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Subtask 2.14: Identification of Vulnerable, Underserved and Under-resourced Communities in the Neuse Basin

North Carolina Flood Resiliency Blueprint

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

December 2023

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Definitions

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

Common Acronyms

ADA - Americans with Disabilities Act

CAB - Community Advisory Board

CEJST - Climate and Economic Justice Screening Tool

CFLD - Coastal Flooding

ClimRR - Climate Risk and Resilience Portal

CMS - Community Mapping System

DAC - Disadvantaged Communities

EAL - Expected Annual Loss

EALT - Expected Annual Loss Total

EJ - Environmental Justice

EJSCREEN - Environmental Justice Screening and Mapping Tool

EXPT – Exposure tool

FEMA - Federal Emergency Management Agency

HRCN - Hurricane

J40 - Justice 40 Initiative

LMI - Low- and Moderate-Income

NC – North Carolina

NCDEQ – North Carolina Department of Environmental Quality

NOAA - National Oceanic and Atmospheric Administration

NRI - National Risk Index

RFLD - Riverine Flooding

RMP - Risk Management Plan

SLR - Sea Level Rise

SVI - Social Vulnerability Index

US – United States

USDA - U.S. Department of Agriculture

1 Scope

The Flood Resiliency Blueprint (Blueprint) includes many tasks and reports. A description of how all Blueprint documents tie together can be found *here*.

The scope of this task was to support the Blueprint through the identification of vulnerable, underserved, and under-resourced communities in the Neuse River Basin that experience or will experience flooding and possible solutions for increasing the resiliency of those communities and adjacent ecosystems, based in part on stakeholder engagement with those communities.

To prepare for stakeholder engagement, the communities must first be identified. This document outlines the data and process used to identify these communities in the Neuse River Basin along with recommendations related to engagement of these communities. Potential solutions for increasing resiliency will be identified after stakeholder engagement has occurred for the Draft Neuse Basin Flood Resiliency Action Strategy (Subtask 4.4).

Communities identified in this report were determined by evaluating and cross-referencing flood, environmental, and social vulnerability datasets to consider cumulative impacts of these various types of vulnerabilities and risks. The information will be used to inform the stakeholder engagement efforts within the Neuse Basin and support the development of the Draft Neuse Basin Flood Resiliency Action Strategy (Subtask 4.4). It is possible that further evaluation of data and discussion with stakeholder engagement specialists will identify additional areas of vulnerable, under-served and under-resourced communities. However, this report represents the first step in that process.

A draft proposal that provides a more defined, repeatable approach is included in Appendix A. The draft approach would result in similar findings as this report. Feedback from underserved, under-resourced, and vulnerable communities will help finalize this approach.

The NC Flood Resiliency Blueprint is an ongoing process where the Blueprint Team and its partners learns as we move through the state and work with each basin. Some of the documents may be revisited as experience is gained, more information is gathered, and as better data, methodologies, and new technologies become known.

2 Community Identification

2.1 Data Sources

Three data sources were used to identify vulnerable, under-served, and under-resourced communities in the Neuse River Basin that will experience flooding. They were used because of their widespread acceptance and ease of use. They are all publicly available online tools with downloadable datasets at the census tract level. Each dataset serves a unique purpose in this assessment. The data sources used are as follows:

- Federal Emergency Management Agency's (FEMA's) National Risk Index (NRI), Version 1.19 (https://hazards.fema.gov/nri/data-resources)
- Climate and Economic Justice Screening Tool (CEJST), Version 1.0 (https://screeningtool.geoplatform.gov/en/)
- Centers for Disease Control and Prevention / Agency for Toxic Substances and Disease Registry Social Vulnerability Index (SVI), 2020 (https://www.atsdr.cdc.gov/placeandhealth/svi/index.html)

The following sections discuss each of these data sources in further detail. Additional data sources are also briefly discussed that are considered valuable datasets that were not used in the initial community selection. The discussion covers why these additional sources were not used and identifies ways they can be used to solidify the community selection and to provide additional details about them.

2.1.1 National Risk Index

The National Risk Index (NRI) is a natural hazard risk dataset developed by FEMA that is used to assess risk from 18 natural hazards and was used to identify where risk to flooding is most prominent in the Neuse River Basin. This assessment focused on the three hazards most applicable to this project — coastal flooding, hurricanes, and riverine flooding. The NRI calculates a risk score using three components: Expected Annual Loss, Social Vulnerability, and Community Resilience. The Social Vulnerability component of the NRI is the SVI data which is utilized in this assessment separately and discussed later in this document. The Community Resilience component is University of South Carolina's Baseline Resilience Indicators for Communities (BRIC) data. The BRIC dataset is only available at the county level which is not granular enough to include in this assessment. Therefore, only the Expected Annual Loss component was considered in this analysis.

The Expected Annual Loss Total (EALT) represents the average loss in dollars of buildings, population, and agriculture each year due to a given hazard. This metric can inherently skew toward wealthier communities having greater overall risk than economically disadvantaged communities with the same likelihood of a given hazard simply because the monetary value of buildings in wealthier communities is higher. To examine the data from a more equitable perspective, the expected annual loss (EAL) Rate was used for this assessment. The EAL Rate uses two variables for each of the three hazards from the NRI — the EALT and the exposure total (EXPT). EXPT represents the monetary value

of the buildings, population[2], and agriculture potentially exposed to a given hazard. The EAL Rate represents the EALT as a ratio of the EXPT. The EAL Rate used in this assessment is demonstrated in equation form as follows:

EAL Rate = (CFLD_EALT / CFLD_EXPT) + (HRCN_EALT / HRCN_EXPT) + (RFLD_EALT / RFLD_EXPT)

Where,

CFLD_EALT = EALT from coastal flooding
CFLD_EXPT = EXPT to coastal flooding
HRCN_EALT = EALT from hurricane
HRCN_EXPT = EXPT to hurricane
RFLD_EALT = EALT from riverine flooding
RFLD_EXPT = EXPT from riverine flooding

Figure 2-1 and Figure 2-2 display the difference between the EALT and EAL Rate across the Neuse River Basin at the census tract level. Figure 2-1 shows that the total expected annual losses of buildings, population, and agriculture each year due to flooding and hurricanes ranges from just over $1,000 to over $8 million dollars in tracts across the Neuse River Basin. Figure 2-2 shows that the majority of tracts in the Neuse River Basin expected to lose less than 0.05% of the value of the buildings, population, and agriculture annually that are exposed to flooding and hurricanes.

[2] Benefit-Cost Analysis Sustainment and Enhancements: Standard Economic Values Methodology Report (Version 11.0) (fema.gov)

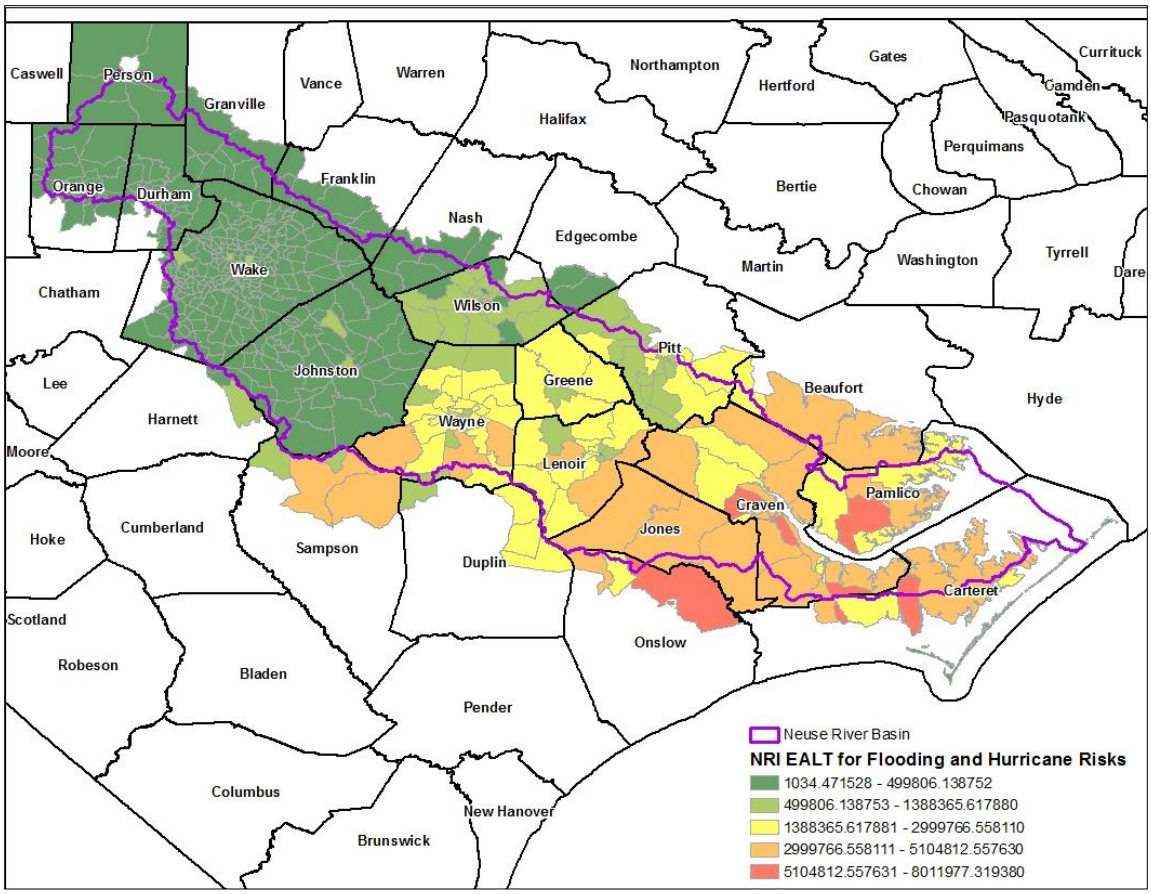

Figure 2-1: EALT for Flood and Hurricane Risks

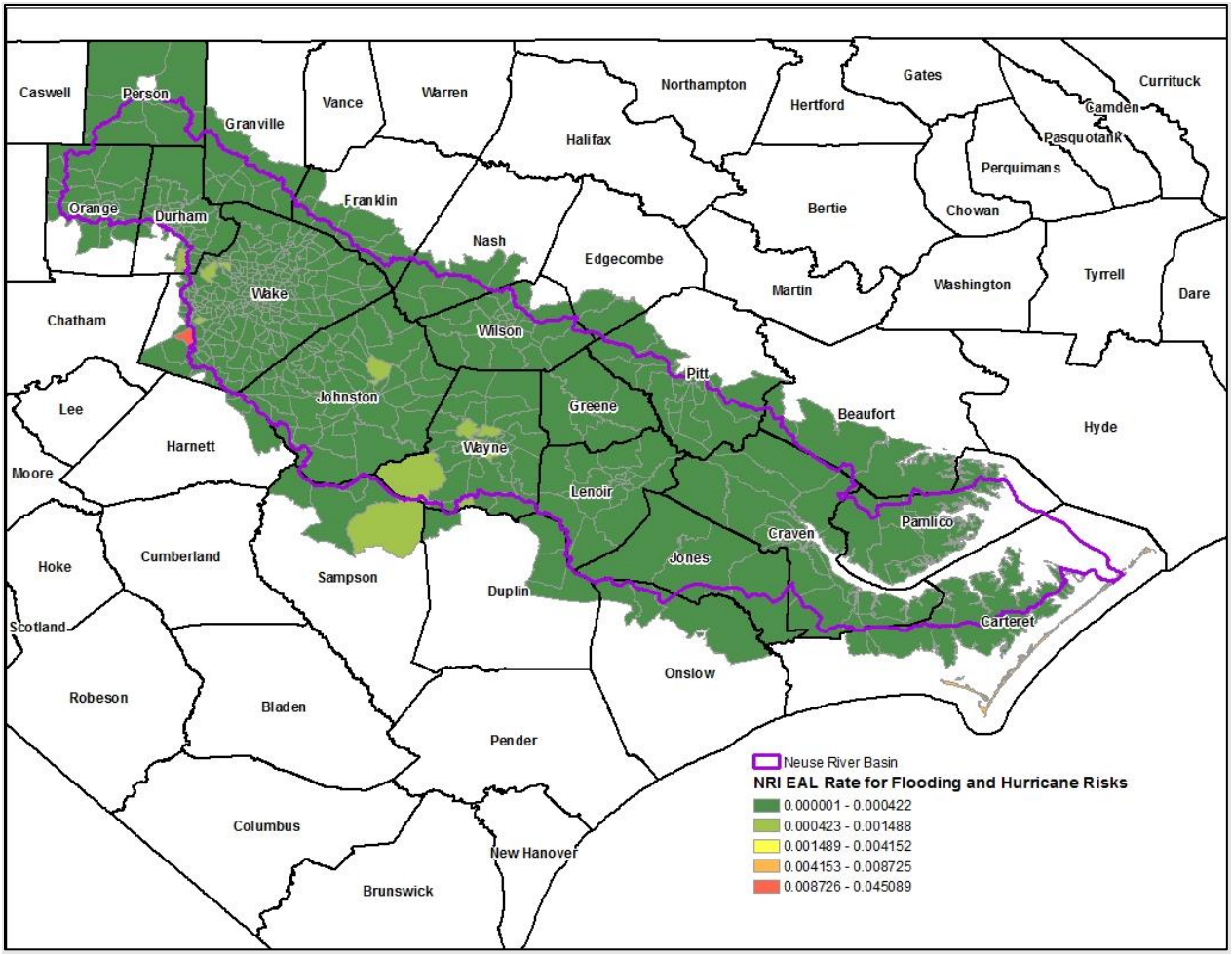

Figure 2-2: EAL Rate for Flood and Hurricane Risks

Figure 2-1 supports the logical assumption that financial losses increase in the southern portion of the basin as we move closer to the coast. The highest annual losses due to flooding and hurricanes are in tracts in Beaufort, Carteret, Craven, Jones, and Pamlico Counties.

Figure 2-2 demonstrates that the majority of tracts in the basin experience fairly similar EAL Rates with a few pocket areas experiencing a higher percentage of loss of buildings, population, and agriculture due to flooding and hurricanes. These pocket areas fall within Johnston, Wake, Wayne, and Wilson Counties.

The EALT and EAL Rate for the coastal flooding and hurricane risks increases closer to the coastline – similar to the overall EALT and EAL Rate assessed in Figures 1 and 2. Therefore, the riverine flood risk was also assessed individually. Figure 2-3 and Figure 2-4 display the EALT and EAL Rate for the riverine flooding risk across the basin.

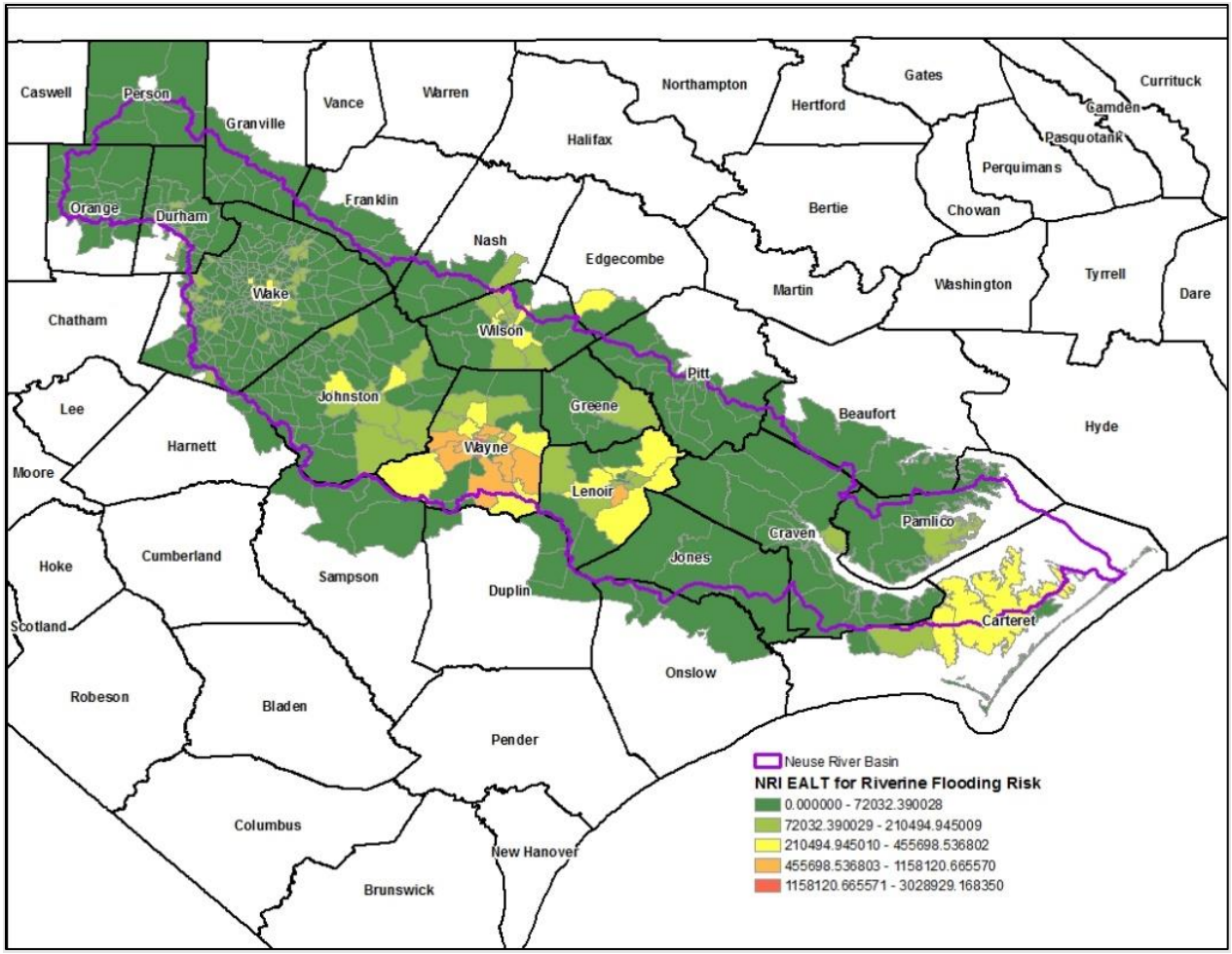

Figure 2-3: EALT for Riverine Flood Risk

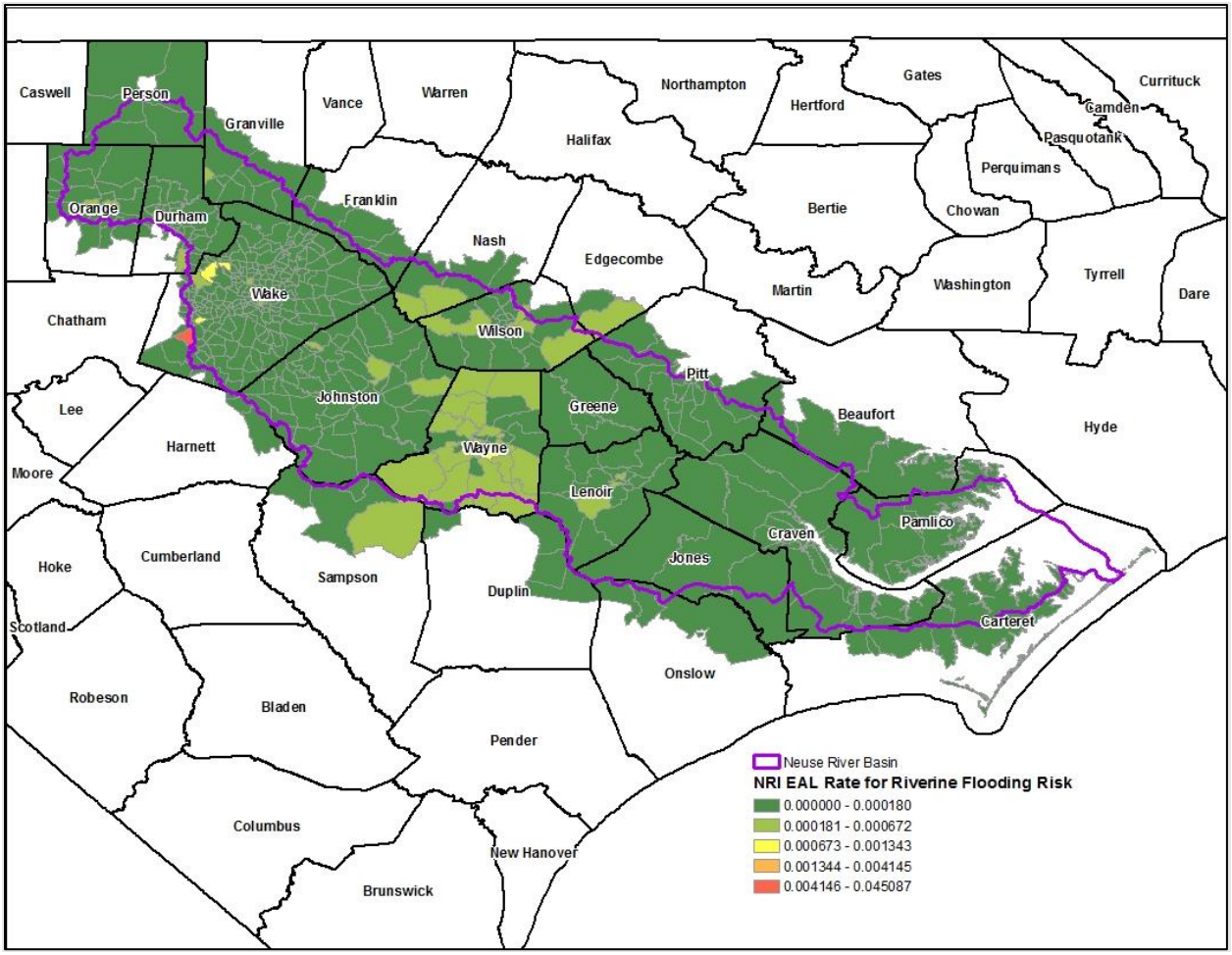

Figure 2-4: EAL Rate for Riverine Flood Risk

Figure 2-3 and Figure 2-4 show risk from riverine flooding to be more prominent in the central portion of the Neuse River Basin.

2.1.2 Social Vulnerability Index

The Social Vulnerability Index (SVI) identifies socially vulnerable populations and is used by numerous federal programs. This dataset uses 16 census variables[3] to rank the overall social vulnerability of census tracts into quartile rankings of low, low-medium, medium-high, and high.

[3] https://www.atsdr.cdc.gov/placeandhealth/svi/documentation/pdf/SVI2020Documentation_08.05.22.pdf

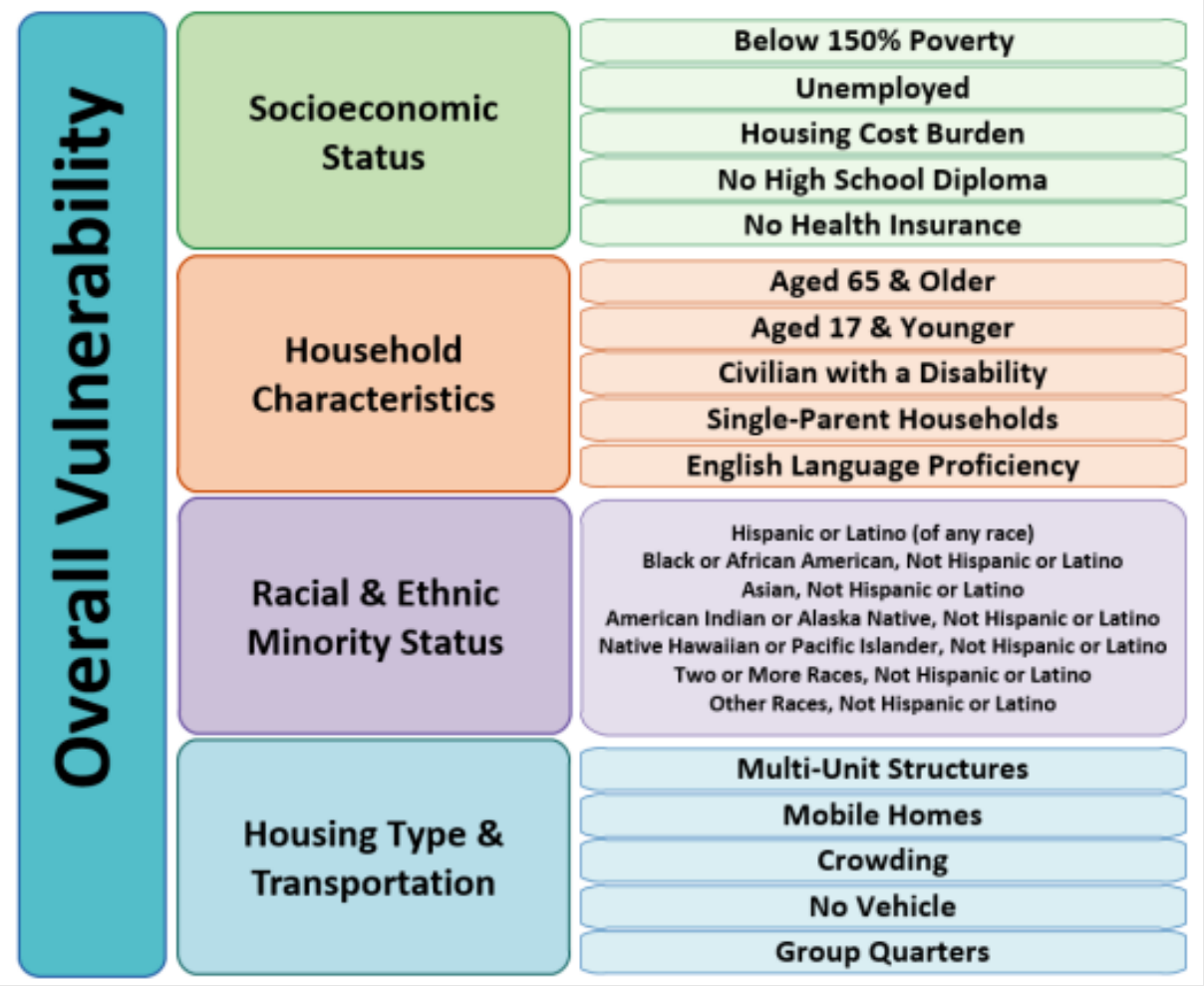

Figure 2-5: SVI Indicators

SVI data can be downloaded at a nationwide or statewide scale. In North Carolina, and particularly in the Neuse River Basin, there is little variation between the nationwide and statewide quartile rankings. Therefore, the statewide dataset was used in this assessment as it provides a North Carolina-specific picture of social vulnerability because it is comparing tracts only to other tracts throughout the state. Figure 2-6 displays the quartile ranking of social vulnerability in the Neuse River Basin.

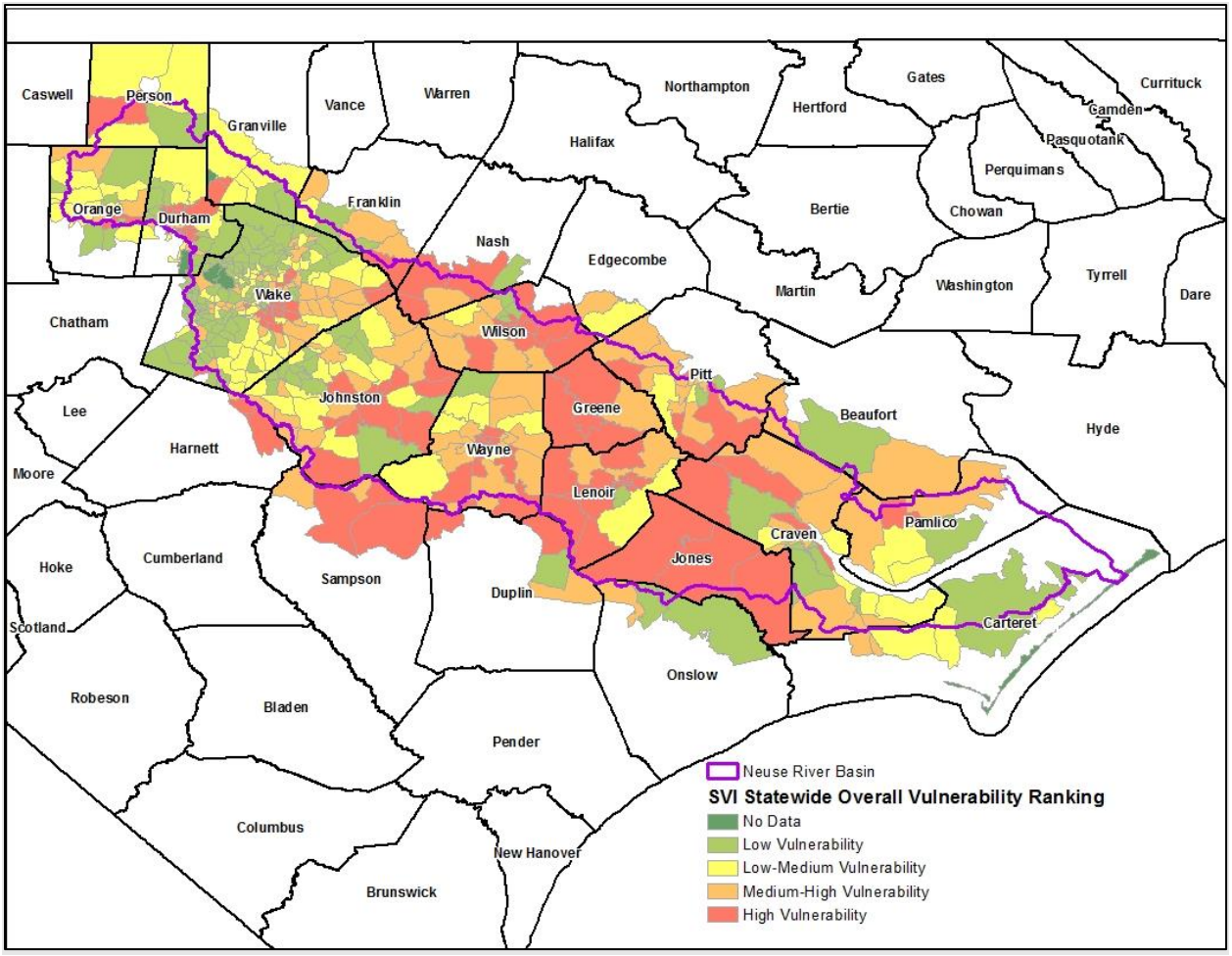

Figure 2-6: Statewide Social Vulnerability Ranking for the Neuse Basin

2.1.3 Climate and Economic Justice Screening Tool

The CEJST was developed specifically to identify disadvantaged communities (DACs) for federal programs to use when reporting on progress related to the Justice40 (J40) Initiative. The J40 Initiative was established as part of Executive Order 14008, entitled "Tackling the Climate Crisis at Home and Abroad." The initiative is a whole-of-Federal government effort to deliver at least 40 percent of the overall benefits from federal investments in climate and clean energy to disadvantaged communities. All federal programs that make investments in climate and clean energy must report on J40 progress. DACs, as defined for J40, are those communities that have been marginalized by society, overburdened by pollution, and underserved by infrastructure and other basic services. This dataset considers eight categories of burden: climate change, energy, health, housing, legacy pollution, transportation, water and wastewater, and workforce development. This dataset is much more focused on environmental and health burdens compared to the CDC SVI which solely considers social factors.

Figure 2-7 displays the census tracts in the Neuse River Basin that are classified as disadvantaged by the CEJST. The DACs are heavily concentrated in the central to southcentral portion of the Neuse River Basin.

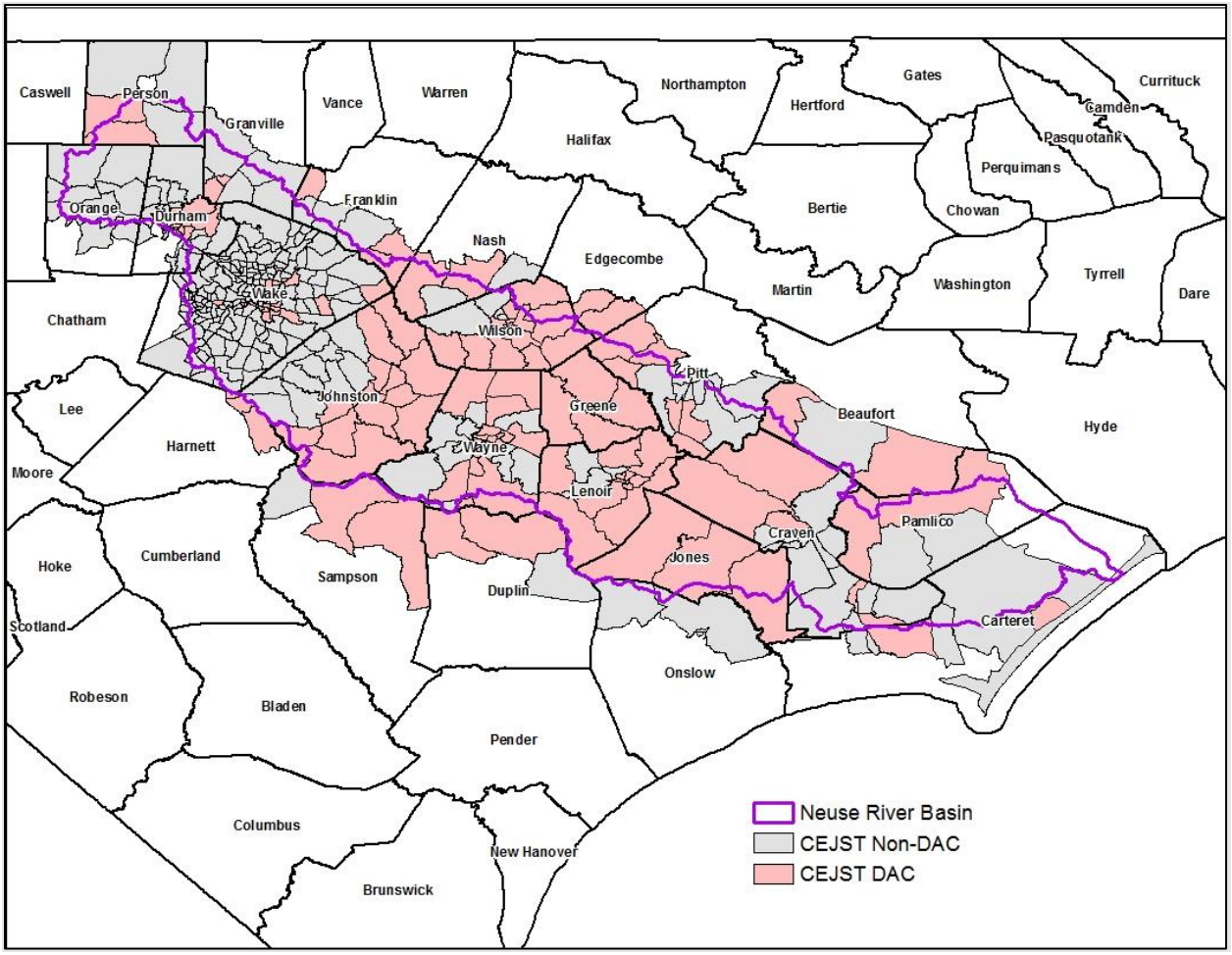

Figure 2-7: Disadvantaged Communities (DACs)

Figure 2-8 shows the number of burden categories (1 – 8) meeting the minimum thresholds to classify the tracts as DACs. Only one burden category has to meet the minimum thresholds to classify a tract as a DAC but looking at the number of burden categories meeting thresholds helps identify areas facing multiple burdens. The tracts with higher numbers of burden categories meeting the thresholds set in this tool also fall in the central to southcentral portion of the Neuse River Basin.

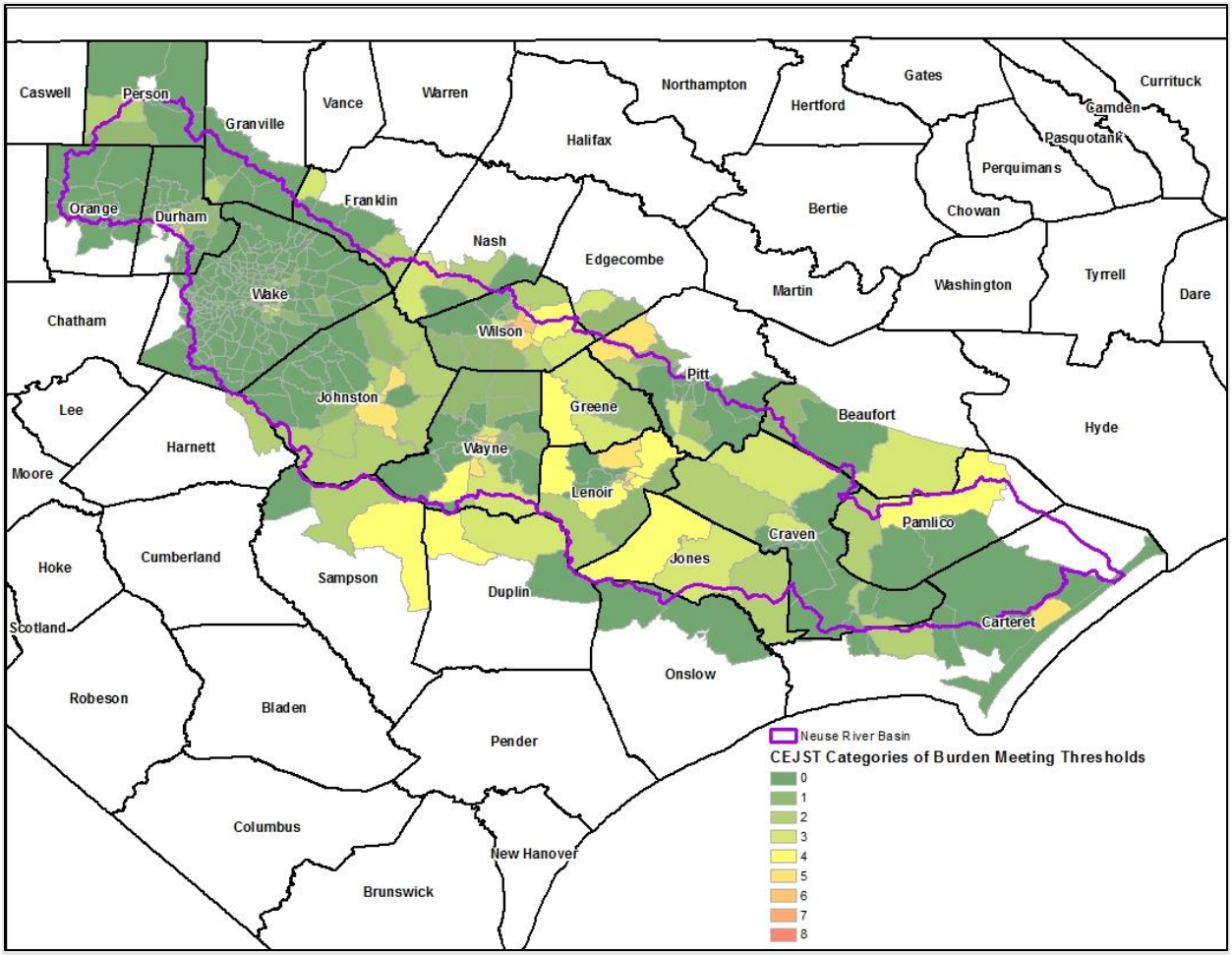

Figure 2-8: Categories of Burden meeting thresholds to identify areas facing multiple burdens.

2.1.4 Other Datasets

There are several other valuable datasets that were not used in the selection of communities that are worth discussing and that were used in other ways in this process. These datasets were not used for community identification primarily because they would make the process less efficient and difficult while not providing significant additional value. This is an approach that needs to be repeatable and efficient and can be included in a final decision support tool for the State. These datasets were used to confirm some of the initial findings that classified these as identified vulnerable, underserved, and under-resourced communities and to provide additional details and information on the selected communities to be used during community outreach and engagement and resiliency planning.

2.1.4.1 Environmental Justice Screening and Mapping Tool

The Environmental Justice Screening and Mapping Tool (EJSCREEN) was developed by the United States (US) Environmental Protection Agency and is considered the first National level environmental justice (EJ) tool. It was published in 2015. This is strictly an online tool and not a downloadable dataset (but all indicators in the tool are publicly available data). The CEJST uses a number of datasets from this tool and displays results at the block group level. This tool does not consider cumulative impacts and it can be difficult to assess compounding vulnerabilities. It includes 13 environmental/pollution, seven socioeconomic, five health disparity, four climate change data, and

five critical service gap indicators. Some of its more unique indicators are among the pollution indicators, broadband internet gaps, and food deserts.

https://ejscreen.epa.gov/mapper/

2.1.4.2 North Carolina Department of Environmental Quality Community Mapping System

This North Carolina Department of Environmental Quality (NCDEQ) Community Mapping System (CMS) is the tool that provides the most local data and at the census block level. This is strictly an online tool and not a downloadable dataset making it not viable for quick assessment of community's basin wide. This tool is intended to provide permitting and other environmental information to increase knowledge, understanding, and local outreach and public participation. It also has an EJ component intended to provide relevant demographic and health data. Beyond having local environmental information, one of the more unique pieces of data this tool provides is related to the status of renter- and owner-occupied housing.

https://ncdenr.maps.arcgis.com/apps/webappviewer/index.html?id=1eb0fbe2bcfb4cccb3cc212af8a0b8c8

2.1.4.3 Low- and Moderate-Income Data

The low- and moderate-income (LMI) data is published by the US Department of Housing and Urban Development. The data is available at block group, place, county subdivisions, and county level. This is an online tool and can be downloaded but does not add significant information to assessments as all tools used in this assessment have income and/or poverty indicators. The most current dataset available is the 2011-2015 dataset. All other datasets used have newer data.

https://hud.maps.arcgis.com/apps/webappviewer/index.html?id=ffd0597e8af24f88b501b7e7f326bedd

2.1.4.4 Climate Change Data

Climate change is crucial to consider for the Blueprint. It is even more important to consider impacts of climate change for already vulnerable communities as it has been documented that climate change will impact vulnerable communities hardest. Two climate change datasets were considered in this analysis. These climate change datasets specifically were not included in the initial selection of communities in this process as they would skew overall vulnerability to be highest in coastal areas when they exist in a basin and could cause vulnerable communities further inland and their unique needs to be overlooked.

2.1.4.5 Sea Level Rise Viewer

The sea level rise (SLR) viewer, an online tool, is produced by the National Oceanic and Atmospheric Administration (NOAA) and data can also be downloaded. This tool displays the inundation areas in one foot increments above current Mean Higher High Water level up to 10 feet. Sea level rise (SLR) has a correlation with an increase in the number of flooding events that occur annually. It does not include actual SLR predictions. The southern portion of the Neuse River Basin is most likely to be impacted by SLR as it is near the coast.

https://coast.noaa.gov/slr/#/layer/slr/0/-11581024.663779823/5095888.569004184/4/satellite/none/0.8/2050/interHigh/midAccretion

2.1.4.6 Climate Risk and Resilience Portal Precipitation Explorer

The Climate Risk and Resilience (ClimRR) portal was developed by the Center for Climate Resilience and Decision Science at Argonne National Laboratory in partnership with AT&T and FEMA and intended to be used for future climate risk planning. The map component of this portal provides climate projections related to temperature, precipitation, wind speeds, and fire weather. The Precipitation Explorer component of the map was referenced in this assessment and the data is downloadable. The majority of Neuse River Basin expected to experience a 1-8-inch increase in precipitation in the next 30 years and a 6-10-inch increase by late century. The expected increase range increases as you move towards coastline.

https://disgeoportal.egs.anl.gov/portal/apps/webappviewer/index.html?id=bae59f3ee7d64c38be73fa0e9dfff77c

2.2 Identified Communities

This assessment is intended to identify vulnerable, under-served, and under-resourced communities to engage with more closely to collect feedback and to help shape the Neuse Basin Action Strategy to better serve these communities. This assessment is not intended to identify and engage with every vulnerable, under-served, and under-resourced community in the basin. It is important to identify representative communities across the basin that have a variety of vulnerabilities and obstacles, as well as, of natural hazard risks being faced so that this engagement can help serve all vulnerable, under-served, and under-resourced communities across the basin and the State and help shape the Blueprint Decision Support Tool.

Seven representative communities have been identified for consideration to be included in stakeholder engagement intended to help shape the decision support tool being developed for this project. In the following sections, each of these seven communities is discussed further, explaining why they were identified and are good candidates for additional outreach. The communities selected are listed by a geographic location identifier. This geographic location identifier is not an exact description of its boundaries. While the geographic description identifier may be an incorporated area, the actual boundary of the identified community may also include unincorporated areas. Figure 2-9 displays the geographic spread of the identified communities.

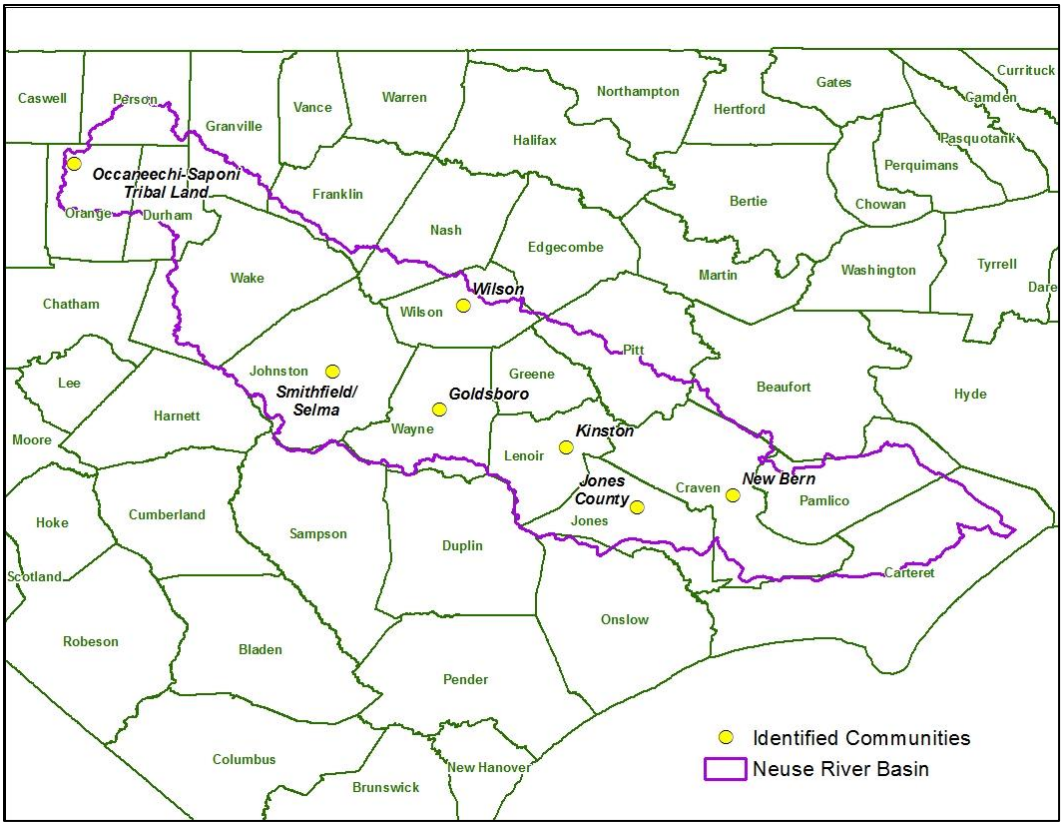

Figure 2-9: Identified Communities

2.2.1 City of New Bern, Craven County

Population ~ 31,539

The northeast portions of the City of New Bern is considered vulnerable, under-served, and under-resourced. The community is an urbanized area facing high flood risk that is expected to increase with climate change. The north to northeast portion of the city faces numerous environmental, health, and social risks compounding their obstacles to resiliency.

2.2.1.1 NRI Findings

This portion of the community is expected to experience some of the highest annual losses due to flooding and hurricanes in the basin.

2.2.1.2 SVI Findings

The northern portion of the community, particularly the northeast, are among the highest social vulnerability rankings in the State (see Figure 2-10). Eight of the 16 indicators in this community fall among the 90th percentile in the state:

- Persons below 150 percent poverty
- Housing cost-burden occupied housing units.
- Persons with no high school diploma
- Persons uninsured
- Single-parent households
- Persons with limited English

- Crowded households
- Households with no vehicle

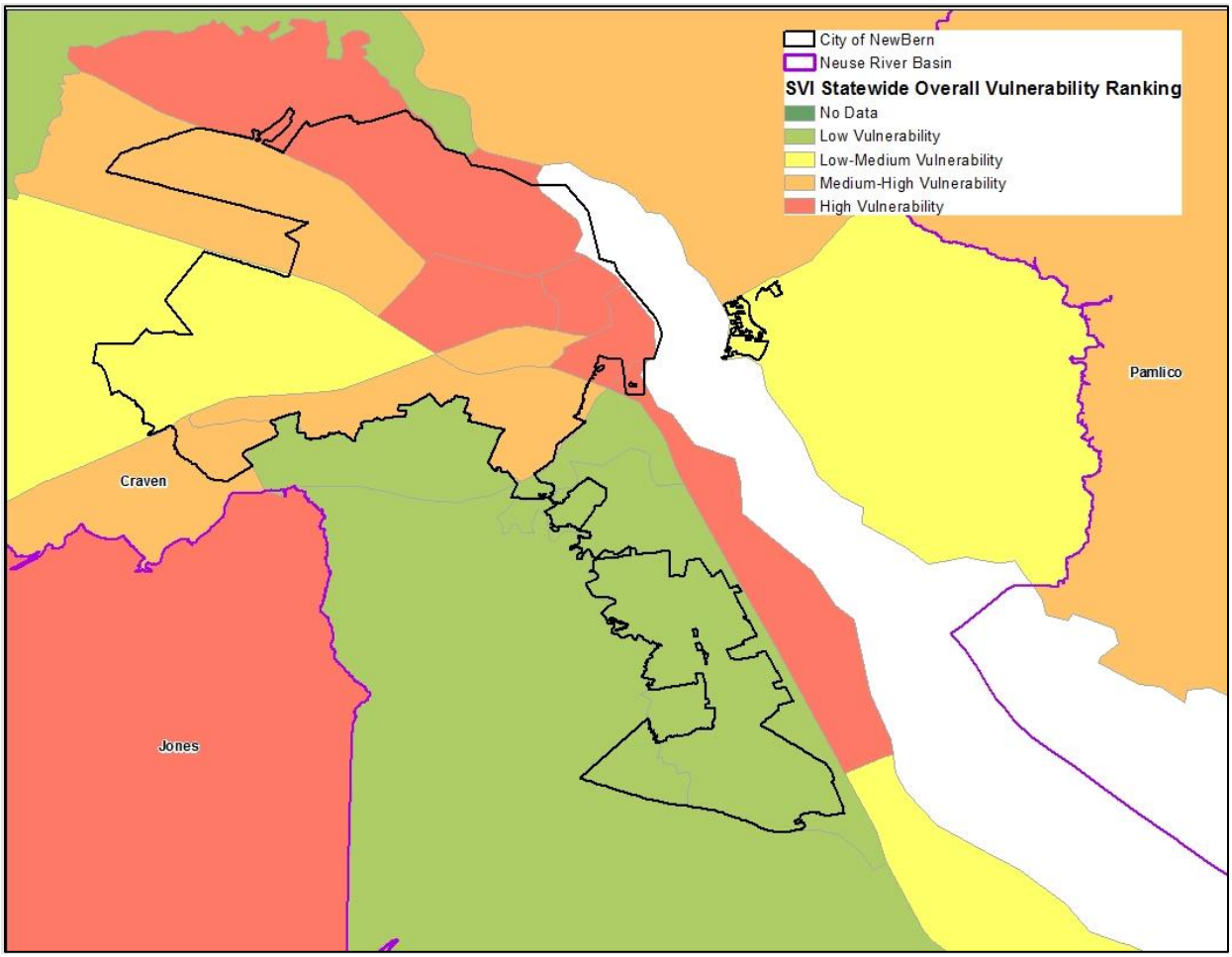

Figure 2-10: City of New Bern SVI Rankings

SVI data also provides insight to some of the specific vulnerabilities that could impact stakeholder engagement and outreach activities:

Minority Populations: The population of this area is approximately 40% African American and Hispanic/Latino.

Language Barriers: There is a concentrated population with limited English proficiency in this area in Census Tract 37049960600 (north of Dr. Martin Luther King Jr. Boulevard, east of US Highway 17, south of S Glenburnie Road, and west of Norfolk Southern Railway) where the Hispanic/Latino population accounts for 12% of the total population in this tract.

Single Parent Households: There is a large percentage of single parent households in this area. The percentile ranking for single parent households with children under 18 years old in most tracts in this area rank among the 55th – 98th percentile across the State.

No Vehicle: A large number of households do not have access to a vehicle. The percentile ranking for households with no vehicle in most tracts in this area rank among the 71st – 98th percentile across the State.

No Broadband Internet: This portion of the city is also where more people in this area do not have access to broadband internet.

2.2.1.3 CEJST Findings

The northeast portion of the city is classified as DACs in the CEJST as shown in Figure 2-11. Six of the eight categories of burden are flagged as issues in this community. Below is a list of indicators in each of these six burden categories meeting set thresholds:

- Climate Change: expected agriculture loss rate, projected flood risk
- Energy: energy cost
- Health: asthma, diabetes, heart disease, low life expectancy
- Legacy Pollution: formerly used defense sites.
- Water and Wastewater: underground storage tanks and releases
- Workforce Development: low median income, poverty, unemployment, high school education

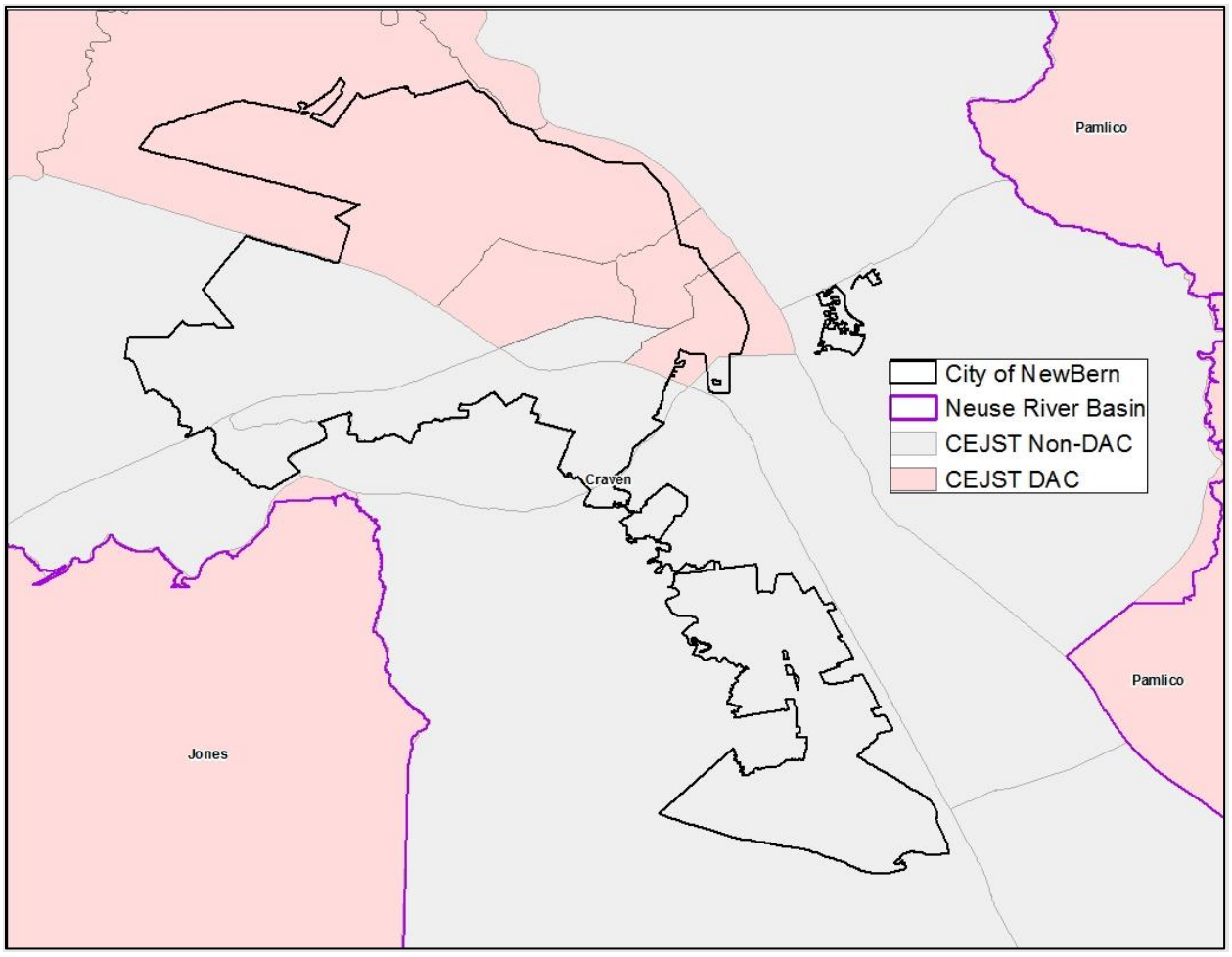

Figure 2-11: City of New Bern CEJST DACs

2.2.1.4 Additional Findings

Additional findings and/or supporting data was also collected from the other datasets discussed earlier in this report not used in the selection process.

2.2.1.4.1 CLIMATE CHANGE DATA

Among the seven identified communities, New Bern is the one most likely to experience the biggest changes due to climate change. NOAA's Sea Level Rise Viewer shows that SLR is expected to impact areas immediately north of Trent River first. The Precipitation Explorer in ClimRR shows that precipitation is expected to increase approximately 4-9 inches in the next 30 years.

2.2.1.4.2 EJSCREEN

EJSCREEN supports the CEJST findings of underground storage tanks being an environmental hazard and flags some additional environmental concerns in this community such as diesel particulate matter and lead paint. This tool also supports the low-income and health vulnerability findings from the CEJST and SVI. It also supports broadband access issues exist in this portion of the community as found in the SVI.

2.2.1.4.3 NCDEQ CMS

The NCDEQ CMS tool shows a large number of underground storage tank incidents in this community supporting the CEJST findings. This tool also identifies block groups in this area as potentially underserved, supporting the findings from the CEJST and SVI.

In this area, homeowners and renters are evenly split. It is important to consider the viewpoint of renters when preparing education materials. This group can also provide a unique perspective to challenges they face in flood resiliency.

2.2.1.4.4 LMI

The majority of census block groups in the northeast portion of New Bern are classified as low- and moderate-income block groups.

2.2.2 Towns of Selma and Smithfield, Johnston County

Population ~ 19,181

The southern portions of the Towns of Selma and Smithfield and unincorporated areas south of Smithfield were identified as a vulnerable, underserved, and under-resourced community Figure 2-12. This community is a mix of urban and rural areas facing higher riverine flood risk than most of the Neuse River Basin and that is expected to increase due to increased development and impervious surfaces, and more frequent high intensity rain events. This community faces numerous environmental, health, and social risks compounding their obstacles to resiliency.

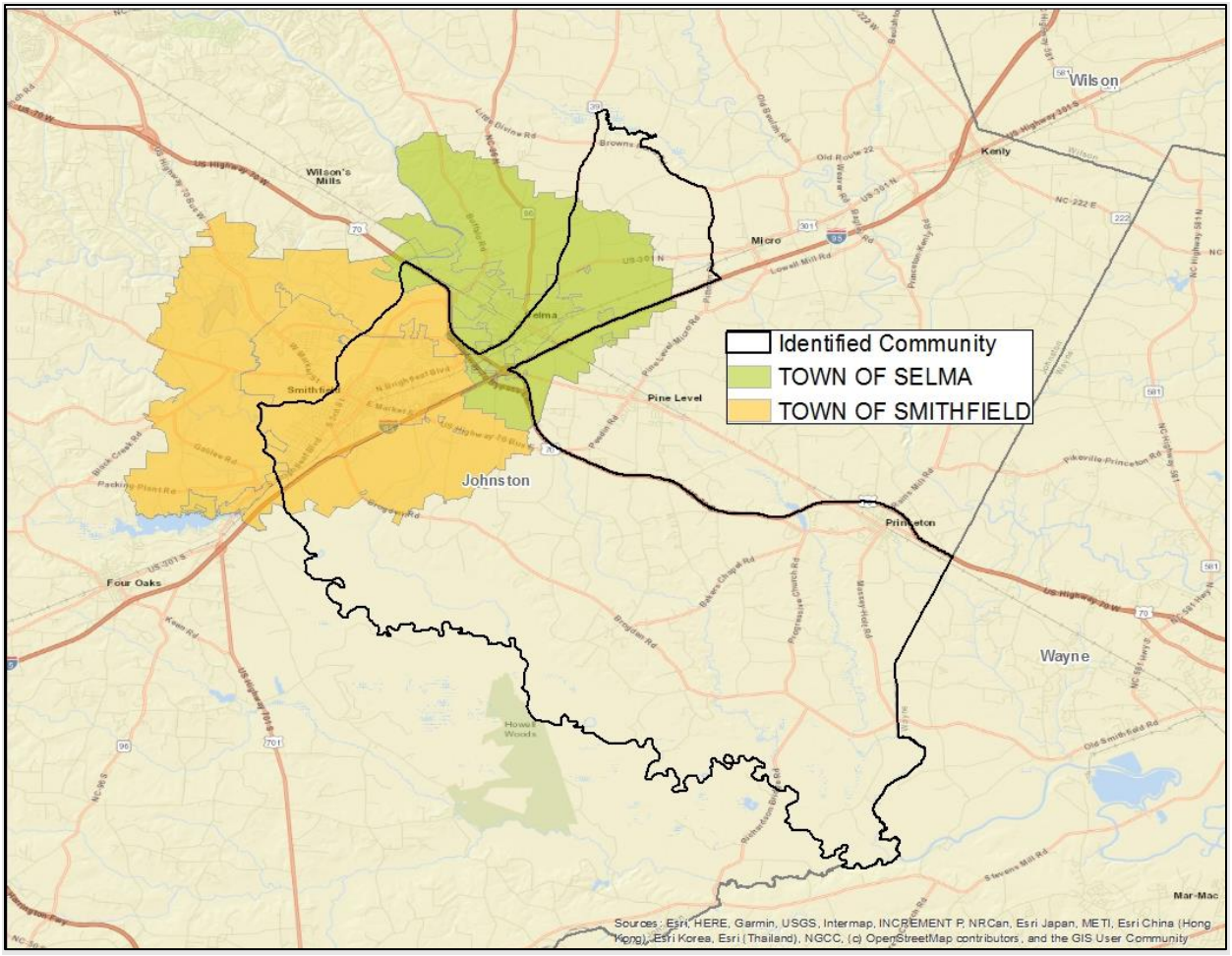

Figure 2-12: Identified Community Near Towns of Selma and Smithfield

2.2.2.1 NRI Findings

This identified community is expected to experience annual losses due to riverine flooding greater than the majority of the Neuse River Basin.

2.2.2.2 SVI Findings

The entire identified community is among the highest social vulnerability rankings in the state (see Figure 2-13). Nine of the sixteen indicators in this community fall among the 90th percentile in the State:

- Persons below 150 percent poverty
- Civilians unemployed
- Housing cost-burden occupied housing units.
- Persons aged 17 or younger.
- Persons with a disability
- Single-parent households
- Crowded households
- Households with no vehicle
- Persons in group quarters

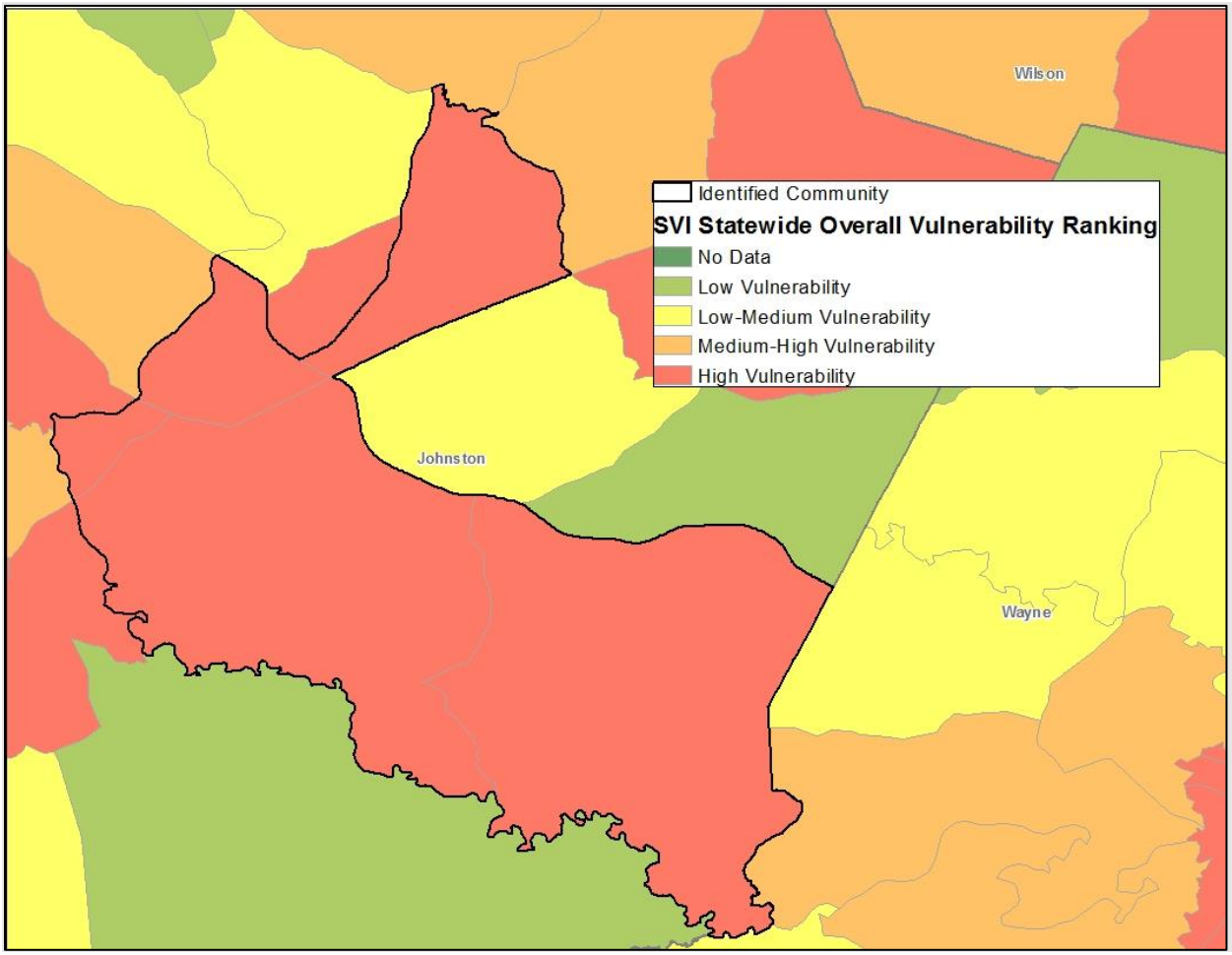

Figure 2-13: SVI Rankings Near Towns of Selma and Smithfield

SVI data also provides insight to some of the specific vulnerabilities that could impact stakeholder engagement and outreach activities:

Minority Populations: This identified community is approximately 44% African American and Hispanic/Latino.

Single Parent Households: There is a large percentage of single parent households in the Selma portion of the community. The percentile ranking for single parent households with children under 18 years old in most tracts in this area rank among the 59th – 94th percentile across the State.

No Vehicle: A large number of households do not have access to a vehicle. The percentile ranking for households with no vehicle across this entire community rank among the highest across the State (73rd – 97th percentile).

No Broadband Internet: Approximately 25% of the population in this community also lacks access to broadband internet.

2.2.2.3 CEJST Findings

This entire community is classified as a DAC in the CEJST as shown in Figure 2-14. Six of the eight categories of burden are flagged as issues in this community. Below is a list of indicators in each of these six burden categories meeting set thresholds:

- Climate Change: expected agriculture loss rate
- Energy: energy cost
- Health: diabetes, heart disease, low life expectancy
- Housing: housing cost
- Transportation: transportation barriers
- Water and Wastewater: underground storage tanks and releases
- Workforce Development: low median income, unemployment, high school education

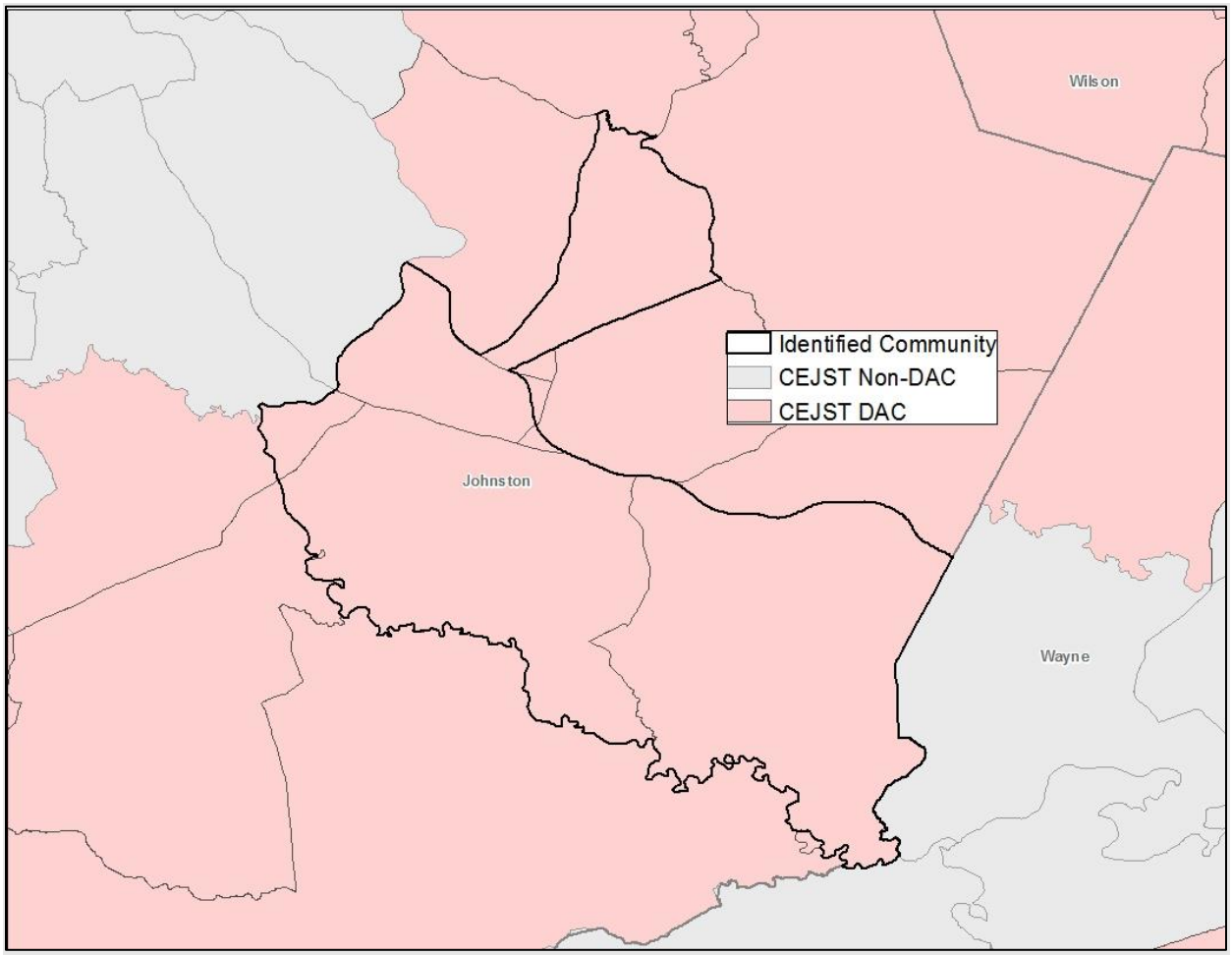

Figure 2-14: CEJST DACs Near Towns of Selma and Smithfield

2.2.2.4 Additional Findings

Additional findings and/or supporting data was also collected from the other datasets discussed earlier in this report not used in the selection process.

2.2.2.4.1 CLIMATE CHANGE DATA

The Precipitation Explorer in ClimRR shows that precipitation is expected to increase approximately 2-8 inches in the next 30 years.

2.2.2.4.2 EJSCREEN

EJSCREEN supports the CEJST findings of underground storage tanks being an environmental hazard and flags some additional environmental concerns in this community such as traffic proximity and risk management plan (RMP) facility proximity. This tool also supports the low-income and health vulnerability findings from the CEJST and SVI. It also supports that access to broadband is an issue in portions of the community as found in the SVI.

2.2.2.4.3 NCDEQ CMS

The NCDEQ CMS tool shows numerous underground storage tank incidents in this community supporting the CEJST findings and identifies a few hazardous waste sites in the Smithfield portion of the community. This tool also identifies block groups in this area as potentially underserved further supporting the findings from the CEJST and SVI.

The DEQ CMS tool shows this community to be majority homeowner occupied housing especially as you move into the unincorporated areas of the community. The presence of renters increases in the urbanized portions of the towns but is still largely homeowners.

2.2.2.4.4 LOW AND MODERATE INCOME (LMI)

This is the only identified community that falls into a county classified as having low- and moderate-income countywide. The majority of the census blocks that touch the Towns of Smithfield and Selma are well above the threshold of being classified as low to moderate income block groups.

2.2.3 Jones County

Population ~ 9,233

Jones County is identified as a vulnerable, underserved, and under-resourced community and the majority of the county falls in the Neuse River Basin. This is an agricultural and rural community facing annual flood and hurricane risks that are expected to increase with climate change. This community also faces multiple health and social risks, primarily disability and other health risks, compounding their ability to respond to flooding impacts.

2.2.3.1 NRI Findings

The census tracts in this community are expected to experience annual losses greater than most tracts in the Neuse River Basin due to flooding and hurricanes.

2.2.3.2 SVI Findings

This is the only county in the basin and one of two counties in the entire state where all census tracts in the county are ranked among the highest social vulnerability ranking (see Figure 15). Four of the 16 indicators in this community fall among the 90th percentile in the state:

- Persons uninsured
- Persons aged 65 or older.
- Persons with a disability
- Mobile homes

The disability indicator ranking is among the 90th percentile statewide in all three census tracts in this county, so it is a widespread vulnerability.

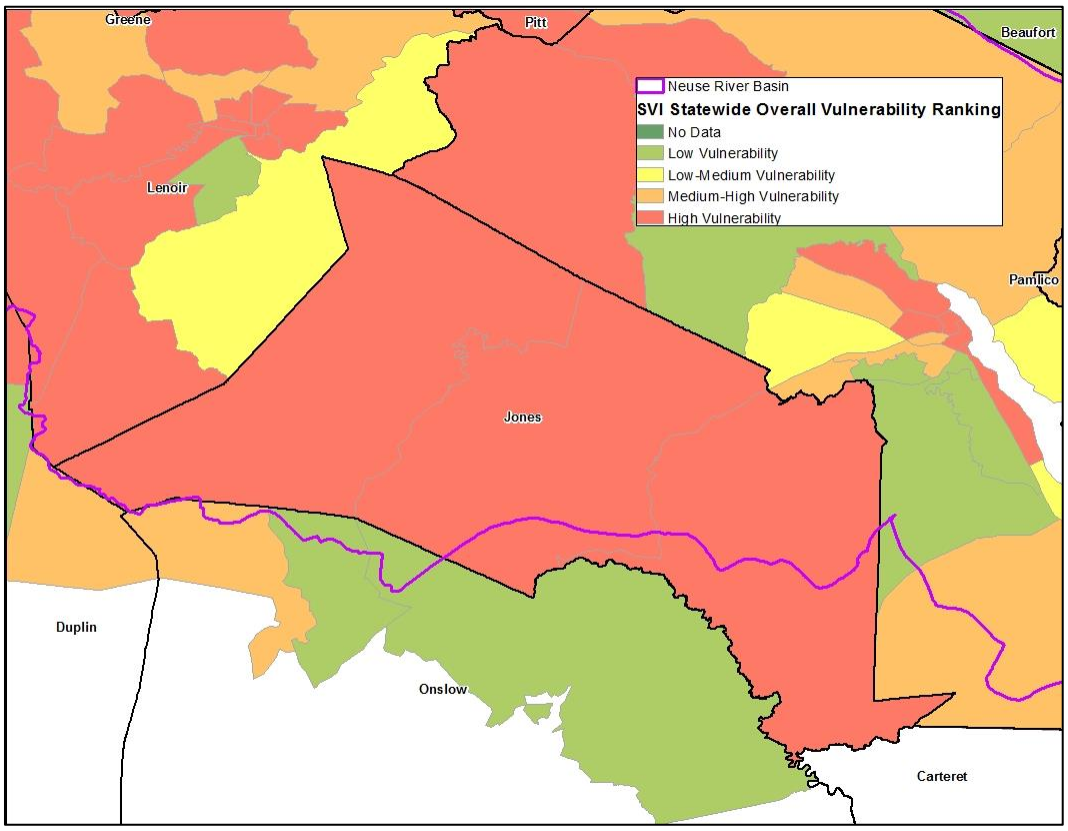

Figure 2-15: SVI Rankings in Jones County

SVI data also provides insight to some of the specific vulnerabilities that could impact stakeholder engagement and outreach activities:

Minority Populations: This county is approximately 29% African American.

Disabilities: This is the highest statewide percentile ranking social vulnerability in the community and is experienced throughout the county.

Seniors: There is a significant senior population in central and southcentral Jones County. Over 23% of the population in the county is over 65 years old.

No Broadband Internet: Approximately 25% of the population in this county lacks access to broadband internet.

2.2.3.3 CEJST Findings

This entire county is classified as a DAC in the CEJST as shown in Figure 16. Four of the eight categories of burden are flagged as issues in this community. Below is a list of indicators in each of these four burden categories meeting set thresholds:

- Climate Change: expected agriculture loss rate, expected building loss rate.

- Health: diabetes, heart disease
- Transportation: transportation barriers
- Workforce Development: poverty, high school education

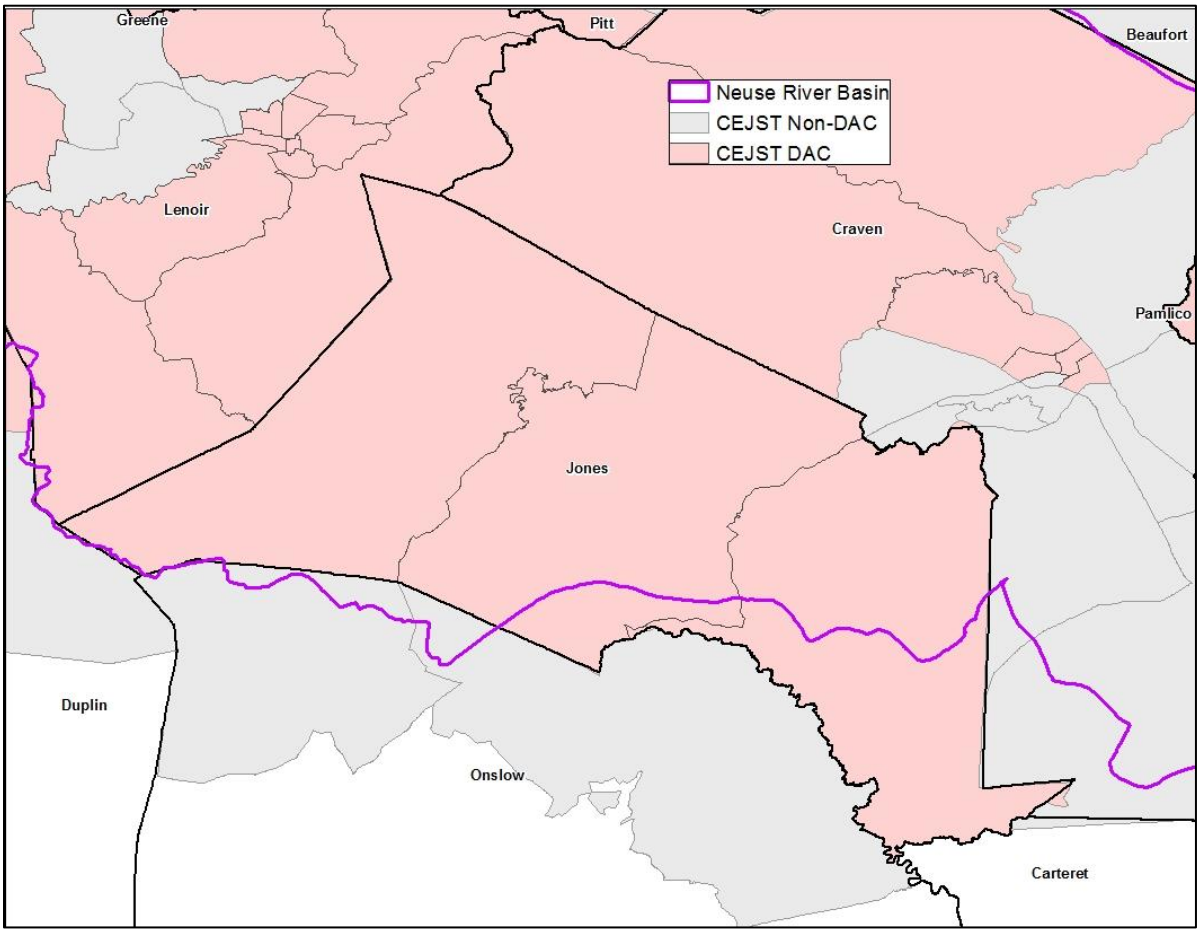

Figure 2-16: CEJST DACs in Jones County

2.2.3.4 Additional Findings

Additional findings and/or supporting data was also collected from the other datasets discussed earlier in this report not used in the selection process.

2.2.3.4.1 CLIMATE CHANGE DATA

NOAA's Sea Level Rise Viewer shows that SLR is expected to impact areas along the Trent River first. The Precipitation Explorer in ClimRR shows that precipitation is expected to increase approximately 4-8 inches in the next 30 years.

2.2.3.4.2 EJSCREEN

EJSCREEN does not indicate any major environmental issues other than flooding similarly to the CEJST. This tool also supports the heart disease and disability health vulnerability findings, and lack of insurance finding from the SVI. It also supports that access to broadband is an issue in this community as found in the SVI.

2.2.3.4.3 NCDEQ CMS

This tool shows a number of underground storage tank incidents, mostly near the Town of Trenton and shows many animal feed operations in this county. This tool also identifies health issues being above the state average throughout this entire county as found in the CEJST. This tool identifies block groups along the northeast portion of the county as potentially underserved partially supporting the findings from the CEJST and SVI. The CMS shows the northeast portion of the county as having higher minority and senior populations compared to the rest of the county.

This tool shows this community to be majority homeowner occupied housing throughout the entire county.

2.2.3.4.4 LOW AND MODERATE INCOME (LMI)

The northeast corner of Jones County is classified as a low- and moderate-income block group.

2.2.4 City of Kinston, Lenoir County

Population ~ 19,365

The City of Kinston is identified as a vulnerable, under-served, and under-resourced community. It is an urban community facing annual losses from flood and hurricane risks. These flood risks are forecasted to increase in with climate change. This is only one of two identified communities where the expected population loss rate due to natural hazards met the thresholds set in the CEJST to be classified as a DAC.

This community is unique in the number of health and social vulnerabilities it faces. Every part of Kinston faces multiple vulnerabilities and risks, but those specific vulnerabilities differ across the city.

2.2.4.1 NRI Findings

Census tracts in the City of Kinston are expected to experience higher annual losses to flooding and hurricane risks than most tracts in the Neuse River Basin.

2.2.4.2 SVI Findings

The northern and central portions of the community are among the highest social vulnerability rankings in the state (see Figure 2-17). Thirteen of the 16 indicators in this community fall among the 90th percentile in the state:

- Persons below 150 percent poverty
- Persons unemployed
- Housing cost-burden occupied housing units.
- Persons with no high school diploma
- Persons aged 65 or older.
- Persons aged 17 or younger.
- Persons with a disability
- Single-parent households
- Minority persons
- Mobile homes
- Crowded households
- Households with no vehicle
- Persons in group quarters

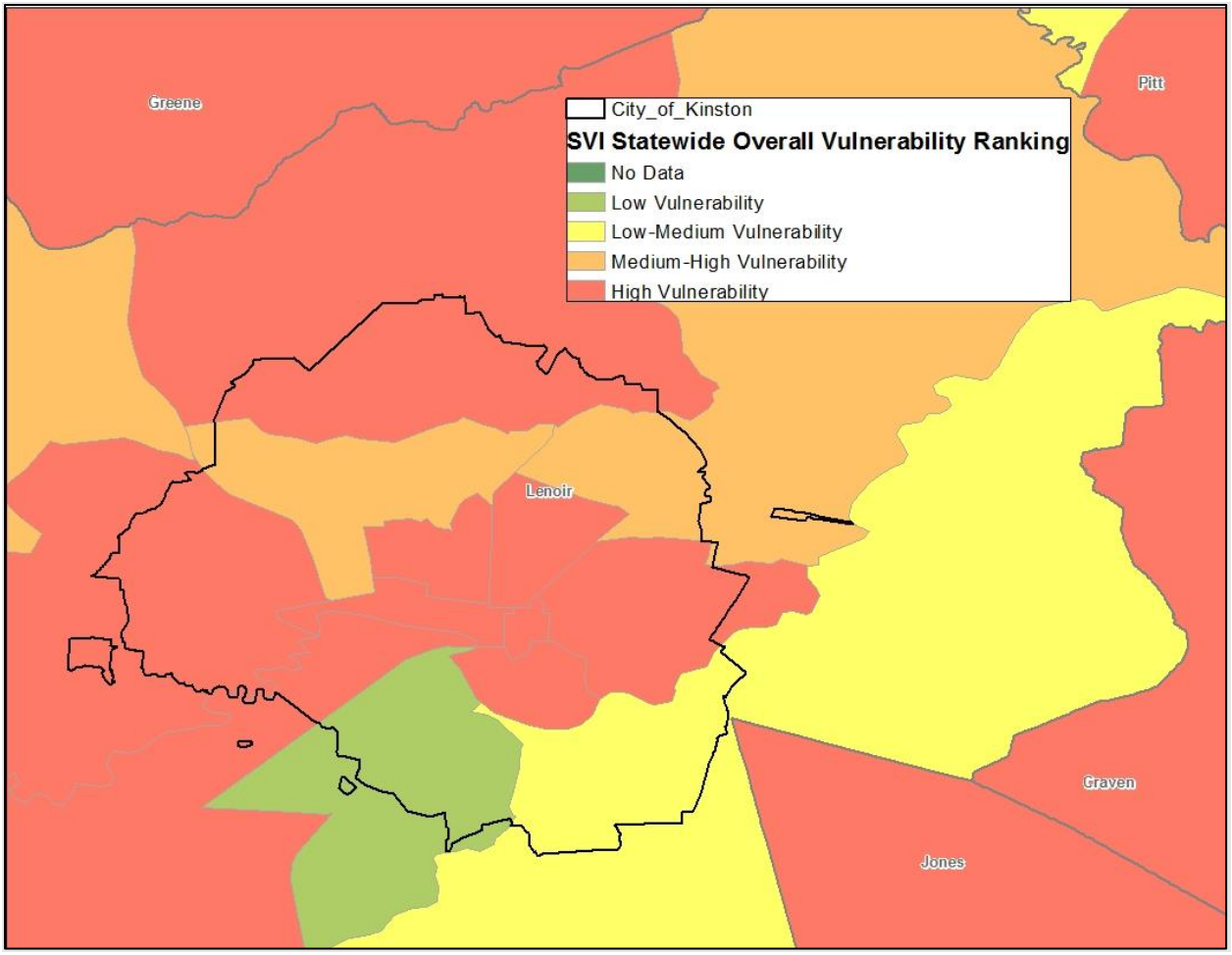

Figure 2-17: City of Kinston SVI Rankings

SVI data also provides insight to some of the specific vulnerabilities that could impact stakeholder engagement and outreach activities:

Minority Populations: This community is a predominantly African American community (approximately 67%).

Single Parent Households: The census tracts in central Kinston rank higher than the majority of tracts Statewide.

Disabilities: There is a significant portion of the population across the city that have mobility issues. All census tracts touching this community are among the 71st – 100th percentile in terms of population with disabilities.

No Vehicle: A large number of households do not have access to a vehicle. Eleven of the thirteen tracts that touch this community rank between the 64th and 100th percentile across the State for households without a vehicle.

No Broadband Internet: Central Kinston is where more people do not have access to broadband internet.

2.2.4.3 CEJST Findings

The northeast portion of the city is classified as a DAC in the CEJST as shown in Figure 2-18. All eight categories of burden are flagged as issues in this community. Below is a list of indicators in each of these eight burden categories meeting set thresholds:

- Climate Change: expected agriculture loss rate, projected flood risk, expected population loss rate.
- Energy: energy cost
- Health: asthma, diabetes, heart disease, low life expectancy
- Housing: housing cost, lack of indoor plumbing, lead paint
- Legacy Pollution: formerly used defense sites.
- Transportation: transportation barriers
- Water and Wastewater: underground storage tanks and releases
- Workforce Development: low median income, poverty, unemployment, high school education

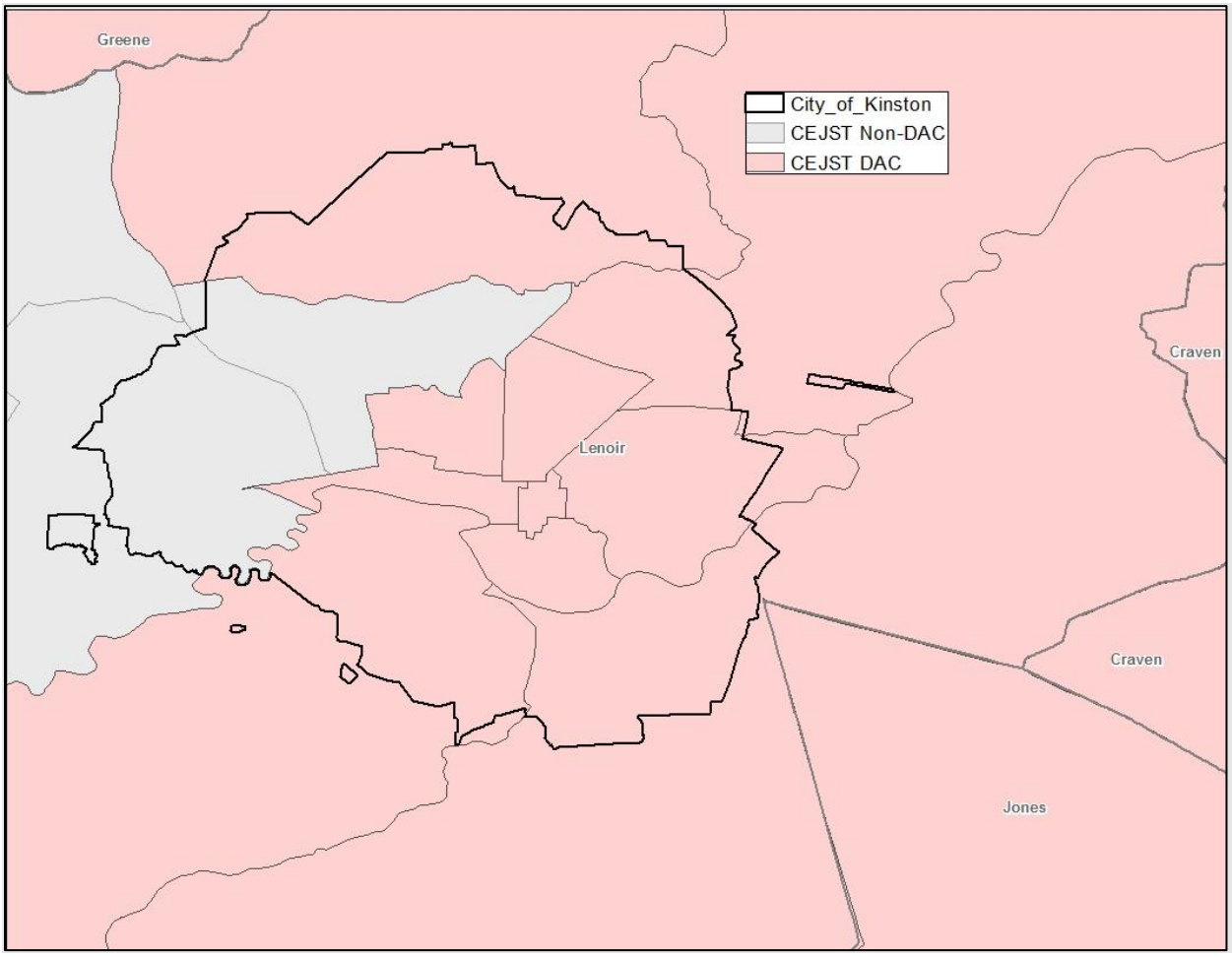

Figure 2-18: City of Kinston CEJST DACs

2.2.4.4 Additional Findings

Additional findings and/or supporting data were also collected from the other datasets discussed earlier in this report not used in the selection process.

2.2.4.4.1 CLIMATE CHANGE DATA

The Precipitation Explorer in ClimRR shows that precipitation is expected to increase approximately 3-8 inches in the next 30 years.

2.2.4.4.2 EJSCREEN

EJSCREEN supports the CEJST findings of underground storage tanks and lead paint being environmental hazards in this community. This tool also supports the social and health vulnerability findings from the CEJST and SVI. It also supports broadband access issues existing in portions of the community as found in the SVI. Lastly, it also identifies a food desert in central Kinston. Food desert is a term from this tool used to identify census tracts with low access to food and utilizes the U.S. Department of Agriculture's (USDA) Food Access Research Atlas. The following indicators are used to identify food deserts: accessibility to healthy food (measured by distance to a store or number of stores), individual-level resources like family income and vehicle availability, and neighborhood-level indicators like average income and availability of public transportation.

2.2.4.4.3 NCDEQ CMS

This tool shows many underground storages tank incidents in this community supporting the CEJST finding that this is an environmental hazard in this community. This tool also identifies most block groups in this community as potentially underserved very similarly to the CEJST DACs.

In this area, homeowners and renters are evenly split in many parts of the city but there are tracts where renters significantly outweigh homeowners – in central Kinston. It is important to consider the viewpoint of renters when preparing education materials. This group can also provide a unique perspective to challenges they face in flood resiliency.

2.2.4.4.4 LMI

The block groups in the center of Kinston are classified as low- and moderate-income block groups.

2.2.5 City of Goldsboro, Wayne County

Population ~ 20,200

Seven census tracts in the central portion of the City of Goldsboro (as shown in Figure 2-21) are identified as a vulnerable, underserved, and under-resourced community and are the subject of the assessment in this section. This community is an urban community with the highest expected annual losses from riverine flooding in the entire basin, which is expected to increase with climate change. This is only one of two identified communities where the expected population loss rate due to natural hazards met the thresholds set in the CEJST to be classified as a DAC. The identified community has social and environmental vulnerabilities that compound their obstacles to resiliency.

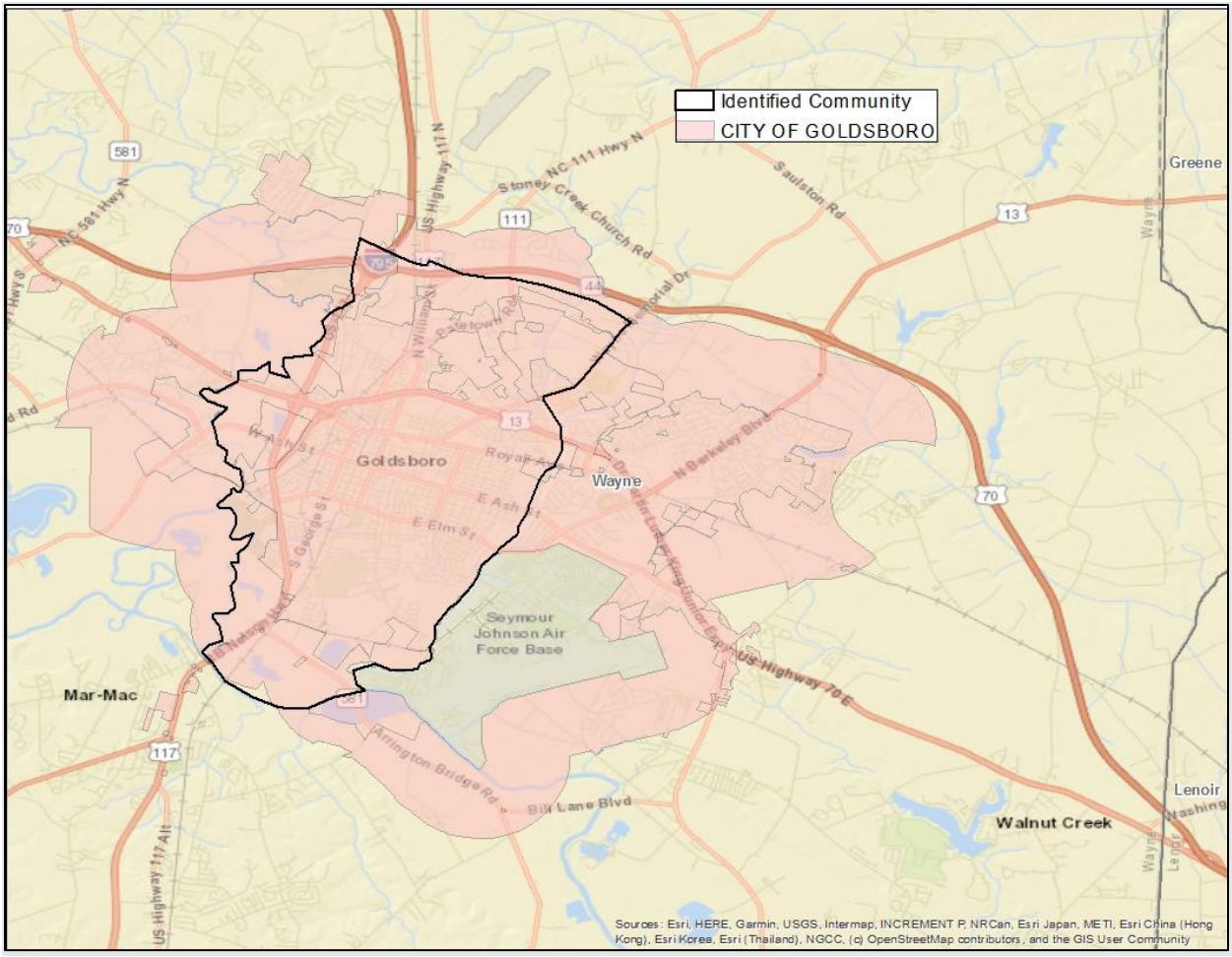

Figure 2-19: Identified Community in City of Goldsboro

2.2.5.1 NRI Findings

The two census tracts in the entire Neuse River Basin with the highest expected annual losses due to riverine flooding are in this community. Census tracts in the City of Kinston are expected to experience higher annual losses to flooding and hurricane risks than most tracts in the Neuse River Basin. These tracts are in the southwestern part of the identified community boundary. This community also experiences higher expected annual losses and EAL Rates from flooding and hurricane risks combined than the majority of tracts in the basin.

2.2.5.2 SVI Findings

The entire identified community is among the highest social vulnerability rankings in the state as shown in Figure 2-20. Eleven of the 16 indicators in this community fall among the 90th percentile in the state:

- Persons below 150 percent poverty
- Persons unemployed
- Housing cost-burden occupied housing units.
- Persons with no high school diploma
- Persons aged 17 or younger.
- Persons with a disability

- Single-parent households
- Minority persons
- Crowded households
- Households with no vehicle
- Persons in group quarters

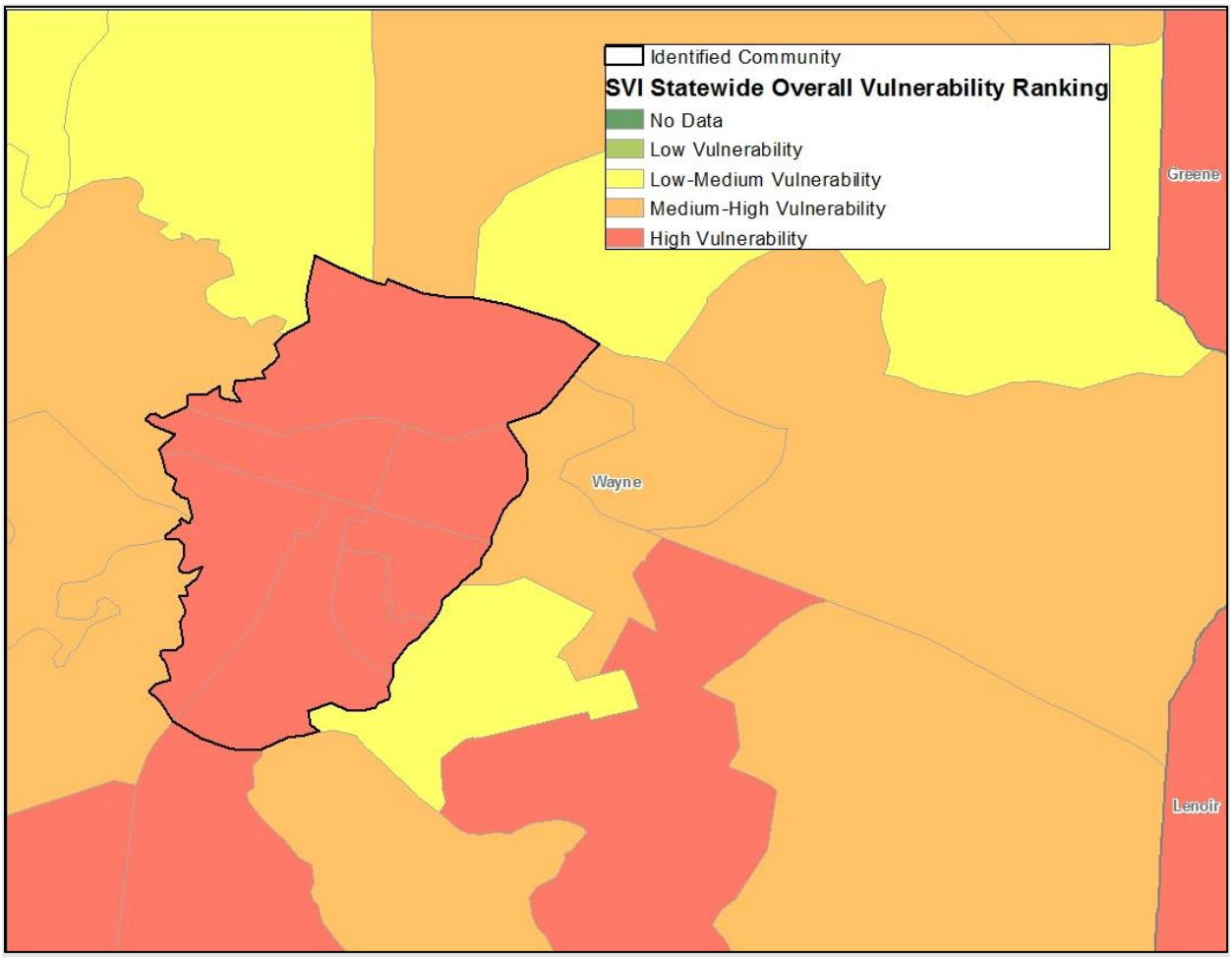

Figure 2-20: SVI Rankings in Goldsboro

SVI data also provides insight to some of the specific vulnerabilities that could impact stakeholder engagement and outreach activities:

Minority Populations: This community is 68% African American.

Disabilities: There is a significant portion of the population across the city that have mobility issues. The seven census tracts in this community rank in the 47th – 99th percentile Statewide for individuals with disabilities.

No Vehicle: No access to a vehicle is a significant issue community wide. All census tracts in this community fall within the 81st – 100th percentile Statewide for households without a vehicle.

No Broadband Internet: 19% of households in the eastern central portion of this community do not have access to broadband internet.

2.2.5.3 CEJST Findings

This entire community is classified as a DAC in the CEJST as shown in Figure 2-21. Six of the eight categories of burden are flagged as issues in this community. Below is a list of indicators in each of these six burden categories meeting set thresholds:

- Climate Change: expected agriculture loss rate, expected building rate loss, expected population loss rate.
- Energy: energy cost
- Health: asthma, diabetes, heart disease, low life expectancy
- Housing: housing cost, lack of indoor plumbing
- Water and Wastewater: underground storage tanks and releases
- Workforce Development: low median income, poverty, unemployment, high school education

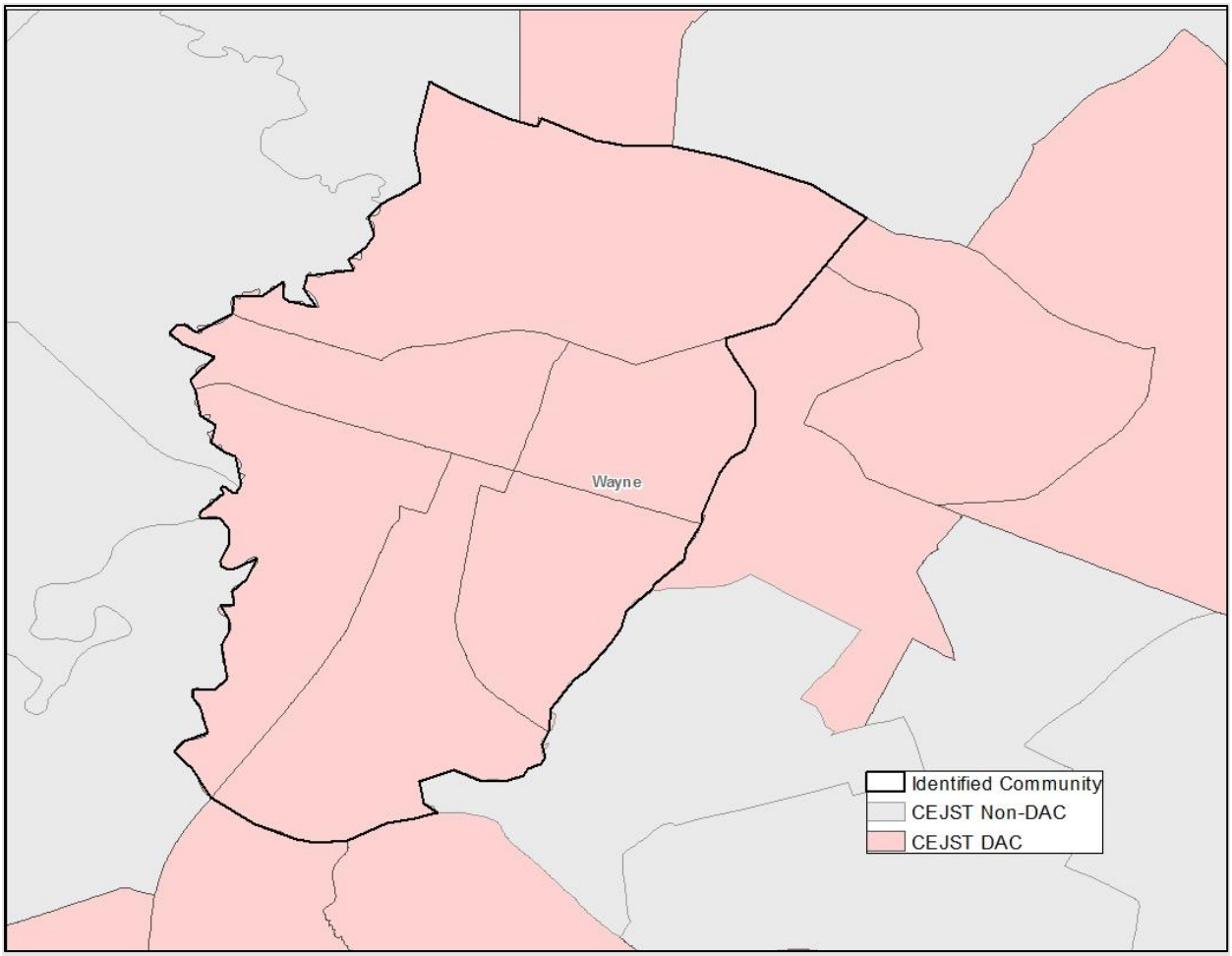

Figure 2-21: CEJST DACs in Goldsboro

2.2.5.4 Additional Findings

Additional findings and/or supporting data were also collected from the other datasets discussed earlier in this report not used in the selection process.

2.2.5.4.1 CLIMATE CHANGE DATA

The Precipitation Explorer in ClimRR shows that precipitation is expected to increase approximately 3-8 inches in the next 30 years.

2.2.5.4.2 EJSCREEN

EJSCREEN supports the CEJST findings of underground storage tanks and lead paint being environmental hazards in this community. This tool also supports the social and health vulnerability findings from the CEJST and SVI. It also supports broadband access issues existing in portions of the community as found in the SVI. Lastly, it also identifies that most of this identified community is a food desert and is by far the most prevalent concern of access to food among the identified communities in this assessment.

2.2.5.4.3 NCDEQ CMS

This tool shows many underground storages tank incidents, along with some above ground storage tank incidents, in this community supporting the CEJST finding that this is an environmental hazard in this community. This tool also identifies nearly every block group in this identified community as potentially underserved further supporting CEJST and SVI findings.

In this area, renters are much more prevalent in areas close to and just southeast of US Highways 117 and 13. Outside of that area, the identified community is primarily homeowner occupied housing.

2.2.5.4.4 LMI

The majority of census block groups in this identified community are well above the threshold to be classified as low- and moderate-income block groups.

2.2.6 City of Wilson, Wilson County

Population ~ 47,606

The entire City of Wilson is not considered vulnerable, under-served, and under-resourced, but the southern half of the city is and is the focus of this assessment. This community is an urbanized area facing impacts from riverine flooding that is expected to increase with climate change. The southern half of the city is expected to experience high agricultural and building loss rates due to natural hazards annually. This community faces numerous environmental, health, and social risks compounding their obstacles to resiliency.

2.2.6.1 NRI Findings

This community is expected to experience significant annual losses due to riverine flooding. A small area in central Wilson (Census Tract 37195000801 which lies between US Highway 301, Hines Street, and the railroad) experiences a higher EAL Rate due to riverine flooding than most of the Neuse River Basin.

2.2.6.2 SVI Findings

The entire southern half of the city is among the highest areas of social vulnerability rankings in the state (see Figure 2-22). Thirteen of the 16 indicators in this community fall among the 90th percentile in the state:

- Persons below 150 percent poverty
- Civilians unemployed

- Housing cost-burden occupied housing units.
- Persons with no high school diploma
- Persons uninsured
- Persons aged 17 or younger.
- Persons with a disability
- Single-parent households
- Persons with limited English
- Minority persons
- Crowded households
- Households with no vehicle
- Persons in group quarters

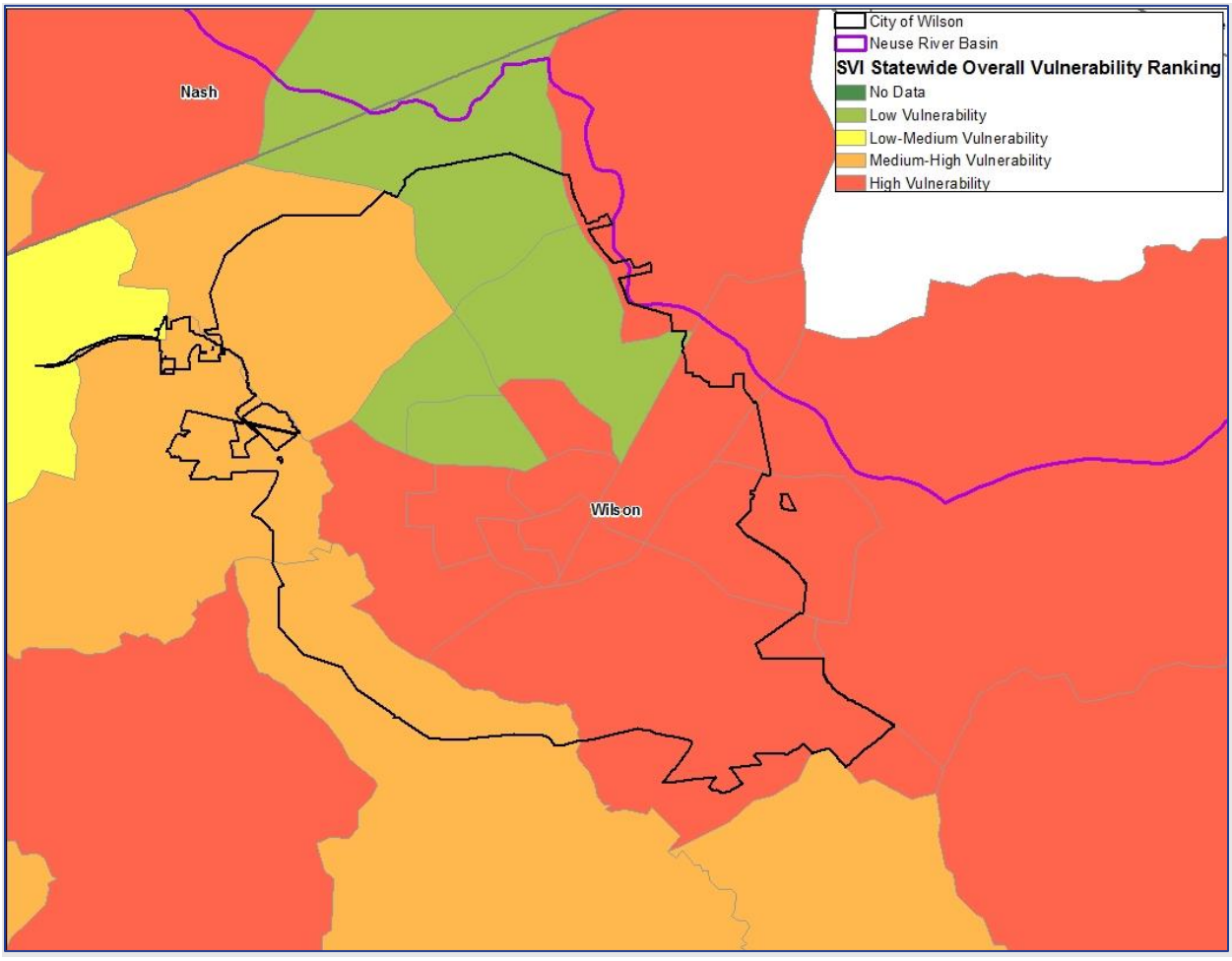

Figure 2-22: City of Wilson SVI Rankings

SVI data also provides insight to some of the specific vulnerabilities that could impact stakeholder engagement and outreach activities:

Minority Populations: The entire City of Wilson is a predominantly African American and Hispanic community (approximately 59%). That number increases to approximately 76% African American and Hispanic in the tracts with the highest social vulnerability in the city (those classified as having High Vulnerability within the city limits in Figure 20),

Language Barriers: There is a concentrated population with limited English proficiency in Census Tract 37195000701 (northeast of US Highway 264, southeast of US Highway 301, and south of State Highway 42) and a large Hispanic population in southern Wilson. Tracts in southern and eastern central Kinston ranks among the 62nd – 96th percentile Statewide for persons with who speak English "less than well."

Single Parent Households: There is a large percentage of single parent households in central and southcentral Wilson. Every tract that touches Kinston ranks higher than the majority of tracts Statewide for this indicator.

Disabilities: There are census tracts in central and southern Wilson with a significant senior population or disabled population that could have mobility issues. These tracts rank among the top 30% of tracts Statewide for person with disabilities.

Seniors: There are census tracts in western central Wilson with a significant senior population. These tracts rank among the top 30% of tracts Statewide for person over age 65.

No Vehicle: A large number of households in central and southcentral Wilson do not have access to a vehicle. All tracts in the southern half of Kinston rank among the top 20% of tracts Statewide for households without a vehicle.

No Broadband Internet: Approximately 30% of households in southern Wilson do not have access to computers with broadband internet.

2.2.6.3 CEJST Findings

More than half of the city is classified as a DAC in the CEJST, primarily in the southern half, as shown in Figure 2-23. All 8 categories of burden are flagged as issues in this community. Below is a list of indicators in each of the burden categories meeting set thresholds:

- Climate Change: expected agriculture loss rate, expected building loss rate.
- Energy: energy cost
- Health: asthma, diabetes, heart disease, low life expectancy
- Housing: housing cost
- Legacy Pollution: proximity to RMP facilities
- Transportation: transportation barriers
- Water and Wastewater: underground storage tanks and releases
- Workforce Development: low median income, poverty, unemployment, high school education

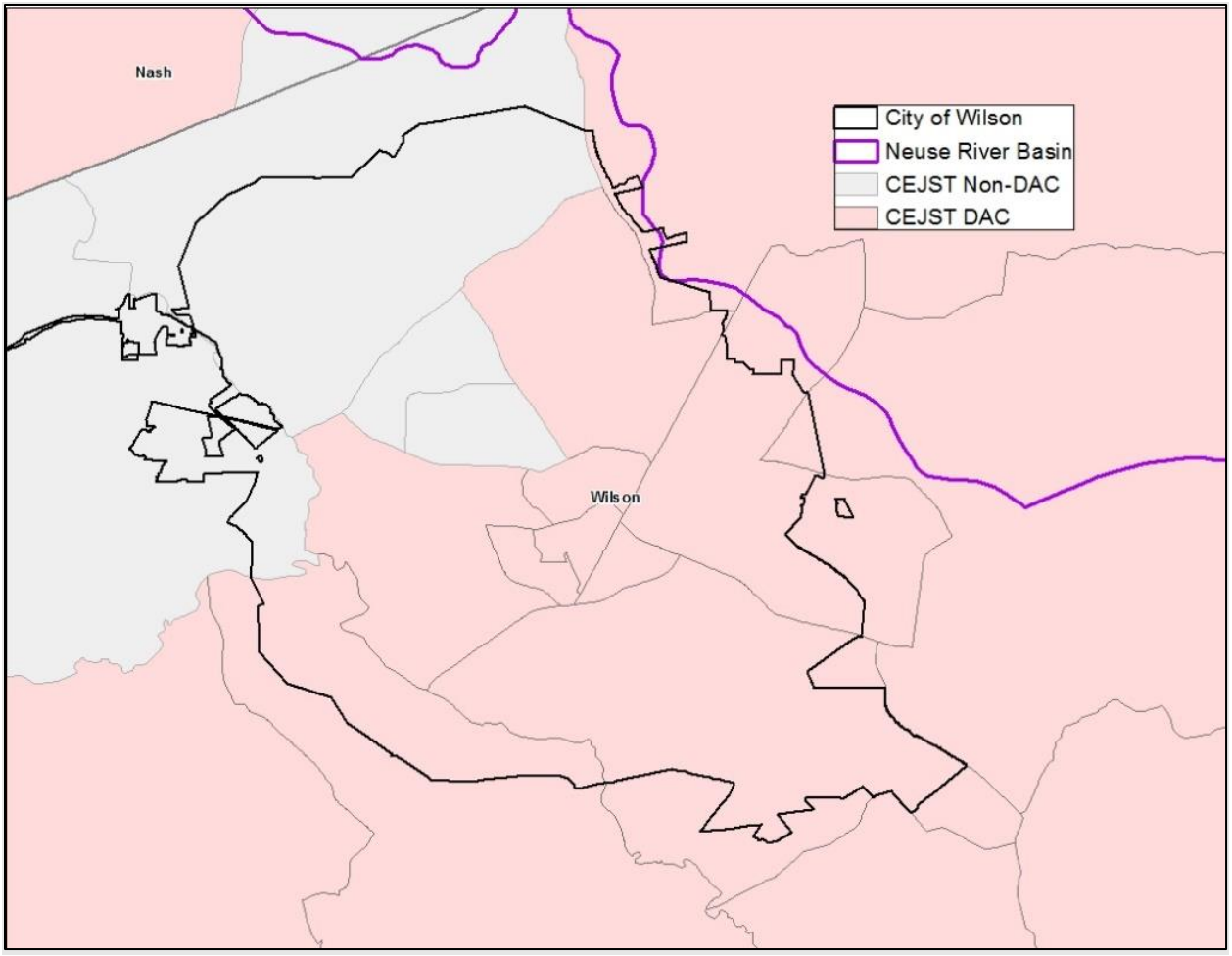

Figure 2-23: City of Wilson CEJST DACs

2.2.6.4 Additional Findings

Additional findings and/or supporting data were also collected from the other datasets discussed earlier in this report not used in the selection process.

2.2.6.4.1 CLIMATE CHANGE DATA

The Precipitation Explorer in ClimRR shows that precipitation is expected to increase approximately 3-7 inches in the next 30 years.

2.2.6.4.2 EJSCREEN

EJSCREEN supports the CEJST findings of underground storage tanks and proximity to RMPs being an environmental hazard and flags some additional environmental concerns in this community such as toxic releases to air, traffic proximity, and lead paint. This tool also supports the low-income, unemployment, low education, and health vulnerability findings from CEJST and SVI. This tool identifies more areas in this community with broadband internet gaps than SVI does.

2.2.6.4.3 NCDEQ CMS

This tool shows many above ground and underground storage tank incidents supporting the findings from CEJST and identifies the presence of numerous hazardous waste sites. This tool also identifies block groups in this area as potentially underserved, supporting the findings from the CEJST and SVI.

In this area, homeowners and renters are evenly split. It is important to consider the viewpoint of renters when preparing education materials. This group can also provide a unique perspective to challenges they face in flood resiliency.

2.2.6.4.4 LMI

The smaller census block groups that lie in central and north central Wilson are classified as low- and moderate-income block groups.

2.2.7 Occaneechi Band of the Saponi Nation, Orange County

Population ~ 4,200 (entire tribal land including area outside Neuse River Basin)

This is a state-recognized tribe and is the only tribal land located in the Neuse River Basin. The tribal perspective is an important one and is the reason this community is identified here despite the datasets used not identifying it as an underserved, under-resourced, vulnerable community. A portion of this tribal land is located in northern tip of the Neuse River Basin at its headwaters as shown in Figure 24.

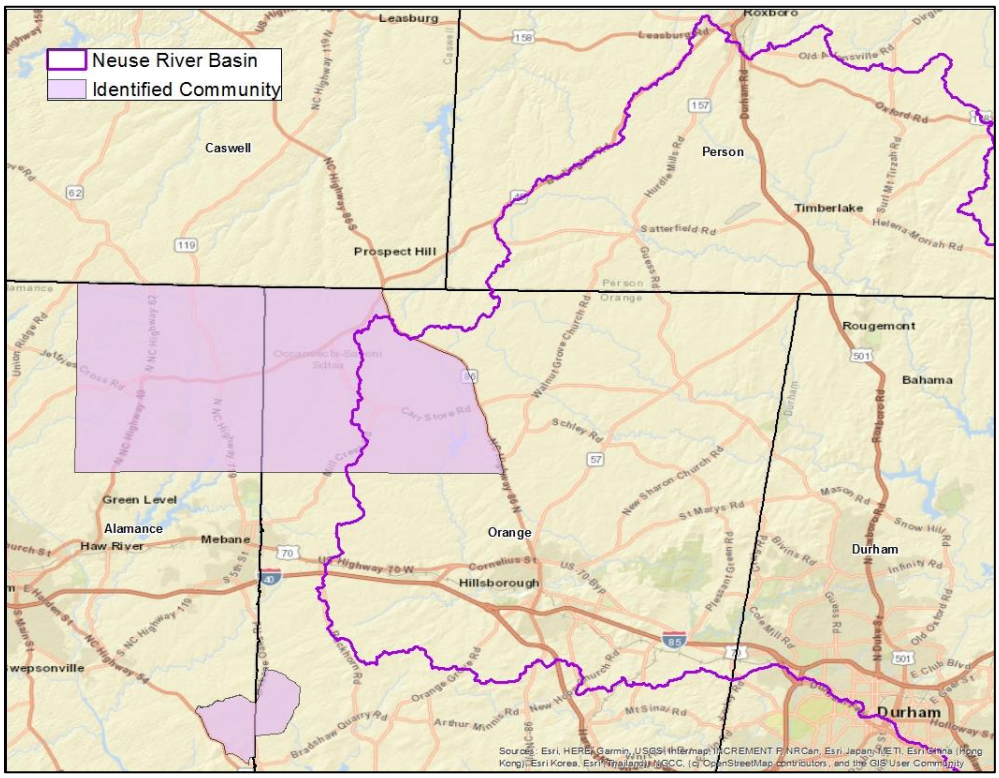

Figure 2-24: Identified Community in Occaneechi-Saponi Tribal Land

2.2.7.1 NRI Findings

This community is expected to experience annual losses due to riverine flooding and hurricanes. While the EALT for both tracts intersecting this community fall among the lowest 10-15% in the State, the EAL Rate falls among the top 40% in the State. This means that while the dollar value is the expected losses due to flooding and hurricanes seems low in comparison to most tracts Statewide, the percentage of the total value being lost is higher compared to the majority of tracts Statewide.

2.2.7.2 SVI Findings

Approximately half of the tribal land in the Neuse River Basin falls in the Medium-High Vulnerability ranking category and the other half falls in the Low-Medium Vulnerability ranking category as shown in Figure 25. This community has no indicators that fall among the 90th percentile in the state. The northern census tract shows a significantly higher overall vulnerability ranking (67%) compared to the southern tract (27%). The biggest difference between the two tracts are in the Housing and Transportation theme of indicators. Six of the 16 indicators are in the 65th percentile ranking Statewide or higher in at least one of the two tracts intersecting this community:

- Civilians unemployed
- Persons aged 65 or older.
- Single-parent households
- Housing in structures with 10 or more units
- Mobile homes
- Persons in group quarters

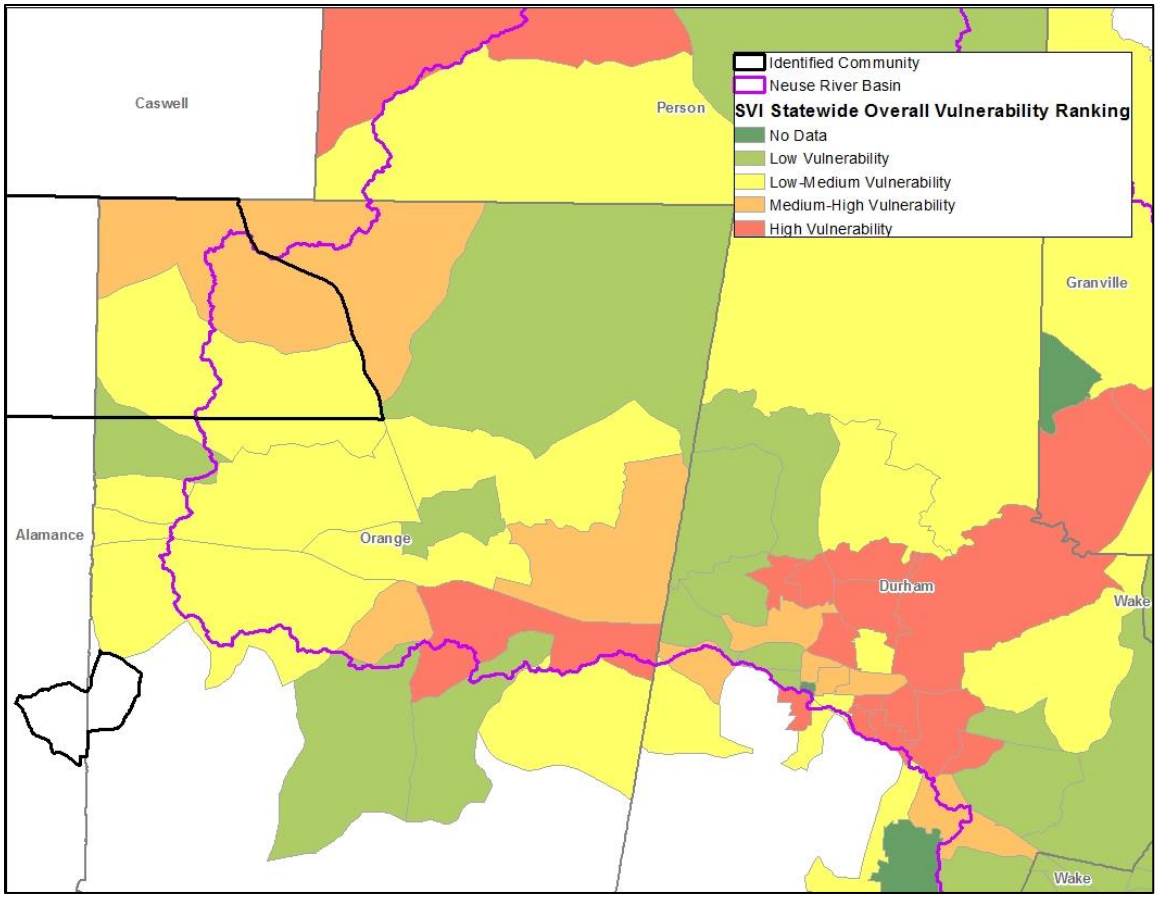

Figure 2-25: Occaneechi-Saponi Tribal Land SVI Rankings

SVI data also provides insight to some of the specific vulnerabilities that could impact stakeholder engagement and outreach activities:

Single Parent Households: This indicator's percentile ranking for the southern portion of this community ranks higher than the majority of tracts in the State.

Seniors: This community has a significant senior population. These tracts rank among 68th and 90th percentile of tracts Statewide for person over age 65.

2.2.7.3 CEJST Findings

This community is not identified as a DAC in the CEJST because it is not a Federally recognized tribal land but a State-recognized one and it does not meet the minimum thresholds for any of the burden categories. While it does not meet the minimum thresholds of any single burden category, it does exceed the 90th percentile for two indicators each in a different burden category:

Climate Change: expected agriculture loss rate

- Transportation: transportation barriers

2.2.7.4 Additional Findings

Additional findings and/or supporting data were also collected from the other datasets discussed earlier in this report not used in the selection process.

2.2.7.4.1 CLIMATE CHANGE DATA

The Precipitation Explorer in ClimRR shows that precipitation is expected to increase approximately 0.2 - 2 inches in the next 30 years.

2.2.7.4.2 EJSCREEN

EJSCREEN supports the senior population findings from SVI and the transportation barriers finding from the CEJST.

2.2.7.4.3 NCDEQ CMS

This tool supports the SVI findings related to senior populations.

2.2.7.4.4 LOW AND MODERATE INCOME (LMI)

Orange County is not classified as being Low- and Moderate-Income overall, but census block group in the northern portion of this community is classified as Low- and Moderate-Income.

3 Appendix A. Draft Methodology for Identifying Vulnerable Communities

This appendix outlines a draft approach for identifying underserved, under-resourced, and vulnerable communities in river basins for The Blueprint.

Three datasets were used to identify these communities in the Neuse River Basin as discussed in Sections 2- 2.1.3 of this document. This task was completed by reviewing these three datasets separately and considering them cumulatively. This methodology was not used in this process but would result in similar selections by equally considering the three datasets at the census-tract level. A visual inspection of the results of this approach would still be needed as single census tracts are not identified as a community in this process. A visual inspection will demonstrate where clusters of highly vulnerable tracts exist.

Draft approach:

- Each of the three datasets are scored between 0-4 pts towards the overall score.
- SVI pts
  - overall ranking *or* data not available for a tract with a population of 0 = 0
  - low vulnerability ranking = 1
  - low-medium = 2
  - medium-high = 3
  - high vulnerability ranking *or* data not available for a tract with a population > 0 = 4 pts
- CEJST pts
  - not a DAC = 0 pts
  - DAC w/ 0-2 burden categories meeting thresholds = 1 pt
  - DAC w/ 3-4 burden categories met = 2
  - DAC w/ 5-6 burden categories met = 3
  - DAC w/ 7-8 burden categories met = 4 pts
- NRI pts – Use total expected annual losses from riverine & coastal flooding and hurricanes combined. Then, use natural breaks to develop five groupings that would receive 0-4 pts.
- Tribal Land pts
  - no State- or federally recognized tribal lands in tract = 0
  - has State- or federally recognized tribal lands in tract = 4 pts
- Total Ranking Score will be 0-16 with higher values being more vulnerable.

Figure 26 displays the results of this repeatable approach in the Neuse River Basin with the total ranking score. It also labels the approximate locations of the communities identified in the report without using this defined approach. It is seen that all communities identified in this assessment fall among the two highest ranking categories of scores. The communities identified for the Neuse had a unique consideration of serving as a case study to help shape the Blueprint methodology. So, communities were selected to include communities with a wide array of vulnerabilities. That will not be a consideration in other basins.

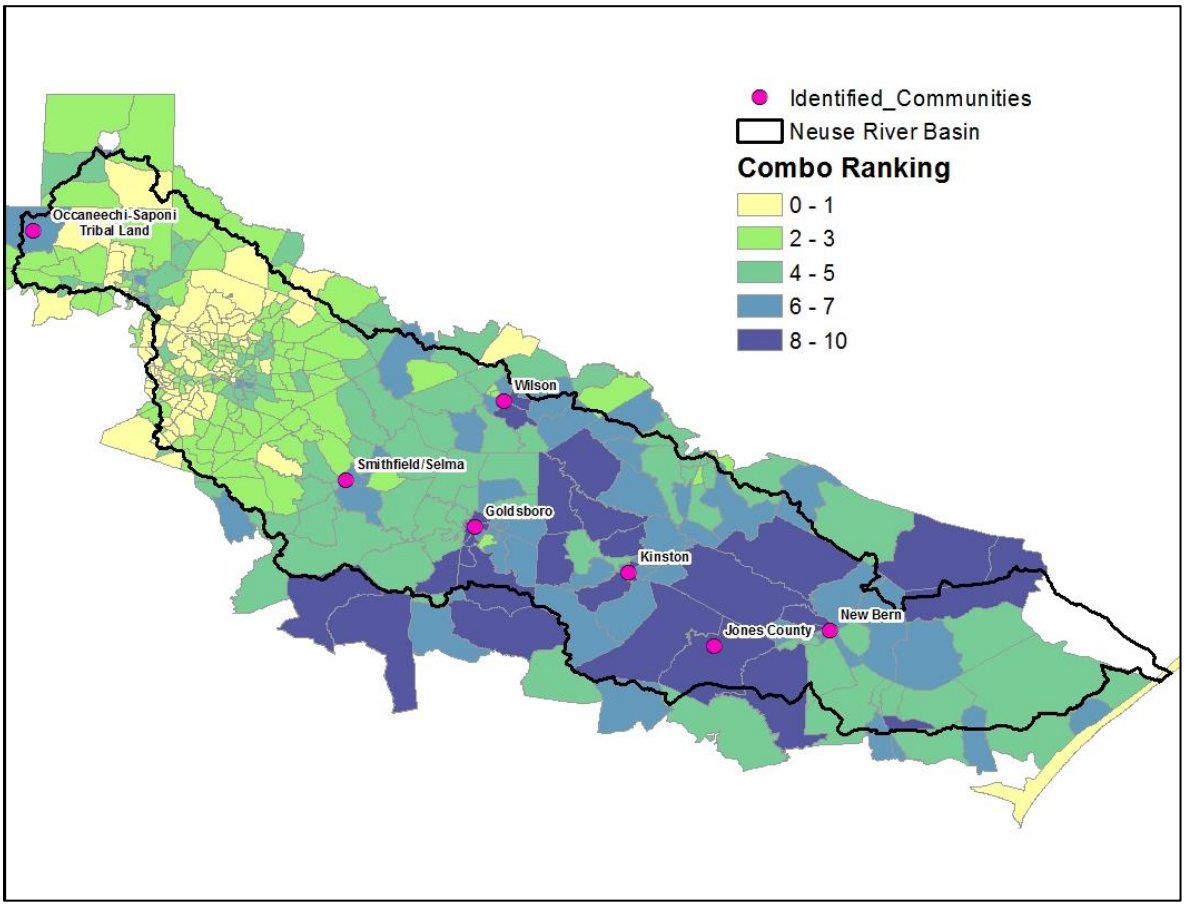

Figure 3-1: Methodology for Identifying Vulnerable Communities