaborate with NCDOT and conduct study to examine capacity of culverts at US Hwy 117 and E Hayes St (near Little Town Learning Center) to alleviate flooding issues.	CAT	5th
Infrastructure - Study	Study Culverts near NC Hwy 53 and I-40	Collaborate with NCDOT and conduct study to examine capacity of culverts along east side of NC Hwy 53 and under I-40.	CAT	6th

Project Type	Project Name	Project Summary	Source	Rank
Policy-Based Solution	Update Comprehensive Plan with Resiliency & Sustainability Components	Develop an updated Comprehensive Plan that includes Resiliency and Sustainability components to continue supporting ongoing efforts.	Burgaw Capital Improvement Plan/CAT	2nd
Infrastructure	Install Flood Gage on Burgaw Creek	Install a flood gage on Burgaw Creek at US Hwy 117 to provide more data to the NC FIMAN. Currently, the closest gage to Burgaw is on the Northeast Cape Fear River along NC Hwy 53 E.	Hurricane Matthew Resilient Redevelopment Program	8th
Policy-Based Solution	Enhance/Update Emergency Management Plan	Identify County-sponsored emergency shelters that need assistance to meet American Red Cross operations standards. Confirm that critical emergency facilities have backup power and generators. Identify a post-storm point of distribution for goods and supplies that can be accessed by most vulnerable populations.	Public Workshop	6th
Infrastructure	Alleviate Drainage Blockage along Osgood Canal	Address flooding along Osgood Canal by clearing box culverts that are blocked due to sediment build up.	Burgaw Stormwater Master Plan/CAT	3rd
Policy-Based Solution	Acquire Land for Floodplain Preservation	Identify funding for acquiring properties or easements within the floodplain and floodway and limit development to reduce negative impacts from flooding.	Hurricane Matthew Resilient Redevelopment Plan	3rd

Project Type	Project Name	Project Summary	Source	Rank
Policy-Based Solution	Conduct Transportation Study	Conduct transportation feasibility analysis to identify ways to improve services to critical facilities. Determine strategies to ensure roadways are accessible during and post-storm events for Meals on Wheels to deliver food to homebound seniors.	CAT/Burgaw Comprehensive Plan	4th
Policy-Based Solution	Establish Formal Participation in the NFIP Community Rating System	Formalize the Town's participation in the NFIP Community Rating System and evaluate Burgaw's flood risk and insurance coverage.	CAT	7th
Policy-Based Solution	Conduct Long Range Water Resources Plan	Establish a long-range water resource plan to provide a roadmap and guide development of water supply and management solutions to understand behaviors or residential and commercial water demand which influence the future need for water supply and wastewater management facilities.	Kleinfelder	9th
Infrastructure - Study	Assess Stream Linearity	Examine potential opportunities to restore stream meanders and pools to reduce cubic feet flow rates. Consider areas like Dickerson St/ Industrial Dr or Wallace St/Timberly.	CAT/Sea Grant	7th
Outreach/Education	Educate HOAs about Stormwater Best Management Practices	Engage HOAs about stormwater best management practices and explore potential assessment of stormwater/retention ponds in HOA subdivisions throughout the Town.	CAT	4th

Table 15. Full Critical Asset List

Asset ID	Asset Type	Asset Name	Lat	Long	Ownership (Private/ Public)	Floodzone Exposure	Overall Vulnerability
119	Public Safety/Emergency Service/Fire Station	Administration	34.54403814	-77.91598214	Public	No FEMA Floodzone	Medium
118	Community Government Service Office	Agriculture/Soil & Water/ NC Cooperative Ext	34.54378212	-77.91765127	Public	No FEMA Floodzone	Very Low
118	Community Government Service Office	Agriculture/Soil & Water/ NC Cooperative Ext	34.54359984	-77.91692614	Public	No FEMA Floodzone	Very Low
118	Community Government Service Office	Agriculture/Soil & Water/ NC Cooperative Ext	34.54321857	-77.91684292	Public	No FEMA Floodzone	Very Low
118	Community Government Service Office	Agriculture/Soil & Water/ NC Cooperative Ext	34.54280925	-77.91721762	Public	No FEMA Floodzone	Very Low
118	Community Government Service Office	Agriculture/Soil & Water/ NC Cooperative Ext	34.54302511	-77.91648268	Public	No FEMA Floodzone	Very Low
37	Health Service	Ashe Gardens Memory Care	34.55358451	-77.93196523	Private	No FEMA Floodzone	Medium
37	Health Service	Ashe Gardens Memory Care	34.55393967	-77.93147461	Private	No FEMA Floodzone	Medium
76	Community Government Service Office	Biberstein Building	34.55134818	-77.92494727	Public	No FEMA Floodzone	Low
20	Place of Worship	Bible Baptist Church	34.52296561	-77.90501742	Private	No FEMA Floodzone	Very Low
341	Pump Station	Bickett St.	34.54721328	-77.91590905	Public	No FEMA Floodzone	Low
6	Community Government Service Office	Board of Education	34.55237993	-77.93966021	Public	500-year	Low
6	Community Government Service Office	Board of Education	34.55222792	-77.93929875	Public	100/500-year	Medium
6	Community Government Service Office	Board of Education	34.55232084	-77.93899753	Public	100/500-year	Medium

Asset ID	Asset Type	Asset Name	Lat	Long	Ownership (Private/ Public)	Floodzone Exposure	Overall Vulnerability
6	Community Government Service Office	Board of Education	34.55203543	-77.93962614	Public	500-year	Low
6	Community Government Service Office	Board of Education	34.55274501	-77.93976834	Public	No FEMA Floodzone	Very Low
6	Community Government Service Office	Board of Education	34.55255335	-77.93919783	Public	100/500-year	Medium
6	Community Government Service Office	Board of Education	34.55264726	-77.94218855	Public	No FEMA Floodzone	Very Low
6	Community Government Service Office	Board of Education	34.55287229	-77.94157785	Public	No FEMA Floodzone	Very Low
6	Community Government Service Office	Board of Education	34.55334916	-77.94180563	Public	No FEMA Floodzone	Very Low
6	Community Government Service Office	Board of Education	34.55242832	-77.94188091	Public	No FEMA Floodzone	Very Low
6	Community Government Service Office	Board of Education	34.55316082	-77.94122098	Public	No FEMA Floodzone	Very Low
6	Community Government Service Office	Board of Education	34.55264764	-77.94133542	Public	No FEMA Floodzone	Very Low
6	Community Government Service Office	Board of Education	34.55292996	-77.94080344	Public	No FEMA Floodzone	Very Low
33	Provisions	BP	34.55025557	-77.93207044	Private	No FEMA Floodzone	Medium
343	Pump Station	Browns- E Fremont	34.55298347	-77.91392624	Public	No FEMA Floodzone	Low
128	Provisions	Browns Mini Mart	34.55270694	-77.91390156	Private	No FEMA Floodzone	Very Low
80	Place of Worship	Burgaw Baptist Church	34.55313457	-77.92716562	Private	No FEMA Floodzone	Very Low
66	Community Government Service Office	Burgaw Community House	34.55156974	-77.92640328	Public	No FEMA Floodzone	Low
82	Place of Worship	Burgaw Methodist Church	34.5532362	-77.92637613	Private	No FEMA Floodzone	Very Low

Asset ID	Asset Type	Asset Name	Lat	Long	Ownership (Private/ Public)	Floodzone Exposure	Overall Vulnerability
54	Schools and/or Emergency Shelter	Burgaw Middle School	34.54580422	-77.92385258	Public	500-year	Medium
54	Schools and/or Emergency Shelter	Burgaw Middle School	34.54557795	-77.92422667	Public	No FEMA Floodzone	Low
54	Schools and/or Emergency Shelter	Burgaw Middle School	34.54500866	-77.92452307	Public	No FEMA Floodzone	Low
54	Schools and/or Emergency Shelter	Burgaw Middle School	34.5447593	-77.92479293	Public	No FEMA Floodzone	Low
54	Schools and/or Emergency Shelter	Burgaw Middle School	34.54441996	-77.92460332	Public	500-year	Medium
54	Schools and/or Emergency Shelter	Burgaw Middle School	34.54444261	-77.92417944	Public	100/500-year	High
54	Schools and/or Emergency Shelter	Burgaw Middle School	34.54405032	-77.9245606	Public	100/500-year	High
54	Schools and/or Emergency Shelter	Burgaw Middle School	34.54473468	-77.92398204	Public	100/500-year	High
54	Schools and/or Emergency Shelter	Burgaw Middle School	34.54499258	-77.92418483	Public	No FEMA Floodzone	Low
54	Schools and/or Emergency Shelter	Burgaw Middle School	34.54489884	-77.92413111	Public	500-year	Medium
54	Pump Station	Burgaw Middle School	34.54331394	-77.92450887	Public	100-year	High
78	Place of Worship	Burgaw Presbyterian Church	34.55048718	-77.92465881	Private	No FEMA Floodzone	Very Low
7	Place of Worship	Burgaw Seventh-Day Adventist Church	34.55097576	-77.93910907	Private	100-year	Medium
18	Power Plants	Burgaw Solar, LLC	34.53539643	-77.91289986	Private	No FEMA Floodzone	Medium

Asset ID	Asset Type	Asset Name	Lat	Long	Ownership (Private/ Public)	Floodzone Exposure	Overall Vulnerability
72	Community Government Service Office	Burgaw Town Center	34.55180792	-77.92585414	Public	No FEMA Floodzone	Low
86	Water/Sewer	Burgaw Wastewater Treatment Plant	34.55743578	-77.92522232	Public	100/500-year	High
53	Schools and/or Emergency Shelter	C.F. Pope Elementary School	34.55702688	-77.92793975	Public	No FEMA Floodzone	Medium
90	Schools and/or Emergency Shelter	Cape Fear Community College - Burgaw Center	34.54372988	-77.92270581	Private	No FEMA Floodzone	Medium
79	Community Government Service Office	Central Library	34.55148615	-77.92419034	Public	No FEMA Floodzone	Low
24	Day Care	Children of World	34.54647193	-77.93412564	Private	100-year	Medium
133	Pump Station	Cooper's Pointe	34.55191421	-77.90965119	Public	No FEMA Floodzone	Low
10	Health Service	DaVita SEDC Burgaw Dialysis Center	34.54182868	-77.92392289	Private	100/500-year	High
340	Pump Station	Dudley St.	34.544977	-77.92658228	Public	100-year	High
131	Place of Worship	Dwelling Place Church	34.54300863	-77.9107404	Private	No FEMA Floodzone	Very Low
120	Community Government Service Office	Elections	34.54389513	-77.9153625	Public	No FEMA Floodzone	Low
38	Pump Station	Eloise Fennell	34.56319121	-77.9323202	Private	No FEMA Floodzone	Low
123	Pump Station	EMS Pendor E.O.C	34.5585381	-77.91707394	Private	No FEMA Floodzone	Low
127	Day Care	Excel Learning Center Burgaw / SPEC Preschool & School Age Childcare	34.54915153	-77.9109975	Private	No FEMA Floodzone	Very Low
48	Provisions	Family Dollar 4653	34.55116942	-77.92943335	Private	No FEMA Floodzone	Very Low
113	Pump Station	Family Dollar Pump Station	34.55876117	-77.91806786	Private	No FEMA Floodzone	Low
111	Provisions	Food Lion	34.56108161	-77.91931949	Private	No FEMA Floodzone	Medium
111	Pump Station	Food Lion Pump Station	34.56100219	-77.92025709	Private	No FEMA Floodzone	Low
2	Pump Station	Four County Electric	34.54626388	-77.95277134	Private	No FEMA Floodzone	Low

Asset ID	Asset Type	Asset Name	Lat	Long	Ownership (Private/ Public)	Floodzone Exposure	Overall Vulnerability
28	Place of Worship	Gateway Community Church	34.55170183	-77.9342319	Private	100/500-year	Medium
110	Provisions	Go GAS	34.55858207	-77.919297	Private	No FEMA Floodzone	Medium
110	Provisions	Go GAS	34.55841757	-77.9194404	Private	No FEMA Floodzone	Medium
96	Community Government Service Office	Heritage House	34.55128057	-77.92329815	Public	100/500-year	Medium
56	Historic/Cultural	Historic Train Depot	34.5499535	-77.92799753	Public	No FEMA Floodzone	Low
25	Pump Station	Hwy 53	34.5491128	-77.9357601	Public	100-year	High
144	Pump Station	I-40	34.57340646	-77.90711633	Public	500-year	Medium
13	Pump Station	Industrial Park	34.5381446	-77.91970535	Public	No FEMA Floodzone	Low
51	Community Government Service Office	Judicial Annex	34.5508384	-77.92792499	Public	No FEMA Floodzone	Low
137	Place of Worship	Kingdom Connection Church Ministries	34.55566672	-77.90981636	Private	500-year	Low
21	Place of Worship	Kingdom Hall - Jehovha's Witness	34.53135809	-77.90548077	Private	No FEMA Floodzone	Very Low
107	Community Government Service Office	Law Enforcement Building/ Utilities/Facilities & Grounds Maintenance/ Fleets	34.55059303	-77.91859985	Public	No FEMA Floodzone	Low
107	Community Government Service Office	Law Enforcement Building/ Utilities/Facilities & Grounds Maintenance/Fleets	34.55122714	-77.91859302	Public	No FEMA Floodzone	Low
105	Community Government Service Office	Legal Aid	34.55003904	-77.91823256	Public	No FEMA Floodzone	Low
39	Pump Station	Lewis Sausage	34.56475622	-77.93135788	Private	100/500-year	High
23	Pump Station	Lift Station #12	34.54591866	-77.93491787	Private	100-year	High

Asset ID	Asset Type	Asset Name	Lat	Long	Ownership (Private/ Public)	Floodzone Exposure	Overall Vulnerability
58	Day Care	Little Town Learning Center	34.54663601	-77.92470696	Private	100-year	High
84	Place of Worship	Macedonia AME Church	34.55470094	-77.92619214	Private	No FEMA Floodzone	Very Low
3	Place of Worship	Middle District Missionary Baptist	34.54424048	-77.95233704	Private	No FEMA Floodzone	Very Low
92	Pump Station	Mike Vick Pump Station	34.5486447	-77.92383644	Private	100-year	High
52	Place of Worship	Mt. Pisgah Baptist Church	34.55538952	-77.92775101	Private	No FEMA Floodzone	Very Low
30	Community Government Service Office	NC Department of Transportation	34.55341466	-77.93535716	Public	500-year	Low
30	Community Government Service Office	NC Department of Transportation	34.55283075	-77.93665301	Public	100/500-year	Medium
30	Community Government Service Office	NC Department of Transportation	34.5531946	-77.93650921	Public	500-year	Low
30	Community Government Service Office	NC Department of Transportation	34.55296638	-77.93642847	Public	500-year	Low
30	Community Government Service Office	NC Department of Transportation	34.5532896	-77.93585154	Public	500-year	Low
30	Community Government Service Office	NC Department of Transportation	34.55271944	-77.93707526	Public	100/500-year	Medium
30	Community Government Service Office	NC Department of Transportation	34.55300445	-77.93574282	Public	100/500-year	Medium
99	Natural Asset	NC Hazard Mitigation Buyout Property - Burgaw	34.55277778	-77.92244223	Public	100/500-year	
4	Pump Station	NC Hwy 53 W	34.54525652	-77.94791084	Private	No FEMA Floodzone	Low
132	Community Government Service Office	NCDMV Driver's License Office	34.54263627	-77.91015279	Public	No FEMA Floodzone	Low
90	Natural Asset	Osgood Canal Greenway	34.54391394	-77.92381133	Public	100/500-year	
345	Natural Asset	Osgood Canal Greenway	34.54802529	-77.92704497	Public	100/500-year	
97	Natural Asset	Pecan Park	34.55204493	-77.92272049	Public	100/500-year	

Asset ID	Asset Type	Asset Name	Lat	Long	Ownership (Private/ Public)	Floodzone Exposure	Overall Vulnerability
19	Community Government Service Office	Pender Adult Services	34.54132016	-77.91243896	Public	No FEMA Floodzone	Medium
19	Community Government Service Office	Pender Adult Services	34.54218116	-77.91184629	Public	No FEMA Floodzone	Low
29	Community Government Service Office	Pender County - NC Department of Transportation	34.55580796	-77.9339901	Public	100/500-year	Medium
29	Community Government Service Office	Pender County - NC Department of Transportation	34.55448678	-77.93344214	Public	No FEMA Floodzone	Very Low
29	Community Government Service Office	Pender County - NC Department of Transportation	34.55486367	-77.93362464	Public	500-year	Low
29	Community Government Service Office	Pender County - NC Department of Transportation	34.55515344	-77.93426655	Public	500-year	Low
29	Community Government Service Office	Pender County - NC Department of Transportation	34.55529785	-77.93386114	Public	No FEMA Floodzone	Very Low
29	Community Government Service Office	Pender County - NC Department of Transportation	34.55433329	-77.93379367	Public	100-year	Medium
29	Community Government Service Office	Pender County - NC Department of Transportation	34.55479635	-77.93273483	Public	No FEMA Floodzone	Very Low

Asset ID	Asset Type	Asset Name	Lat	Long	Ownership (Private/ Public)	Floodzone Exposure	Overall Vulnerability
29	Community Government Service Office	Pender County - NC Department of Transportation	34.55503203	-77.93285702	Public	No FEMA Floodzone	Very Low
29	Community Government Service Office	Pender County - NC Department of Transportation	34.5554851	-77.93408393	Public	No FEMA Floodzone	Very Low
29	Community Government Service Office	Pender County - NC Department of Transportation	34.55685148	-77.93338226	Public	No FEMA Floodzone	Very Low
29	Community Government Service Office	Pender County - NC Department of Transportation	34.55513421	-77.9413376	Public	No FEMA Floodzone	Very Low
138	Natural Asset	Pender County and Town of Burgaw Open Space	34.54937551	-77.8983994	Public	No FEMA Floodzone	
29	Community Government Service Office	Pender County Correctional Institution	34.55414152	-77.93658723	Public	No FEMA Floodzone	Very Low
29	Community Government Service Office	Pender County Correctional Institution	34.5542296	-77.93632783	Public	No FEMA Floodzone	Very Low
29	Community Government Service Office	Pender County Correctional Institution	34.5544667	-77.93662871	Public	No FEMA Floodzone	Very Low
29	Community Government Service Office	Pender County Correctional Institution	34.55394373	-77.93773955	Public	No FEMA Floodzone	Very Low
29	Community Government Service Office	Pender County Correctional Institution	34.55377198	-77.93834048	Public	No FEMA Floodzone	Very Low
29	Community Government Service Office	Pender County Correctional Institution	34.55480065	-77.93668326	Public	No FEMA Floodzone	Very Low

Asset ID	Asset Type	Asset Name	Lat	Long	Ownership (Private/ Public)	Floodzone Exposure	Overall Vulnerability
29	Community Government Service Office	Pender County Correctional Institution	34.55471651	-77.93696704	Public	No FEMA Floodzone	Very Low
29	Community Government Service Office	Pender County Correctional Institution	34.55531417	-77.93696445	Public	No FEMA Floodzone	Very Low
29	Community Government Service Office	Pender County Correctional Institution	34.55457317	-77.93618147	Public	No FEMA Floodzone	Very Low
29	Community Government Service Office	Pender County Correctional Institution	34.55431603	-77.93572007	Public	No FEMA Floodzone	Very Low
29	Community Government Service Office	Pender County Correctional Institution	34.55478034	-77.93570708	Public	No FEMA Floodzone	Very Low
29	Community Government Service Office	Pender County Correctional Institution	34.55477196	-77.93545577	Public	No FEMA Floodzone	Very Low
29	Community Government Service Office	Pender County Correctional Institution	34.55449201	-77.93508118	Public	No FEMA Floodzone	Very Low
29	Community Government Service Office	Pender County Correctional Institution	34.55508805	-77.93562361	Public	No FEMA Floodzone	Very Low
29	Community Government Service Office	Pender County Correctional Institution	34.55544908	-77.93556063	Public	No FEMA Floodzone	Very Low
29	Community Government Service Office	Pender County Correctional Institution	34.55564969	-77.93610058	Public	No FEMA Floodzone	Very Low
29	Community Government Service Office	Pender County Correctional Institution	34.55411769	-77.93713638	Public	No FEMA Floodzone	Very Low
29	Community Government Service Office	Pender County Correctional Institution	34.55462921	-77.93725706	Public	No FEMA Floodzone	Very Low
29	Community Government Service Office	Pender County Correctional Institution	34.55480501	-77.93877063	Public	No FEMA Floodzone	Very Low

Asset ID	Asset Type	Asset Name	Lat	Long	Ownership (Private/ Public)	Floodzone Exposure	Overall Vulnerability
29	Community Government Service Office	Pender County Correctional Institution	34.55451734	-77.93956723	Public	No FEMA Floodzone	Very Low
29	Community Government Service Office	Pender County Correctional Institution	34.55450603	-77.93771494	Public	No FEMA Floodzone	Very Low
29	Community Government Service Office	Pender County Correctional Institution	34.55420974	-77.93898861	Public	No FEMA Floodzone	Very Low
29	Community Government Service Office	Pender County Correctional Institution	34.55429331	-77.9384465	Public	No FEMA Floodzone	Very Low
29	Community Government Service Office	Pender County Correctional Institution	34.5549787	-77.93816569	Public	No FEMA Floodzone	Very Low
29	Community Government Service Office	Pender County Correctional Institution	34.55515021	-77.93756634	Public	No FEMA Floodzone	Very Low
71	Community Government Service Office	Pender County Courthouse	34.55069022	-77.92579631	Public	No FEMA Floodzone	Low
125	Public Safety/Emergency Service/Fire Station	Pender County EMS	34.55897395	-77.91648627	Public	No FEMA Floodzone	Medium
124	Public Safety/Emergency Service/Fire Station	Pender County EMS - Depot	34.55910105	-77.91707389	Public	No FEMA Floodzone	Medium
124	Public Safety/Emergency Service/Fire Station	Pender County EMS - Depot	34.55936224	-77.91729004	Public	No FEMA Floodzone	Medium
124	Public Safety/Emergency Service/Fire Station	Pender County EMS - Depot	34.559361	-77.91710277	Public	No FEMA Floodzone	Medium
124	Public Safety/Emergency Service/Fire Station	Pender County EMS - Depot	34.55928535	-77.91738541	Public	No FEMA Floodzone	Medium
75	Public Safety/Emergency Service/Fire Station	Pender County Jail	34.55230545	-77.92506199	Public	No FEMA Floodzone	Medium

Asset ID	Asset Type	Asset Name	Lat	Long	Ownership (Private/ Public)	Floodzone Exposure	Overall Vulnerability
74	Community Government Service Office	Pender County Jail Administration	34.55196373	-77.92505224	Public	No FEMA Floodzone	Low
1	Natural Asset	Pender County Open Space	34.5436458	-77.95923232	Public	No FEMA Floodzone	
11	Natural Asset	Pender County Open Space	34.54187502	-77.92196606	Private	No FEMA Floodzone	
14	Natural Asset	Pender County Open Space	34.54126382	-77.91743187	Public	No FEMA Floodzone	
15	Natural Asset	Pender County Open Space	34.54017972	-77.91684666	Public	No FEMA Floodzone	
16	Natural Asset	Pender County Open Space	34.53970216	-77.91683845	Public	No FEMA Floodzone	
17	Natural Asset	Pender County Open Space	34.54062661	-77.9168585	Public	No FEMA Floodzone	
22	Natural Asset	Pender County Open Space	34.54229525	-77.93349828	Public	100/500-year	
40	Natural Asset	Pender County Open Space	34.54364107	-77.93029151	Public	No FEMA Floodzone	
115	Natural Asset	Pender County Open Space	34.56591127	-77.91962932	Private	100/500-year	
116	Natural Asset	Pender County Open Space	34.56604905	-77.91852167	Public	100-year	
117	Natural Asset	Pender County Open Space	34.5419422	-77.91733522	Public	No FEMA Floodzone	
139	Natural Asset	Pender County Open Space	34.57222202	-77.90900124	Public	100-year	
140	Natural Asset	Pender County Open Space	34.57359543	-77.90849141	Public	100-year	
141	Natural Asset	Pender County Open Space	34.57521174	-77.90824807	Public	100-year	
142	Natural Asset	Pender County Open Space	34.57520184	-77.9071957	Private	100-year	
143	Natural Asset	Pender County Open Space	34.5746854	-77.90537324	Public	500-year	
145	Natural Asset	Pender County Open Space	34.57536148	-77.90690136	Public	100-year	
146	Natural Asset	Pender County Open Space	34.57516707	-77.90643568	Public	100-year	
147	Natural Asset	Pender County Open Space	34.57632257	-77.90614835	Public	100-year	
148	Natural Asset	Pender County Open Space	34.57584076	-77.90553195	Public	100-year	
149	Natural Asset	Pender County Open Space	34.57667789	-77.90554896	Public	100-year	
41	Public Safety/Emergency Service/Fire Station	Pender County Probation and Parole (DPS)	34.5446725	-77.92918724	Public	No FEMA Floodzone	Medium
67	Historic/Cultural	Pender County Tourism/ Historic Jail	34.55165982	-77.92614016	Public	No FEMA Floodzone	Low
106	Health Service	Pender Memorial Hospital & Emergency Center	34.55060308	-77.9198933	Public	No FEMA Floodzone	Medium

Asset ID	Asset Type	Asset Name	Lat	Long	Ownership (Private/ Public)	Floodzone Exposure	Overall Vulnerability
106	Health Service	Pender Memorial Hospital & Emergency Center	34.55111015	-77.91942243	Public	No FEMA Floodzone	Medium
9	Natural Asset	Pender Memorial Park	34.54145316	-77.93103497	Public	100-year	
31	Natural Asset	Pender Memorial Park	34.54340956	-77.93141875	Private	100/500-year	
6	Pump Station	Penderlea Bus Station	34.553832	-77.94207715	Public	No FEMA Floodzone	Low
45	Provisions	Piggly Wiggly	34.55004168	-77.92951613	Private	No FEMA Floodzone	Medium
73	Community Government Service Office	Planning & Inspections	34.552016	-77.92570854	Public	No FEMA Floodzone	Low
12	Pump Station	Private	34.53949944	-77.91965324	Private	No FEMA Floodzone	Low
44	Community Government Service Office	Public Works Office/ Warehouse	34.54787317	-77.93045261	Public	No FEMA Floodzone	Low
44	Community Government Service Office	Public Works Office/ Warehouse	34.54805593	-77.92979676	Public	No FEMA Floodzone	Low
44	Community Government Service Office	Public Works Office/ Warehouse	34.54769106	-77.92981811	Public	No FEMA Floodzone	Low
8	Day Care	Romper Room Day Care Center	34.52448487	-77.93115534	Private	No FEMA Floodzone	Very Low
57	Natural Asset	Rotary Park	34.54907701	-77.92769004	Public	No FEMA Floodzone	
112	Provisions	Shell	34.559246	-77.91879342	Private	No FEMA Floodzone	Medium
112	Provisions	Shell	34.55929653	-77.91850761	Private	No FEMA Floodzone	Medium
121	Community Government Service Office	Social Services	34.54452974	-77.91433343	Public	No FEMA Floodzone	Low
26	Place of Worship	St. John United Holy Church	34.54787332	-77.93515283	Private	100-year	Medium
122	Place of Worship	St. Mary's Episcopal Church	34.54699485	-77.91729895	Private	No FEMA Floodzone	Very Low
135	Pump Station	Stag Park	34.56569041	-77.91358956	Public	500-year	Medium
342	Pump Station	Stag Park Chloride Station	34.56198865	-77.8969954	Public	500-year	Medium
32	Water/Sewer	swInlet	34.54522047	-77.93230349	Public	500-year	N/A
34	Water/Sewer	swInlet	34.55168162	-77.93159497	Public	500-year	N/A

Asset ID	Asset Type	Asset Name	Lat	Long	Ownership (Private/ Public)	Floodzone Exposure	Overall Vulnerability
35	Water/Sewer	swInlet	34.55176728	-77.93125838	Public	500-year	N/A
36	Water/Sewer	swInlet	34.55181142	-77.93108685	Public	500-year	N/A
43	Water/Sewer	swInlet	34.54496193	-77.92779587	Public	100/500-year	N/A
45	Water/Sewer	swInlet	34.5495816	-77.92902349	Public	No FEMA Floodzone	N/A
45	Water/Sewer	swInlet	34.54972339	-77.92845419	Public	No FEMA Floodzone	N/A
46	Water/Sewer	swInlet	34.54876197	-77.92809839	Public	No FEMA Floodzone	N/A
46	Water/Sewer	swInlet	34.5486106	-77.92804365	Public	No FEMA Floodzone	N/A
47	Water/Sewer	swInlet	34.54851008	-77.9280052	Public	No FEMA Floodzone	N/A
48	Water/Sewer	swInlet	34.55097062	-77.92891161	Public	No FEMA Floodzone	N/A
48	Water/Sewer	swInlet	34.55114139	-77.92897659	Public	No FEMA Floodzone	N/A
48	Water/Sewer	swInlet	34.55129701	-77.92903235	Public	No FEMA Floodzone	N/A
49	Water/Sewer	swInlet	34.55153955	-77.9291178	Public	No FEMA Floodzone	N/A
50	Water/Sewer	swInlet	34.55063898	-77.92736049	Public	No FEMA Floodzone	N/A
50	Water/Sewer	swInlet	34.55068453	-77.92737773	Public	No FEMA Floodzone	N/A
55	Water/Sewer	swInlet	34.55098798	-77.9283993	Public	No FEMA Floodzone	N/A
55	Water/Sewer	swInlet	34.5449865	-77.92611445	Public	100-year	N/A
60	Water/Sewer	swInlet	34.54998477	-77.92707144	Public	No FEMA Floodzone	N/A
61	Water/Sewer	swInlet	34.54795633	-77.92686663	Public	No FEMA Floodzone	N/A
62	Water/Sewer	swInlet	34.54989593	-77.92423495	Public	No FEMA Floodzone	N/A
62	Water/Sewer	swInlet	34.54975041	-77.92417993	Public	No FEMA Floodzone	N/A
63	Water/Sewer	swInlet	34.54993962	-77.9244208	Public	No FEMA Floodzone	N/A
64	Water/Sewer	swInlet	34.54919198	-77.92405198	Public	100-year	N/A
65	Water/Sewer	swInlet	34.55074734	-77.92710379	Public	No FEMA Floodzone	N/A
67	Water/Sewer	swInlet	34.55200235	-77.92601892	Public	No FEMA Floodzone	N/A
67	Water/Sewer	swInlet	34.55197667	-77.92612099	Public	No FEMA Floodzone	N/A
67	Water/Sewer	swInlet	34.55184776	-77.92607633	Public	No FEMA Floodzone	N/A
68	Water/Sewer	swInlet	34.5521803	-77.92619471	Public	No FEMA Floodzone	N/A
69	Water/Sewer	swInlet	34.55250402	-77.92630304	Public	No FEMA Floodzone	N/A
69	Water/Sewer	swInlet	34.55246731	-77.926446	Public	No FEMA Floodzone	N/A

Asset ID	Asset Type	Asset Name	Lat	Long	Ownership (Private/ Public)	Floodzone Exposure	Overall Vulnerability
70	Water/Sewer	swInlet	34.55261462	-77.92586363	Public	No FEMA Floodzone	N/A
72	Water/Sewer	swInlet	34.55204111	-77.92584095	Public	No FEMA Floodzone	N/A
77	Water/Sewer	swInlet	34.55215618	-77.92495124	Public	No FEMA Floodzone	N/A
77	Water/Sewer	swInlet	34.55192341	-77.92482072	Public	No FEMA Floodzone	N/A
103	Water/Sewer	swInlet	34.54982031	-77.92023663	Public	100-year	N/A
103	Water/Sewer	swInlet	34.54979452	-77.92008672	Public	100-year	N/A
104	Water/Sewer	swInlet	34.54984157	-77.91973665	Public	100-year	N/A
108	Water/Sewer	swInlet	34.55316829	-77.91849618	Public	No FEMA Floodzone	N/A
109	Water/Sewer	swInlet	34.55380734	-77.91732587	Public	No FEMA Floodzone	N/A
130	Water/Sewer	swInlet	34.55357766	-77.91420763	Public	No FEMA Floodzone	N/A
150	Water/Sewer	swInlet	34.54869498	-77.92960719	Public	No FEMA Floodzone	N/A
151	Water/Sewer	swInlet	34.5487404	-77.92943548	Public	No FEMA Floodzone	N/A
152	Water/Sewer	swInlet	34.54989143	-77.91974214	Public	100-year	N/A
153	Water/Sewer	swInlet	34.54995335	-77.92027176	Public	100-year	N/A
154	Water/Sewer	swInlet	34.55180915	-77.91859737	Public	No FEMA Floodzone	N/A
155	Water/Sewer	swInlet	34.55386342	-77.91580757	Public	No FEMA Floodzone	N/A
156	Water/Sewer	swInlet	34.55385165	-77.91593164	Public	No FEMA Floodzone	N/A
157	Water/Sewer	swInlet	34.54725511	-77.92415559	Public	100-year	N/A
158	Water/Sewer	swInlet	34.54721123	-77.92432964	Public	100-year	N/A
159	Water/Sewer	swInlet	34.54715717	-77.92450653	Public	100-year	N/A
160	Water/Sewer	swInlet	34.54702924	-77.92494103	Public	100-year	N/A
161	Water/Sewer	swInlet	34.5455253	-77.92986412	Public	No FEMA Floodzone	N/A
162	Water/Sewer	swInlet	34.54539391	-77.92980586	Public	No FEMA Floodzone	N/A
163	Water/Sewer	swInlet	34.54853938	-77.93091962	Public	No FEMA Floodzone	N/A
164	Water/Sewer	swInlet	34.54884348	-77.92970595	Public	No FEMA Floodzone	N/A
165	Water/Sewer	swInlet	34.54900574	-77.92976843	Public	No FEMA Floodzone	N/A
166	Water/Sewer	swInlet	34.54756055	-77.92901286	Public	No FEMA Floodzone	N/A
167	Water/Sewer	swInlet	34.54765595	-77.92863177	Public	No FEMA Floodzone	N/A
168	Water/Sewer	swInlet	34.54823228	-77.92790243	Public	No FEMA Floodzone	N/A

Asset ID	Asset Type	Asset Name	Lat	Long	Ownership (Private/ Public)	Floodzone Exposure	Overall Vulnerability
169	Water/Sewer	swInlet	34.54952093	-77.92774658	Public	No FEMA Floodzone	N/A
170	Water/Sewer	swInlet	34.54907011	-77.92758409	Public	No FEMA Floodzone	N/A
171	Water/Sewer	swInlet	34.54867909	-77.92744047	Public	No FEMA Floodzone	N/A
172	Water/Sewer	swInlet	34.54871034	-77.92731312	Public	No FEMA Floodzone	N/A
173	Water/Sewer	swInlet	34.54969806	-77.92701286	Public	No FEMA Floodzone	N/A
174	Water/Sewer	swInlet	34.54992052	-77.92709551	Public	No FEMA Floodzone	N/A
175	Water/Sewer	swInlet	34.55027369	-77.92722497	Public	No FEMA Floodzone	N/A
176	Water/Sewer	swInlet	34.55034992	-77.92725347	Public	No FEMA Floodzone	N/A
177	Water/Sewer	swInlet	34.55101632	-77.92749923	Public	No FEMA Floodzone	N/A
178	Water/Sewer	swInlet	34.54909663	-77.92679112	Public	No FEMA Floodzone	N/A
179	Water/Sewer	swInlet	34.55003598	-77.92496809	Public	No FEMA Floodzone	N/A
180	Water/Sewer	swInlet	34.54992053	-77.92479545	Public	No FEMA Floodzone	N/A
181	Water/Sewer	swInlet	34.5497844	-77.92458937	Public	No FEMA Floodzone	N/A
182	Water/Sewer	swInlet	34.55011747	-77.92465999	Public	No FEMA Floodzone	N/A
183	Water/Sewer	swInlet	34.55027005	-77.9247191	Public	No FEMA Floodzone	N/A
184	Water/Sewer	swInlet	34.55031986	-77.92478994	Public	No FEMA Floodzone	N/A
185	Water/Sewer	swInlet	34.55026954	-77.92492421	Public	No FEMA Floodzone	N/A
186	Water/Sewer	swInlet	34.5502181	-77.92495854	Public	No FEMA Floodzone	N/A
187	Water/Sewer	swInlet	34.54870369	-77.92592607	Public	No FEMA Floodzone	N/A
188	Water/Sewer	swInlet	34.54871331	-77.9259293	Public	No FEMA Floodzone	N/A
189	Water/Sewer	swInlet	34.54875456	-77.92575715	Public	No FEMA Floodzone	N/A
190	Water/Sewer	swInlet	34.54874464	-77.92575358	Public	No FEMA Floodzone	N/A
191	Water/Sewer	swInlet	34.54701219	-77.925288	Public	500-year	N/A
192	Water/Sewer	swInlet	34.54693312	-77.92534208	Public	500-year	N/A
193	Water/Sewer	swInlet	34.54684895	-77.92531371	Public	100-year	N/A
194	Water/Sewer	swInlet	34.54681087	-77.92521487	Public	100-year	N/A
195	Water/Sewer	swInlet	34.54683979	-77.92509393	Public	100-year	N/A
196	Water/Sewer	swInlet	34.54704119	-77.92516792	Public	500-year	N/A
197	Water/Sewer	swInlet	34.54648511	-77.92509548	Public	100-year	N/A

Asset ID	Asset Type	Asset Name	Lat	Long	Ownership (Private/ Public)	Floodzone Exposure	Overall Vulnerability
198	Water/Sewer	swInlet	34.54647218	-77.92495933	Public	100-year	N/A
199	Water/Sewer	swInlet	34.54531335	-77.92508598	Public	No FEMA Floodzone	N/A
200	Water/Sewer	swInlet	34.54499332	-77.9273622	Public	100-year	N/A
201	Water/Sewer	swInlet	34.54494786	-77.92808336	Public	No FEMA Floodzone	N/A
202	Water/Sewer	swInlet	34.5449665	-77.92706848	Public	100-year	N/A
203	Water/Sewer	swInlet	34.54504121	-77.92674827	Public	100-year	N/A
204	Water/Sewer	swInlet	34.55017489	-77.91908243	Public	No FEMA Floodzone	N/A
205	Water/Sewer	swInlet	34.55013241	-77.91921414	Public	No FEMA Floodzone	N/A
206	Water/Sewer	swInlet	34.54996289	-77.91944615	Public	500-year	N/A
207	Water/Sewer	swInlet	34.54995936	-77.92009004	Public	100-year	N/A
208	Water/Sewer	swInlet	34.54995751	-77.92015742	Public	100-year	N/A
209	Water/Sewer	swInlet	34.54994587	-77.92036039	Public	100-year	N/A
210	Water/Sewer	swInlet	34.54998064	-77.91904663	Public	No FEMA Floodzone	N/A
211	Water/Sewer	swInlet	34.54967078	-77.91904644	Public	No FEMA Floodzone	N/A
212	Water/Sewer	swInlet	34.55279462	-77.91405931	Public	No FEMA Floodzone	N/A
213	Water/Sewer	swInlet	34.55287855	-77.91431357	Public	No FEMA Floodzone	N/A
214	Water/Sewer	swInlet	34.55166235	-77.91854769	Public	No FEMA Floodzone	N/A
215	Water/Sewer	swInlet	34.55583488	-77.91120585	Public	No FEMA Floodzone	N/A
216	Water/Sewer	swInlet	34.55567431	-77.911257	Public	No FEMA Floodzone	N/A
217	Water/Sewer	swInlet	34.55570546	-77.91116353	Public	No FEMA Floodzone	N/A
218	Water/Sewer	swInlet	34.55514676	-77.91097326	Public	No FEMA Floodzone	N/A
219	Water/Sewer	swInlet	34.55517749	-77.9108976	Public	No FEMA Floodzone	N/A
220	Water/Sewer	swInlet	34.55450199	-77.91000216	Public	No FEMA Floodzone	N/A
221	Water/Sewer	swInlet	34.5544869	-77.90980226	Public	No FEMA Floodzone	N/A
222	Water/Sewer	swInlet	34.55454021	-77.90972019	Public	No FEMA Floodzone	N/A
223	Water/Sewer	swInlet	34.55410105	-77.90934948	Public	No FEMA Floodzone	N/A
224	Water/Sewer	swInlet	34.55401368	-77.90922329	Public	No FEMA Floodzone	N/A
225	Water/Sewer	swInlet	34.55413942	-77.90921042	Public	No FEMA Floodzone	N/A
226	Water/Sewer	swInlet	34.55454287	-77.91441359	Public	No FEMA Floodzone	N/A

Asset ID	Asset Type	Asset Name	Lat	Long	Ownership (Private/ Public)	Floodzone Exposure	Overall Vulnerability
227	Water/Sewer	swInlet	34.55434823	-77.91424673	Public	No FEMA Floodzone	N/A
228	Water/Sewer	swInlet	34.55396706	-77.91577632	Public	No FEMA Floodzone	N/A
229	Water/Sewer	swInlet	34.55390572	-77.91601362	Public	No FEMA Floodzone	N/A
230	Water/Sewer	swInlet	34.5540225	-77.91607771	Public	No FEMA Floodzone	N/A
231	Water/Sewer	swInlet	34.5537004	-77.91735963	Public	No FEMA Floodzone	N/A
232	Water/Sewer	swInlet	34.55344568	-77.91784547	Public	No FEMA Floodzone	N/A
233	Water/Sewer	swInlet	34.55356659	-77.91789193	Public	No FEMA Floodzone	N/A
234	Water/Sewer	swInlet	34.55473109	-77.9189275	Public	No FEMA Floodzone	N/A
235	Water/Sewer	swInlet	34.55484175	-77.91897066	Public	No FEMA Floodzone	N/A
236	Water/Sewer	swInlet	34.55480635	-77.91910496	Public	No FEMA Floodzone	N/A
237	Water/Sewer	swInlet	34.55312575	-77.91964409	Public	No FEMA Floodzone	N/A
238	Water/Sewer	swInlet	34.55300414	-77.91960239	Public	No FEMA Floodzone	N/A
239	Water/Sewer	swInlet	34.55279736	-77.92042355	Public	No FEMA Floodzone	N/A
240	Water/Sewer	swInlet	34.55279974	-77.92093843	Public	No FEMA Floodzone	N/A
241	Water/Sewer	swInlet	34.55267906	-77.9208946	Public	No FEMA Floodzone	N/A
242	Water/Sewer	swInlet	34.55244761	-77.92181307	Public	100-year	N/A
243	Water/Sewer	swInlet	34.55251566	-77.92206693	Public	100-year	N/A
244	Water/Sewer	swInlet	34.55247302	-77.92223898	Public	100-year	N/A
245	Water/Sewer	swInlet	34.5523503	-77.92219808	Public	100-year	N/A
246	Water/Sewer	swInlet	34.55233147	-77.92227462	Public	100-year	N/A
247	Water/Sewer	swInlet	34.55209013	-77.92375507	Public	No FEMA Floodzone	N/A
248	Water/Sewer	swInlet	34.55196958	-77.92371052	Public	No FEMA Floodzone	N/A
249	Water/Sewer	swInlet	34.55201443	-77.92405694	Public	No FEMA Floodzone	N/A
250	Water/Sewer	swInlet	34.5518937	-77.92401083	Public	No FEMA Floodzone	N/A
251	Water/Sewer	swInlet	34.55217134	-77.92403417	Public	No FEMA Floodzone	N/A
252	Water/Sewer	swInlet	34.55183358	-77.92425125	Public	No FEMA Floodzone	N/A
253	Water/Sewer	swInlet	34.55187275	-77.9246185	Public	No FEMA Floodzone	N/A
254	Water/Sewer	swInlet	34.55174661	-77.92459541	Public	No FEMA Floodzone	N/A
255	Water/Sewer	swInlet	34.55152728	-77.92545648	Public	No FEMA Floodzone	N/A

Asset ID	Asset Type	Asset Name	Lat	Long	Ownership (Private/ Public)	Floodzone Exposure	Overall Vulnerability
256	Water/Sewer	swInlet	34.55170213	-77.92548119	Public	No FEMA Floodzone	N/A
257	Water/Sewer	swInlet	34.55193216	-77.92554289	Public	No FEMA Floodzone	N/A
258	Water/Sewer	swInlet	34.55204294	-77.92542141	Public	No FEMA Floodzone	N/A
259	Water/Sewer	swInlet	34.55275228	-77.92568232	Public	No FEMA Floodzone	N/A
260	Water/Sewer	swInlet	34.55282705	-77.92657957	Public	No FEMA Floodzone	N/A
261	Water/Sewer	swInlet	34.55289125	-77.92660313	Public	No FEMA Floodzone	N/A
262	Water/Sewer	swInlet	34.55263042	-77.92578225	Public	No FEMA Floodzone	N/A
263	Water/Sewer	swInlet	34.55133732	-77.92620592	Public	No FEMA Floodzone	N/A
264	Water/Sewer	swInlet	34.55145498	-77.92627378	Public	No FEMA Floodzone	N/A
265	Water/Sewer	swInlet	34.55138136	-77.92656705	Public	No FEMA Floodzone	N/A
266	Water/Sewer	swInlet	34.55126575	-77.92648827	Public	No FEMA Floodzone	N/A
267	Water/Sewer	swInlet	34.55117054	-77.92688441	Public	No FEMA Floodzone	N/A
268	Water/Sewer	swInlet	34.55130019	-77.92688481	Public	No FEMA Floodzone	N/A
269	Water/Sewer	swInlet	34.55110148	-77.92716353	Public	No FEMA Floodzone	N/A
270	Water/Sewer	swInlet	34.55121852	-77.92720611	Public	No FEMA Floodzone	N/A
271	Water/Sewer	swInlet	34.55088424	-77.92802782	Public	No FEMA Floodzone	N/A
272	Water/Sewer	swInlet	34.55100188	-77.92807124	Public	No FEMA Floodzone	N/A
273	Water/Sewer	swInlet	34.5509306	-77.92837852	Public	No FEMA Floodzone	N/A
274	Water/Sewer	swInlet	34.55071287	-77.92924403	Public	No FEMA Floodzone	N/A
275	Water/Sewer	swInlet	34.55059207	-77.92919777	Public	No FEMA Floodzone	N/A
276	Water/Sewer	swInlet	34.5506077	-77.92966448	Public	No FEMA Floodzone	N/A
277	Water/Sewer	swInlet	34.55035104	-77.93068752	Public	No FEMA Floodzone	N/A
278	Water/Sewer	swInlet	34.55028866	-77.93093844	Public	No FEMA Floodzone	N/A
279	Water/Sewer	swInlet	34.55016527	-77.93089863	Public	No FEMA Floodzone	N/A
280	Water/Sewer	swInlet	34.55074713	-77.93190319	Public	500-year	N/A
281	Water/Sewer	swInlet	34.55077292	-77.93180837	Public	500-year	N/A
282	Water/Sewer	swInlet	34.55142189	-77.93197416	Public	500-year	N/A
283	Water/Sewer	swInlet	34.55127906	-77.93191945	Public	500-year	N/A
284	Water/Sewer	swInlet	34.55157958	-77.93135645	Public	500-year	N/A

Asset ID	Asset Type	Asset Name	Lat	Long	Ownership (Private/ Public)	Floodzone Exposure	Overall Vulnerability
285	Water/Sewer	swInlet	34.55165313	-77.93106453	Public	500-year	N/A
286	Water/Sewer	swInlet	34.55174389	-77.93069506	Public	500-year	N/A
287	Water/Sewer	swInlet	34.55246354	-77.92803158	Public	No FEMA Floodzone	N/A
288	Water/Sewer	swInlet	34.55252777	-77.92805532	Public	No FEMA Floodzone	N/A
289	Water/Sewer	swInlet	34.5540098	-77.92771426	Public	No FEMA Floodzone	N/A
290	Water/Sewer	swInlet	34.55401969	-77.92771788	Public	No FEMA Floodzone	N/A
291	Water/Sewer	swInlet	34.55397968	-77.92783484	Public	No FEMA Floodzone	N/A
292	Water/Sewer	swInlet	34.55398947	-77.92783822	Public	No FEMA Floodzone	N/A
293	Water/Sewer	swInlet	34.55419147	-77.92791242	Public	No FEMA Floodzone	N/A
294	Water/Sewer	swInlet	34.55418053	-77.92769828	Public	No FEMA Floodzone	N/A
295	Water/Sewer	swInlet	34.55409648	-77.92766974	Public	No FEMA Floodzone	N/A
296	Water/Sewer	swInlet	34.55564957	-77.9283152	Public	No FEMA Floodzone	N/A
297	Water/Sewer	swInlet	34.555618	-77.92843458	Public	No FEMA Floodzone	N/A
298	Water/Sewer	swInlet	34.55515906	-77.92830239	Public	No FEMA Floodzone	N/A
299	Water/Sewer	swInlet	34.55541002	-77.92835881	Public	No FEMA Floodzone	N/A
300	Water/Sewer	swInlet	34.55495232	-77.92822503	Public	No FEMA Floodzone	N/A
301	Water/Sewer	swInlet	34.55463376	-77.92810923	Public	No FEMA Floodzone	N/A
302	Water/Sewer	swInlet	34.54498103	-77.92823176	Public	No FEMA Floodzone	N/A
303	Water/Sewer	swInlet	34.55319771	-77.91836989	Public	No FEMA Floodzone	N/A
304	Water/Sewer	swInlet	34.54606113	-77.92884877	Public	No FEMA Floodzone	N/A
305	Water/Sewer	swInlet	34.5459629	-77.9288125	Public	No FEMA Floodzone	N/A
306	Water/Sewer	swInlet	34.5464459	-77.92730824	Public	No FEMA Floodzone	N/A
307	Water/Sewer	swInlet	34.546348	-77.92727195	Public	No FEMA Floodzone	N/A
308	Water/Sewer	swInlet	34.54524974	-77.9321859	Public	No FEMA Floodzone	N/A
309	Water/Sewer	swInlet	34.54551014	-77.93099245	Public	No FEMA Floodzone	N/A
310	Water/Sewer	swInlet	34.5454127	-77.93095411	Public	No FEMA Floodzone	N/A
311	Water/Sewer	swInlet	34.54571934	-77.93019968	Public	No FEMA Floodzone	N/A
312	Water/Sewer	swInlet	34.54562193	-77.93016234	Public	No FEMA Floodzone	N/A
313	Water/Sewer	swInlet	34.54582174	-77.9298015	Public	No FEMA Floodzone	N/A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