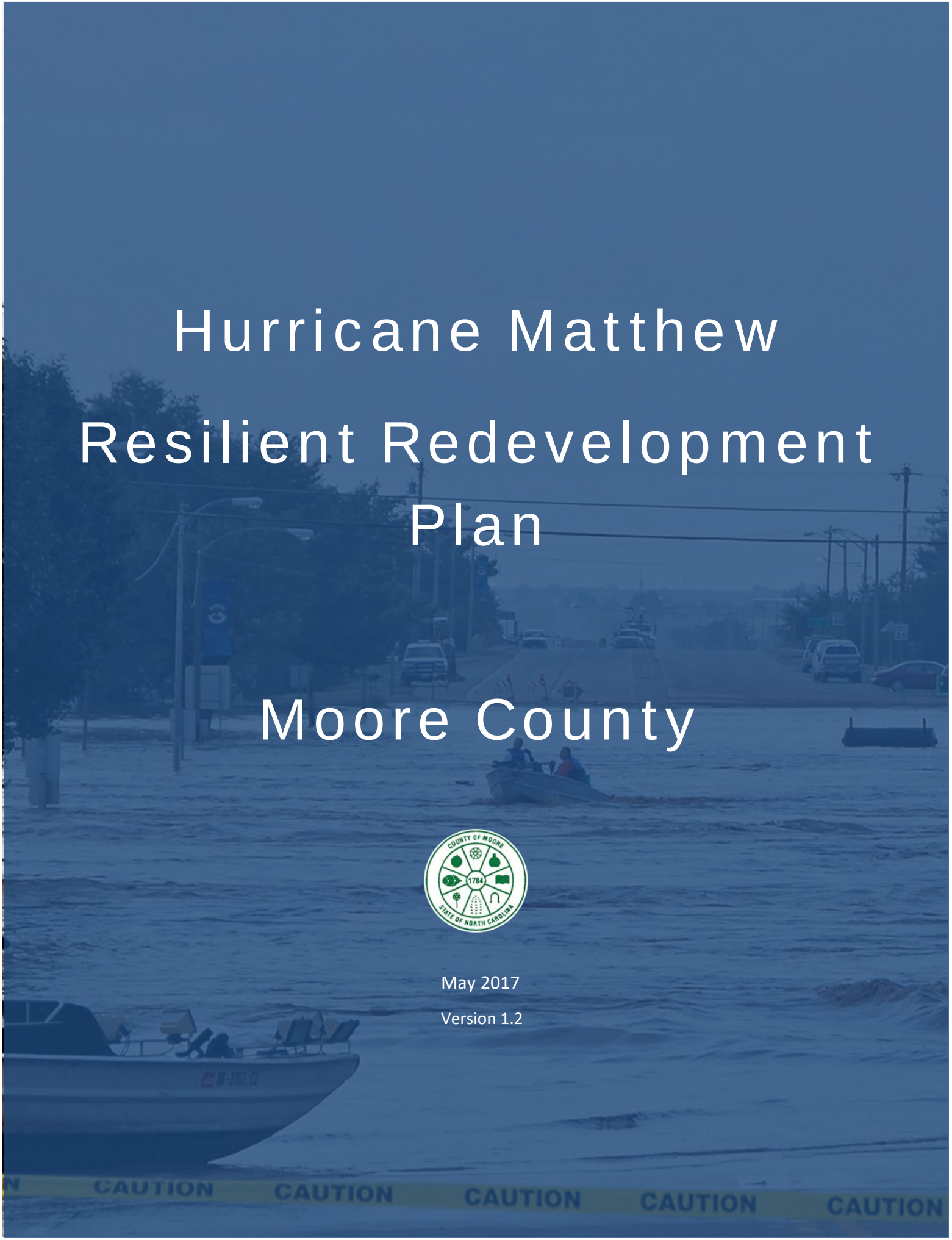


Hurricane Matthew Resilient Redevelopment Plan

Moore County

May 2017

Version 1.2

Contents

Change Log

Version	Date	Summary of Changes
1.1	6/19/17	Minor Revisions
1.2	8/25/17	Labor and unemployment data updated

Executive Summary

In October 2016, Hurricane Matthew caused widespread destruction in the Caribbean and up the Eastern Seaboard of the United States. In North Carolina, at least 26 people lost their lives, and 100,000 homes, businesses, and government buildings sustained damage estimated at $4.8 billion.[1] At the storm's peak, 3,744 individuals fled to 109 shelters across the region. More than 800,000 households lost power and 635 roads were closed, including the major east-west and north-south corridors.

In December 2016, the North Carolina General Assembly established the North Carolina Resilient Redevelopment Planning (NCRRP) program as part of the 2016 Disaster Recovery Act (*Session Law 2016-124*). The purpose of the program is to provide a roadmap for community rebuilding and revitalization assistance for the communities that were damaged by the hurricane. The program empowers communities to prepare locally driven recovery plans to identify redevelopment strategies, innovative reconstruction projects, and other needed actions to allow each community not only to survive but also to thrive in an era when natural hazards are increasing in severity and frequency.

The NCRRP consists of planning and implementation phases and is managed through North Carolina Emergency Management.

Figure 1. NCRRP Counties

This document is a snapshot of the current needs of the County regarding holistic recovery and redevelopment. The plan will evolve as the county analyzes the risk to its assets, identifies needs and opportunities, determines the potential costs and benefits of projects, and prioritizes projects. As projects are more fully defined, the potential impact on neighboring communities and the region may lead to modifications.

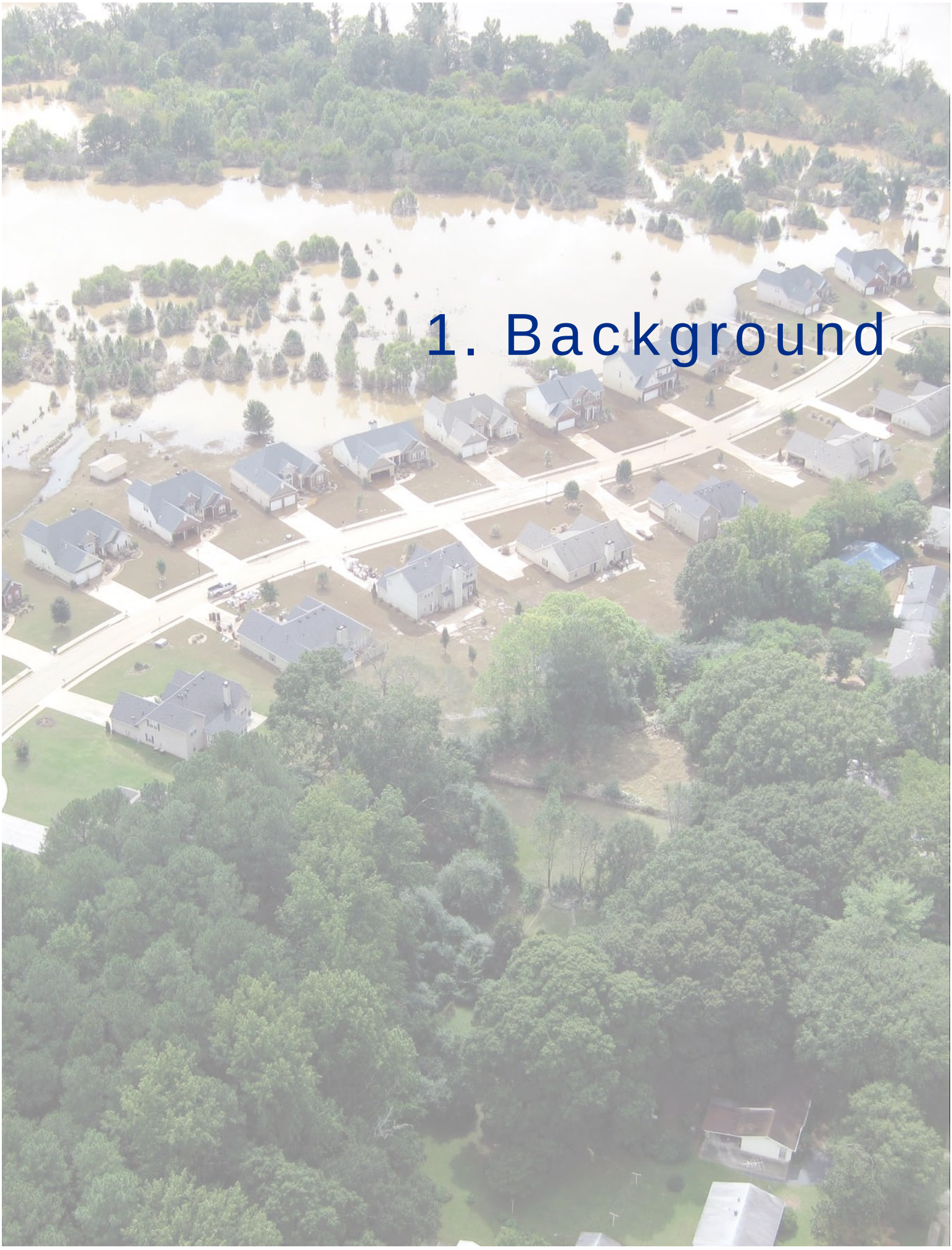
Implementation of the proposed projects and actions described in this plan is subject to applicable federal, state, and local laws and regulations. Proposed projects or actions may be eligible for state or federal funding, or could be accomplished with municipal, nonprofit, or private investments. However, inclusion of a project or action in this plan does not guarantee that it will be eligible for recovery funding.

[1] *State of North Carolina Supplemental Request for Federal Assistance Hurricane Matthew Recovery, https://governor-new.s3.amazonaws.com/s3fs-public/documents/files/Hurricane%20Matthew%20Relief--2017%20Federal%20Request%20%28002%29.pdf.*

After multiple public meetings, Moore County has identified 12 projects in four pillars: Housing, Infrastructure, Economic Development, and Environmental. Details of these projects can be found in Section IV of this plan.

Pillar	Project/Action Count
Housing	2
Economic Development	2
Infrastructure	4
Environment	4
Grand Total	**12**

Table 1. Moore County Summary of Projects by Pillar



1. Background

1. Background

Summary of Hurricane Matthew Storm Damage

Hurricane Matthew was an extraordinarily severe and sustained event that brought record-level flooding to many areas in eastern North Carolina's coastal plain, sound, and coastal communities. Hurricane Matthew hit North Carolina on October 8, 2016, as a Category 1 storm. Communities were devastated by this slow-moving storm primarily by widespread rainfall. During a 36-hour period, up to 18 inches of heavy rainfall inundated areas in central and eastern North Carolina.

Riverine flooding began several days after Hurricane Matthew passed and lasted for more than 2 weeks. New rainfall records were set in 17 counties in the Tar, Cape Fear, Cashie, Lumber, and Neuse River watersheds. Entire towns were flooded as water levels throughout eastern North Carolina crested well beyond previously seen stages.

During the peak of the hurricane, 800,000 households lost power and 635 roads were closed, including a section of I-40 West in Johnston County that was closed for 7 days, and sections of I-95 North and South in Robeson and Cumberland Counties that were closed for 10 days.

Approximately 88,000 homes were damaged and 4,424 were completely destroyed. Losses totaled more than $967 million, representing an economic loss as high as 68% of the damages, or $659 million, not expected to be covered by insurance or FEMA assistance.

North Carolina Governor McCrory requested FEMA assistance on October 9, 2016, and FEMA subsequently declared a major disaster (DR-4285) for North Carolina on October 10, 2016, for 48 counties encompassing approximately 325 cities, towns, townships, and villages.

Preliminary estimates indicate more than 30,000 businesses suffered physical or economic damage, and 400,000 employees were affected as a result. Hurricane Matthew also had a significant impact on the agriculture and agribusiness economy in eastern North Carolina. The nearly 33,000 agricultural workers and 5,000 agricultural-support workers hit by the storm account for more than half of the state's agriculture and agriculture-support workforce.

Initial economic analysis of the impacts of crop and livestock losses caused by Hurricane Matthew estimated the loss of more than 1,200 jobs and roughly $10 million in state and local income and sales tax revenue. 2.[2]

State / Legislative Response

North Carolina's response to Hurricane Matthew included 2,300 swift-water rescues using 79 boats and more than 90 air rescues. North Carolina also deployed over 1,000 National Guard and State Highway Patrol to assist with rescue and sheltering missions. There were 3,744 individuals transported to 109 shelters across central and eastern North Carolina during the storm's peak.

FEMA's disaster declaration made 50 counties eligible for FEMA assistance, 45 of which are eligible for Individual Assistance and Public Assistance and 5 of which are eligible for Public Assistance only.

[2] *Governors McCrory's Request for Federal Assistance for Hurricane Matthew Recovery, November 14, 2016*

- There were 81,832 individuals registered for FEMA/state assistance.
- Federal/state financial assistance in the amount of $92.5 million was approved to help flood survivors recover.
- Small Business Administration (SBA) loans approved for individuals after Hurricane Matthew totaled $65.6 million.
- SBA loans approved for businesses after Hurricane Matthew totaled $23.2 million.

After the immediate response period, North Carolina Governor McCrory and the North Carolina General Assembly took the steps summarized below to obtain and allocate long-term funding for Hurricane Matthew.

November 1: The Hurricane Matthew Recovery Committee is established. Preliminary damage assessments are completed, and the State Emergency Response Task Force continues to administer programs and identify needs unmet by existing federal programs.

November 14: Governor McCrory formally submits North Carolina's request for supplemental federal disaster assistance to the delegation as Congress returns to work.

Late November/Early December: Congress appropriates supplemental disaster assistance for North Carolina. After the supplemental federal disaster recovery assistance package is received, Governor McCrory submits a supplemental state disaster assistance package (House Bill 2) recommendations to the General Assembly and calls a special session. Governor McCrory then signs the Hurricane Matthew Recovery Act to fund disaster recovery efforts.

This supplemental federal assistance was to focus on housing, infrastructure, economic development, and the environment. These four pillars were to be funded through the following programs and agencies: The U.S. Department of Housing and Urban Development's Community Development Block Grant–Disaster Recovery (CDBG-DR) program, Army Corps of Engineers Operations and Maintenance, the FEMA National Dam Safety Program, the Federal Highway Administration's Emergency Highway Funding, and the U.S. Department of Agriculture's Emergency Conservation and Watershed Protection programs.

Resilient Redevelopment Planning

The purpose of the NCRRP program is to provide a roadmap for communities in eastern North Carolina to rebuild and revitalize after being damaged by Hurricane Matthew. The program empowers communities to prepare locally driven, resilient redevelopment plans to identify redevelopment strategies, innovative reconstruction projects, and other actions to allow each community not only to survive, but also to thrive in an era when natural hazards are increasing in severity and frequency.

The NCRRP process employs a holistic approach to planning that includes four pillars: housing, infrastructure, economic development, and the environment. Redevelopment strategies and reconstruction projects for each of the four pillars is included in each plan.

The NCRRP process consists of planning and implementation phases and is managed through North Carolina Emergency Management (NCEM).

Scope of the Plan

This document is a snapshot of the County's current needs for achieving holistic recovery and redevelopment. The plan will evolve as the County analyzes the risk to its assets, identifies needs and opportunities, determines the potential costs and benefits of projects, and prioritizes the projects. As projects are more fully defined, the potential impact on neighboring communities and the region may lead to modifications.

Planning objectives are to (1) develop strategic, resilient redevelopment plans and actions, and (2) to define any unmet funding needed to implement such actions after taking into account other funding sources.

The resulting resilient redevelopment plans will be the foundation for any supplemental funding received through Congress, the North Carolina General Assembly, and other funding sources. These plans will also be the basis for the state's Recovery Action Plan, which is required by the U.S. Department of Housing and Urban Development before the state can expend funds received from the CDBG-DR program.

Local Participation and Public Engagement

Stakeholder engagement and public involvement was an essential component of the NCRRP initiative. Three robust rounds of discovery, analysis, collaboration, and interaction were held with each affected county. Each meeting had two components: an in-depth working session with county officials, subject matter experts, and planners from the affective counties and municipalities; and a public open house. The purpose of each meeting was as follows:

Meeting 1 – Initiated the planning process and validated the existing data pertaining to damage and impacts.

Meeting 2 – NCEM presented draft documentation of resilient redevelopment strategies and received feedback from community leaders and the public.

Meeting 3 – NCEM presented refined resilient redevelopment strategies based on feedback from Meeting 2 and received additional feedback for finalization of the plan.

Each of the 50 counties that were declared a major disaster by the President of the United States as a result of Hurricane Matthew under the Stafford Act (P.L. 93-288) participated in the resilience redevelopment planning process. Each municipality in those counties, as well as the five economic development regions that sustained damage from Hurricane Matthew, were also invited to participate.

The counties impacted by the storm cover the eastern half of North Carolina and occupy parts of the piedmont, sand hills, and coastal areas of the state. A map depicting Moore County and surrounding counties is shown below.

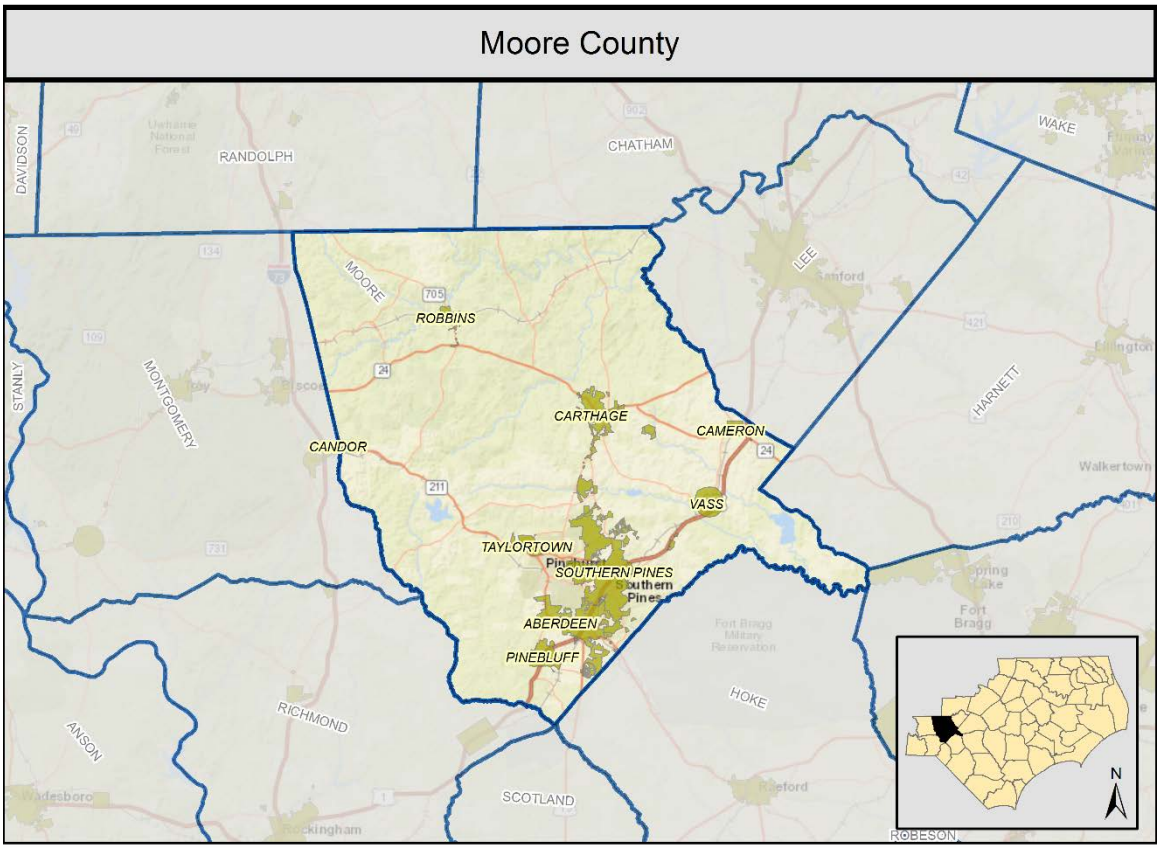
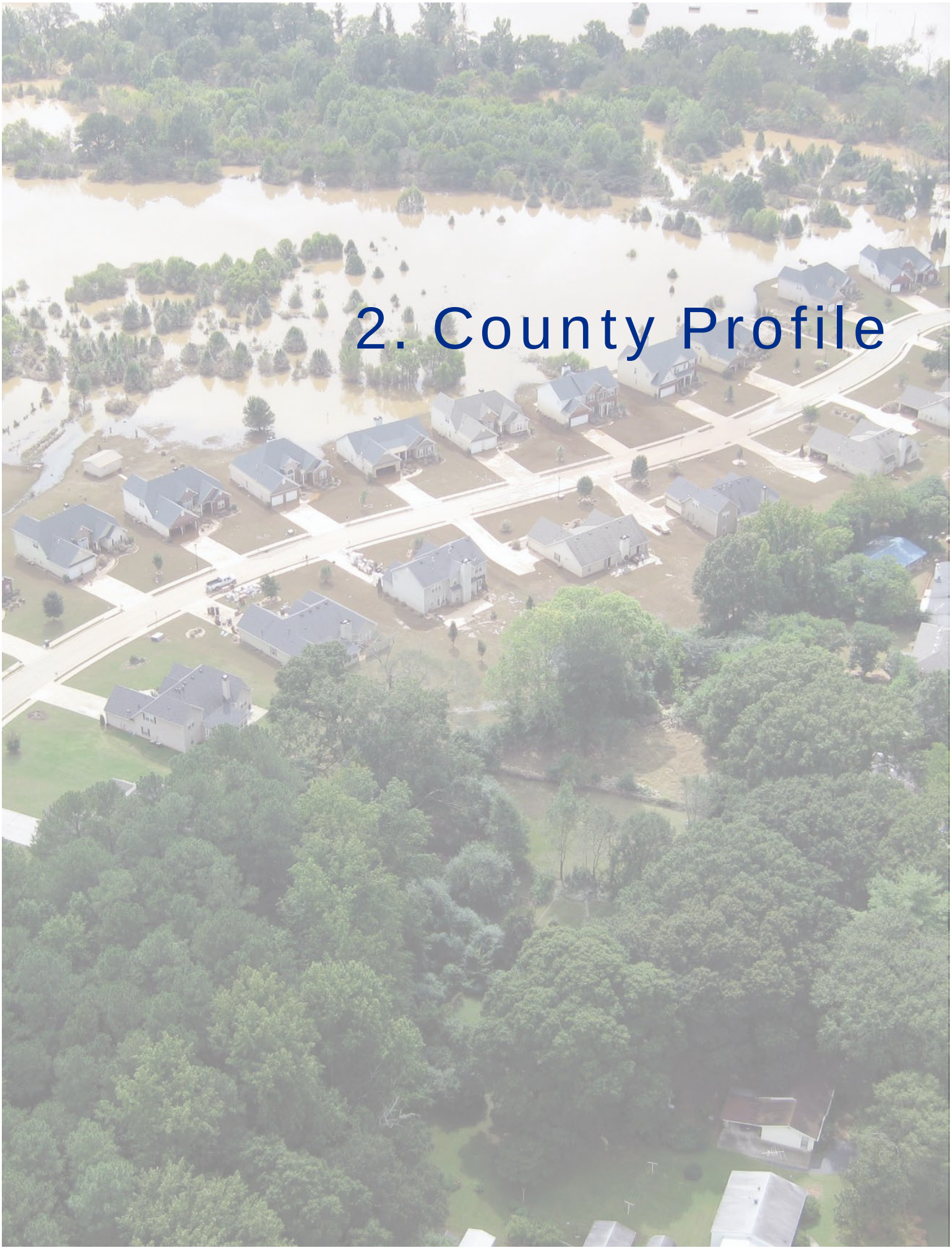


Figure 2. Moore County and Neighboring Counties

Data, Assumptions, and Methodologies

NCEM has assembled a wealth of data, resources, and technical expertise from state agencies, the private sector, and the University of North Carolina system to support the development of innovative best practice strategies.

Implementation of the proposed projects and actions described in this plan is subject to applicable federal, state, and local laws and regulations. Inclusion of a project or action in this plan does not guarantee that it will be eligible for recovery funding. However, proposed projects or actions may be eligible for state or federal funding or could be accomplished with municipal, nonprofit, or private investment.



2. County Profile

2. County Profile

Moore County is located in eastern North Carolina between Fayetteville and Wilmington. It is comprised of eleven incorporated municipalities and one Census-Designated Place (CDP): Town of Aberdeen, Town of Cameron, Town of Carthage, Village of Foxfire, Town of Pinebluff, Village of Pinehurst, Town of Robbins, Seven Lakes CDP, Town of Southern Pines, Town of Taylortown, Town of Vass, and Village of Whispering Pines. Its current population is 91,743. This section provides a profile of housing, economics, infrastructure, environment, and administration within Moore County.

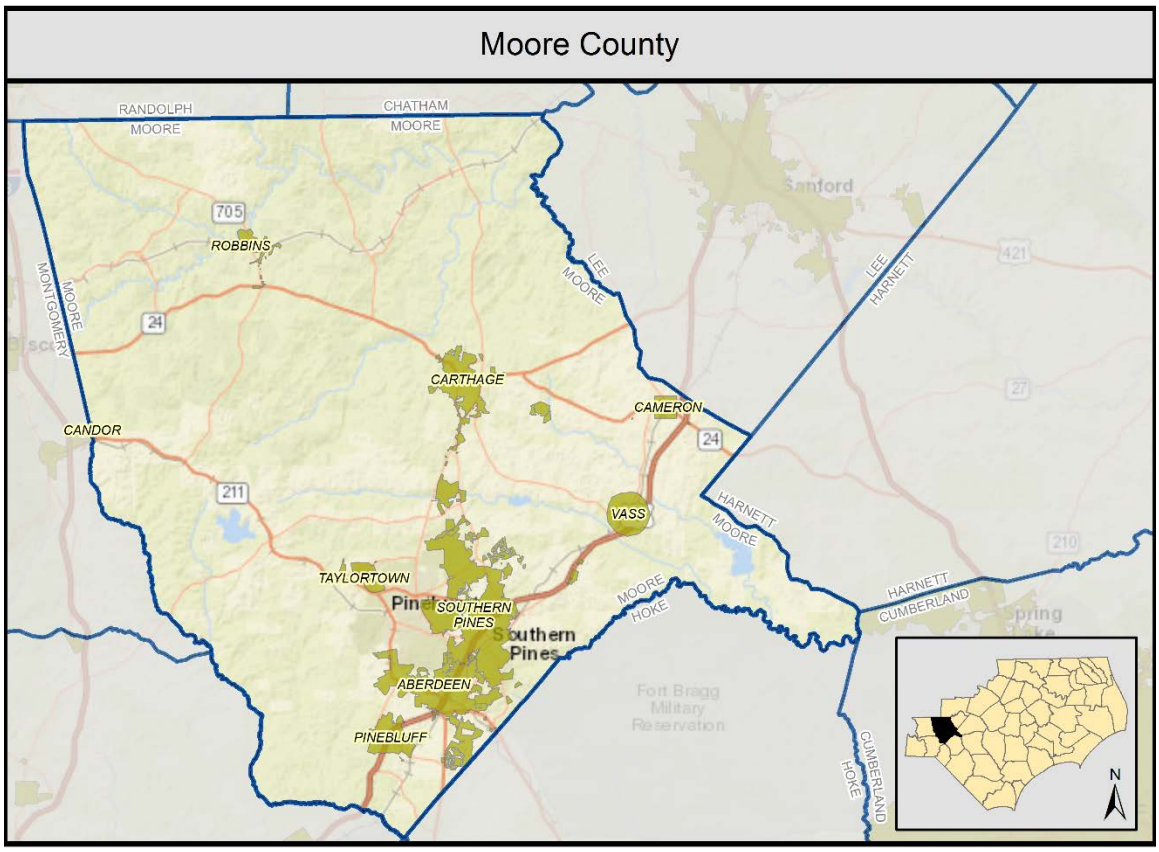


Figure 3. Moore Base Map

Demographic Profile

Demographics for Moore County and its incorporated municipalities and Census-Designated Places are summarized and compared to statewide averages in this profile. The demographic data is from the 2000 Census, 2010 Census, and 2011-2015 American Community Survey five-year estimates.

Population

Moore County has a population of 91,743. Pinehurst is the most populous community within Moore County with a population of 15,313 and Cameron is the least populous community with a population of 287.[3]

[3] *Source: US Census Bureau, American Community Survey 5-year Estimates (2011-2015), Table B01001, "Sex by Age."*

Population Change (2000 to 2010)

The Moore County population grew substantially between the 2000 and 2010 Census. In 2000 the population was 74,774 and in 2010 it was 88,247. The population increased by 13,473 people, or around 18 percent. In comparison, North Carolina grew by 19 percent from 8,049,313 people in 2000 to 9,535,483 in 2010.[4]

Age

The median age in Moore County is 45, which is slightly higher than North Carolina at 42. Within Moore County, Pinehurst has the oldest median age, 61, and Robbins has the youngest median age, 31.[5]

Race and Ethnicity

Moore County is mostly White (83 percent) with a notable African American (12 percent) population. Other races constituting the remaining 5 percent. In comparison, North Carolina is 70 percent White, 22 percent African American, 1 percent American Indian and Alaska Native, 3 percent Asian, less than 1 percent Native Hawaiian/Pacific Islander, 3 percent Some Other Race, and 2 percent Two or More Races. Refer to the table below.[6]

Within Moore County, all of the communities are predominantly White with the exception of Taylortown which is majority African American. In Aberdeen and Taylortown, more than 5 percent of the population identifies as Two or More Races.

The Latino population in Moore County is 6 percent compared to 9 percent for North Carolina. Robbins has the largest Latino population (46 percent) while Cameron, Seven Lakes CDP, and Taylortown all have very small Latino populations according to the Census data. Vass also has a notable Latino population of 17 percent.

Geography	White	Black or African American	American Indian and Alaska Native Alone	Asian	Native Hawaiian/ Pacific Islander	Some Other Race	Two or More Races	Total Non-White
Aberdeen town	68.2%	20.4%	0.2%	4.8%	0.0%	0.6%	5.9%	31.8%
Cameron town	82.2%	17.8%	0.0%	0.0%	0.0%	0.0%	0.0%	17.8%
Carthage town	78.5%	20.9%	0.4%	0.0%	0.0%	0.0%	0.3%	21.5%
Foxfire village	84.4%	11.1%	0.8%	0.6%	0.0%	3.1%	0.0%	15.6%
Pinebluff town	87.5%	7.4%	1.5%	0.6%	0.0%	0.3%	2.6%	12.5%
Pinehurst village	96.3%	1.6%	0.0%	0.9%	0.0%	0.1%	1.1%	3.7%
Robbins town	94.2%	2.7%	0.3%	0.5%	0.0%	0.0%	2.2%	5.8%
Seven Lakes CDP	97.5%	1.4%	0.0%	0.4%	0.0%	0.0%	0.7%	2.5%
Southern Pines town	74.4%	21.9%	0.0%	1.1%	0.0%	0.2%	2.5%	25.6%
Taylortown town	27.6%	62.8%	0.0%	0.0%	0.0%	1.6%	7.9%	72.4%
Vass town	76.9%	20.1%	0.0%	0.0%	0.0%	0.6%	2.4%	23.1%
Whispering Pines Village	91.9%	0.0%	6.7%	0.6%	0.0%	0.0%	0.8%	8.1%
North Carolina	69.5%	21.5%	1.2%	2.5%	0.1%	3.0%	2.4%	30.5%

Table 2. Moore County Race and Ethnicity

[4] *Source: Minnesota Population Center. National Historical Geographic Information System: Version 11.0 [Database]. Minneapolis: University of Minnesota. 2016. http://doi.org/10.18128/D050.V11.0. Census 2000/Census 2010 Time Series Tables Geographically Standardized*

[5] *Source: US Census Bureau, American Community Survey 5-year Estimates (2011-2015), Table B01001, "Sex by Age."*

[6] *Source: US Census Bureau, American Community Survey 5-year Estimates (2011-2015), Table B02001, "Race"*

Limited English Proficiency

Limited English Proficiency (LEP) is defined as populations 18 years or older that speak English less than very well. In Moore County, most of individuals identified as LEP speak Spanish, though some people speak Other Indo-European or Asian-Pacific languages. Similarly, the primary language group for LEP individuals in North Carolina is Spanish. Within Moore County, Robbins has the largest LEP population and that primary language group for LEP populations is Spanish. Most of the communities in the county do not have significant LEP populations according to Census data.[7]

Poverty

In Moore County, 15 percent of the population is below the poverty level compared to 17 percent of the North Carolina population. In Robbins, 43 percent of the population is below the poverty level. The Town of Taylortown also has a significant percent (40 percent) of its population living below the poverty level.[8]

Low and Moderate Income Individuals

In Moore County, 41 percent of the population is classified as low and moderate income (LMI) individuals based on the US Department of Housing and Urban Development's definition. In comparison, 39 percent of the North Carolina population is classified as LMI.[9]

Median Household Income

The median household income of the population 25 to 64 years old is $56,678 in Moore County while it is $53,097 in North Carolina. Median household income statistics were not available in all communities, though it is notable that Pinehurst has the highest median income for this age group at $74,849.[10]

[7] *Source: US Census Bureau, American Community Survey 5-year Estimates (2011-2015), Table B16004, "Age by Language Spoken at Home by Ability to Speak English for the Population 5 Years and Over."*

[8] *Source: US Census Bureau, American Community Survey 5-year Estimates (2011-2015), Table C17002, "Ratio of Income to Poverty Level in the Past 12 Months."*

[9] *Source: US Department of Housing and Urban Development, Estimate of Low and Moderate Income Individuals, https://www.hudexchange.info/programs/acs-low-mod-summary-data/acs-low-mod-summary-data-block-groups-places/*

[10] *Source: US Census Bureau, American Community Survey 5-year Estimates (2011-2015), Table B19094, "Median Household Income in the Past 12 Months."*

Zero Car Households

In Moore County, 6 percent of households do not have a vehicle available compared to 7 percent of North Carolina households. Within Moore County, Southern Pines has the highest percentage of households without access to a vehicle at 12 percent, while Seven Lakes CDP has the lowest percentage: 0 percent.[11]

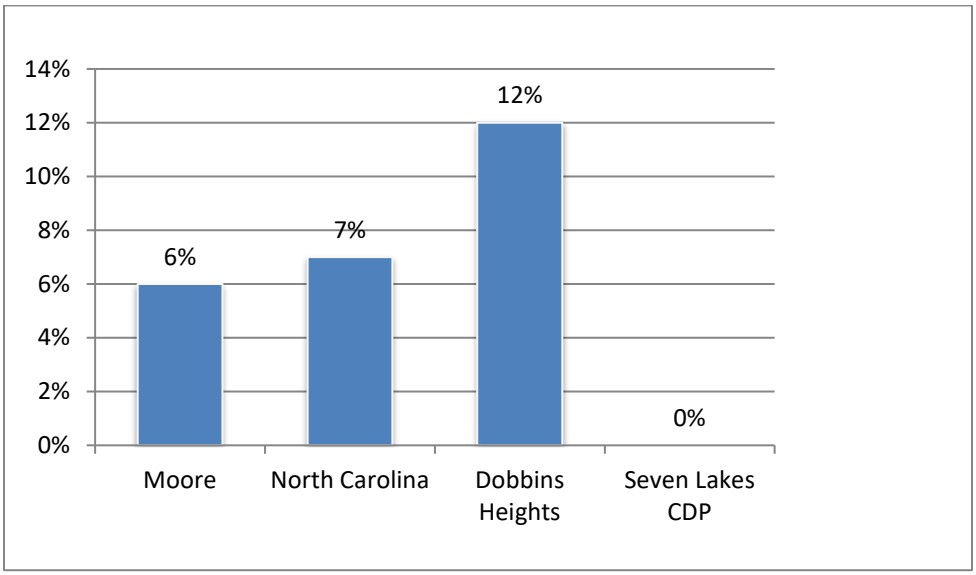


Figure 4. Zero Car Households by Percentage

Commuting: Travel Time to Work, Means of Transportation

The majority of Moore County residents commute alone to work by vehicle, 86 percent, which is slightly above the North Carolina average of 81 percent. Within Moore County, Seven Lakes CDP has the largest percentage of commuters commuting alone, 96 percent, and Taylortown has the least: 82 percent.

Almost no one in Moore County uses public transportation to commute, although Southern Pines is a notable exception at 1 percent. In comparison, 1 percent of North Carolina commuters use public transportation. A greater percentage of Pinebluff, Southern Pines, Taylortown and Vass residents commute by walking, bike, or motorcycle than the North Carolina average of 2 percent.

The mean commute time to work for Moore County residents is 24.1 minutes. In comparison, the North Carolina mean commute time is 24.7 minutes. Within Moore County, Taylortown has the shortest mean commute time at 15.5 minutes while Robbins has the longest at 31.5 minutes.[12]

[11] *Source: US Census Bureau, American Community Survey 5-year Estimates (2011-2015), Table B25044, "Tenure by Vehicles Available."*
[12] *Source: US Census Bureau, American Community Survey 5-year Estimates (2011-2015), Table B08301, "Means of Transportation to Work" and Table GCT0801, "Mean Travel Time to Work of Workers 16 Years and Over Who Did Not Work at Home (Minutes)."*

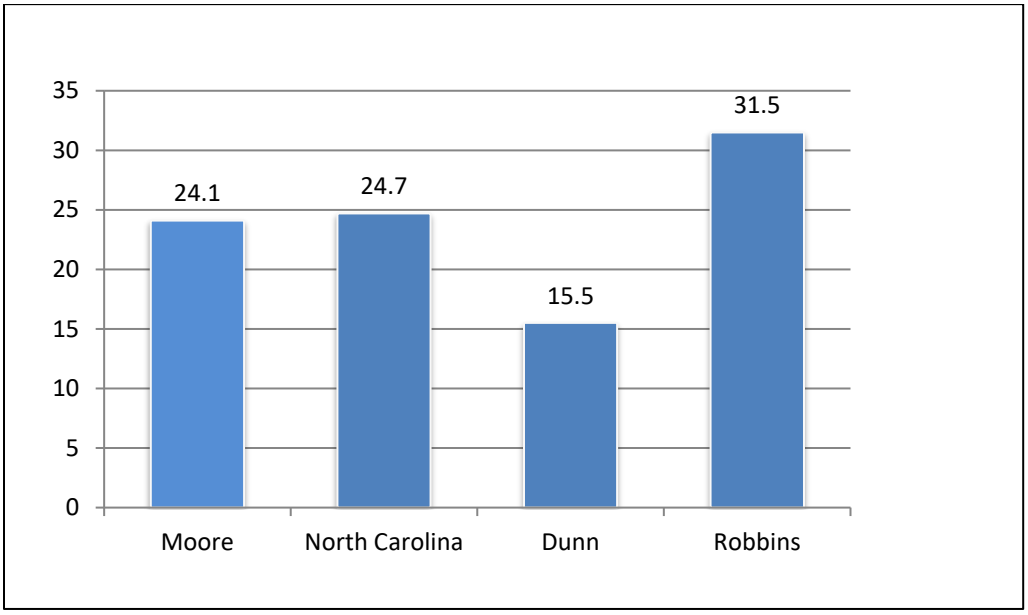


Figure 5. Mean Commute Time to Work in Minutes

Housing Profile

Moore County has nearly 45,000 housing units, 71 percent of which are single-family homes, 15 percent multi-family units, and 14 percent manufactured housing.

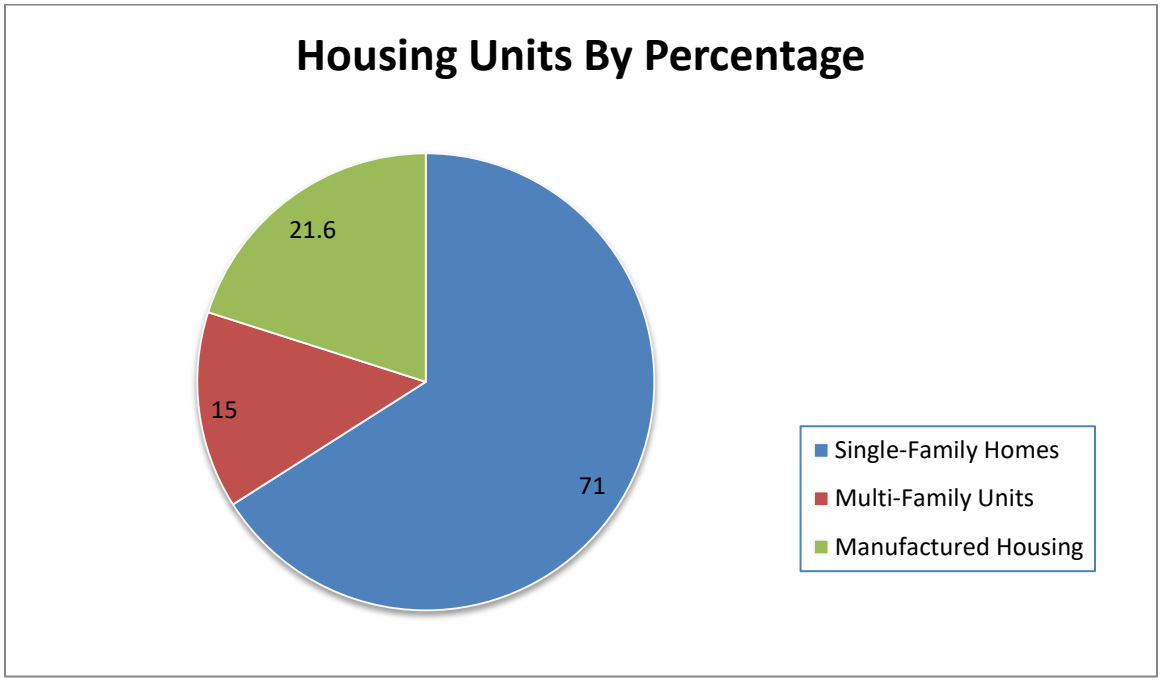


Figure 6. Housing Units By Percentage

In Moore County 17 percent of housing units are vacant, which is slightly more than that of North Carolina. Within Moore County, Robbins has the largest percentage of vacant housing units, 28 percent and. Pinebluff has the least: 8 percent.

Of the occupied housing units, 75 percent are owner-occupied compared to 65 percent in North Carolina; 25 percent are renter-occupied compared to 35 percent in North Carolina.

The median housing value in Moore County $199,100. In comparison, the median housing value in North Carolina is $140,000. Within Moore County, Pinehurst has the highest median housing value: $284,200. Robbins has the lowest median housing value: $83,500.

According to the National Housing Preservation Database, Moore County has 1,396 affordable housing units. Most of the affordable housing is located within Southern Pines. There are also a significant number of units in Aberdeen and Carthage and a few units located in Robbins and Vass.[13]

Economic / Business Profile

Moore County is a growing and diversifying economy with a strong emphasis on educational services, health care, social assistance, and the service industry. According to the US Census Bureau's Longitudinal-Employer Household Dynamics Program, the largest concentrations of jobs within Moore County are in the southern part of the county around Pinehurst, Southern Pines and Aberdeen.[14]

Labor Force

According to the local area unemployment statistics (LAUS) from the Labor and Economic Analysis Division (LEAD) for the unadjusted data for all periods in 2016, the civilian labor force population of Moore County is 39,4623. [15] Within Moore County, Pinebluff has the largest percentage of residents in the labor force, 71 percent, while Pinehurst has the smallest: 42 percent.

The civilian unemployment rate in Moore County is 5 percent. In comparison, the North Carolina civilian unemployment rate is 5.1 percent.[15] Within Moore County, Seven Lakes CDP has the smallest civilian unemployment rate at 0 percent while Taylortown has the largest: 13 percent.[16]

Major Employers

As mentioned, employment in Moore County is mainly concentrated in service sector with a focus on educational services, health care, and social assistance.

In particular, the county is well-known for being home to Pinehurst (No. 2) world class golf course and 39 premier golf courses which provide a strong base for tourism and recreation in the area. Moore County is nationally recognized as a major hub of equestrian activity with a large cluster of expansive, picturesque horse farms around Southern Pines. Moore County also boasts a broad spectrum of recreational and cultural opportunities to enjoy.

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[13] Sources: US Census Bureau, American Community Survey 5-year Estimates (2011-2015), Table B25002, "Occupancy Status"; Table B25003, "Tenure"; Table B25024 "Units in Structure"; Table B25077, "Median Value (Dollars)."
National Housing Preservation Database
[14] Source: US Census Bureau Longitudinal-Employer Household Dynamics Program
[15] Source: Civilian Population and Unemployment Rate - Labor and Economic Division (LEAD) of North Carolina Department of Commerce – Local Area Unemployment Statistics http://d4.nccommerce.com/LausSelection.aspx
[16] Source: US Census Bureau, American Community Survey 5-year Estimates (2011-2015), Table B23025, "Employment Status For The Population 16 Years And Over."

The major employers in the county are First Health of the Carolinas, Inc. (3,000+ employees), Moore County Schools (1,720 employees), and Pinehurst LLC (1,000+ employees). Additionally, Moore County Government and St. Joseph of the Pines Hospital employ between 500-999 people.[17]

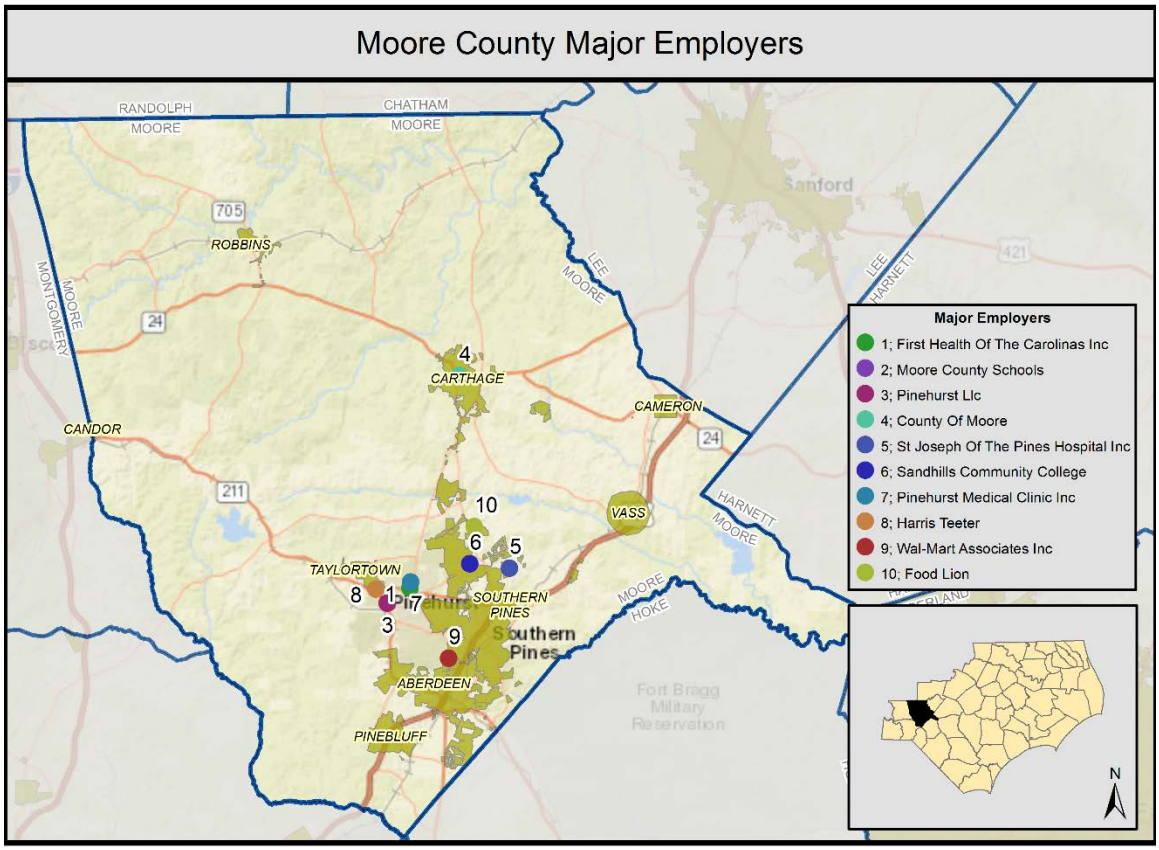

Figure 7. Major Employers by Number of Employees

Economic Development

The county is also focused on becoming a leader in the service and tourism sector within the state and is focused on leveraging its existing assets, such as golf courses, in conjunction with new areas such as eco-tourism. The county also has a growing health and medical sector that it will continue to promote due to a significant aging/elderly population.

Sandhills Community College, serves 4,000 curriculum students and 15,000 continuing education students annually. (SCC) is an active participant in working to educate and improve the labor force in the county and is focused on technical skills that correlate with the county's healthcare and service industry focus. The College works closely with new and existing businesses and industries to provide customized worker training programs on campus, at the work site and throughout Moore County. A Small Business Center and innovative Entrepreneurial Certificate Program are among the resources available at the College. Recently SCC announced receipt of grant funding for the trades program as part of continuing education that will provide the training and skills needed for new and changing manufacturing jobs in the region.

[17] *Sources: NC Department of Commerce*

Finally, it should also be noted that Moore County the county's per capita income ranks 9th out of 100 counties in North Carolina. However, there are a number of communities in Moore County that are examples of sub-county economic disparity, which is basically defined as a community that is relatively poor compared to the rest of the state, but is located within a county that is generally affluent overall. That is to say, while Moore County is classified as being a Tier 3 county (the highest tier) in terms of average unemployment, median household income, and a number of other factors, municipalities located within Moore County such as Robbins, Taylortown, and Vass are all contrastingly classified as Tier 1 municipalities (very economically distressed). This creates a challenge for these municipalities in terms of receiving economic development assistance because grants and other forms of funding are typically not directed to these municipalities since the county is considered to be relatively well-off economically. [18]

Infrastructure Profile

Transportation, health, education, water, and power infrastructure are summarized for Moore County in the sections that follow.

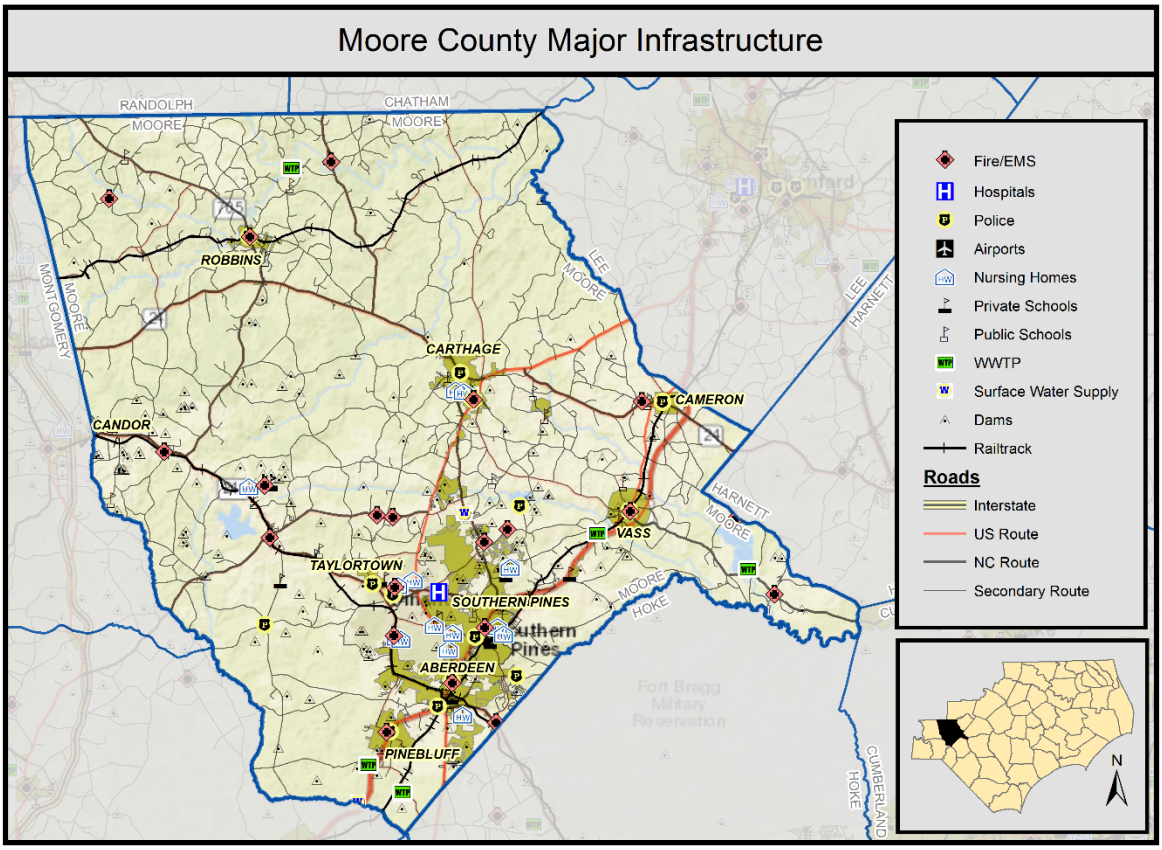

Figure 8. Moore County Major Infrastructure

Transportation

Moore County is home to a vast transportation network that offers access to many major cities and destinations across the state. The county is served by US Highways 1 and 15-501, NC Highways 24/27, 211 and 73, and several smaller highways. It is one of 8 counties in NCDOT's Division 8. Moore and Montgomery Counties are also identified as being in the heart of the NC Mega Site by the Recommended Logistics Villages for the

[18] *Sources: Moore County Economic Development and Moore Community College*

Piedmont Triad. In addition, the county is accessible by plane via the Moore County Airport (SOP) which is county-owned, based in Southern Pines, and provides a full range of services for private aircraft, as well as for passengers and pilots.

Health

There are a number of important health facilities located throughout the county, including several care providers. FirstHealth Moore Regional Hospital located in Pinehurst is a major provider with a heart center, cancer center, and a number of other services.

Education

In terms of schools, the county is served by 23 public schools and 2 charter schools, serving 10,625 students. Minority enrollment is 38 percent of the student body, and the student to teacher ratio is 16:1. In addition, 6 private schools, serving 1,314 students are located in Southern Pines and Vass where minority enrollment is 10 percent of the student body, and the student: teacher ratio is 8 to 1.[19]

Water

Water and wastewater systems are also critical to the county as these systems not only provide water to citizens, but also to major industries.

According to provisional data from the North Carolina Division of Water Resources and the Moore County Public Works Department there are twenty active water systems in Moore County. These are listed below:[20]

- Aberdeen
- Cameron
- Carthage
- Clarendon Gardens
- East Moore Water District
- Foxfire Village
- Moore County- Addor
- Moore County- High Falls
- Moore County- Hyland Hills
- Moore County- Pinehurst
- Moore County- Robbins
- Moore County- Seven Lakes
- Moore County- The Carolina
- Moore County- Vass
- Pine Bluff
- Robbins
- Southern Pines
- Taylortown
- Whispering Pines

[19] *Sources: Moore County Public Schools and Moore Community College*
[20] *Sources: NC Division of Water Resources, Local Water Supply Plans and Moore County Public Works Department*

- Wood Lake

Power

Moore County is served by 3 solar farms, 2 located across the border in Biscoe (Montgomery County) and 1 located in West End. These alternative power resources supplement the power provided by Duke Energy to 11 incorporated municipalities, and 3 smaller providers located in surrounding counties of Lee, Randolph, and Anson. These sources have a net summer capacity of 5 megawatts each.[21]

Natural Gas

Natural gas, provided by Piedmont Natural Gas, is available in southern Moore County to a portion of Pinehurst, Aberdeen, and most of Southern Pines. Moore County is in Piedmont Natural Gas' Eastern Region, Rockingham District.

Environmental Profile

Water resources, natural areas, managed areas, biodiversity, wildlife habitat, and recreation are summarized for Moore County in the sections that follow.

Water Resources

The county is home to a number of significant water bodies, namely the two major rivers that are located within the county's boundaries: Deep River and Little River which are part of the Cape Fear River Basin as well as other smaller rivers and streams that are identified as part of the Lumber River Basin. The Deep River runs through the northern part of the county and The Little River runs mainly through the central and southern part of the county. Several locations along these rivers have been dammed and thus there is some human control over these features.

The county is also home to a number of significant water bodies, namely the many lakes, like Pinehurst Lake, Watsons Lake and Thagards Lake included as part of the numerous golf courses across the county. The majority of these small lakes are often used as stormwater management features, and many were formed damming one of the 68 identified rivers, creeks and branches located in the county.

Wetlands are present throughout the county, especially along the Deep and Little Rivers and their tributaries. [22]

Natural and Managed Areas

In terms of environmental assets, the county has leveraged the Sandhills to develop significant green space and areas as golf courses throughout the county.

According to the NC Natural Heritage Program, there are several natural areas of high, very high, or exceptional value in Moore County. Areas identified as having exceptional or very high importance (highest levels) include:

- Nicks Creek/Eastwood Sandhills
- Voncanon Longleaf Pine Stand
- CPF/Deep River below High Falls Aquatic Habitat

[21] *Source: US Department of Energy, US Energy Mapping System*
[22] *Source: Environmental Protection Agency, NC Natural Heritage Program*

- CPF/Deep River aboveHigh Falls Aquatic Habitat
- Deep River Spiderwort Slopes
- Carbonton Diabase Sill
- Spies Longleaf Pine/Wiregrass Site
- CPF/Bear Creek Aquatic Habitat
- Upper Drowning Creek Swamp Forest
- Walthour Moss Longleaf Pine Forest
- Weymouth Woods State Natural Park
- Paint Hill
- Little River Flatwoods

Besides these areas, there are several managed areas under state ownership within Moore County. Managed areas are properties and easements where natural resource conservation is one of the current primary management goals, or are of conservation interest. These areas in Moore County include, among others: Goodwin State Forest, Sandhills Area Land Trust Preserve, Eastwood Plant Conservation Program, Sandhills Game Land, and Weymouth Woods-Sandhills Nature Preserve.[23]

Biodiversity and Wildlife Habitat

The NC Natural Heritage Program produces a biodiversity and wildlife habitat assessment for the state. According to this assessment, areas with the highest rating for biodiversity and wildlife habitat are concentrated in the southern areas of the county and along major rivers such as the Deep River and Little River. Many of these areas rank between a 9 and 10 on the biodiversity and wildlife habitat scale, with 10 being the highest possible score. Much of the county that is in the southern, urbanized area is unrated or has a much lower rating than areas north of the river.[24]

Parks and Recreation

Finally, the county has a considerable number of municipal-level recreational and park facilities such as Hillcrest Park and Lake Luke Marion in Carthage. In addition, the Town of Southern Pines and the Village of Pinehurst are developing greenway trail systems for their residents. Although the two greenway systems do not connect, more than 15 miles of nature trails are available for hiking, biking, walking, running, and nature observation These and all of the aforementioned environmental assets are especially critical to Moore County as they drive many of the recreational activities of the residents and enhance the local economy via eco-tourism.[25]

Administrative Profile

The administrative capabilities of Moore County and the municipalities within the County are discussed in great detail within Section 7 of the *Cape Fear Regional Hazard Mitigation Plan* (2016). The assessment evaluates the capabilities of the County and municipalities to implement mitigation actions across the areas of planning and regulatory capabilities, administrative and technical capabilities, fiscal capabilities, and political capabilities. Many more details about the capabilities of Robeson County and the municipalities can be found in that document.

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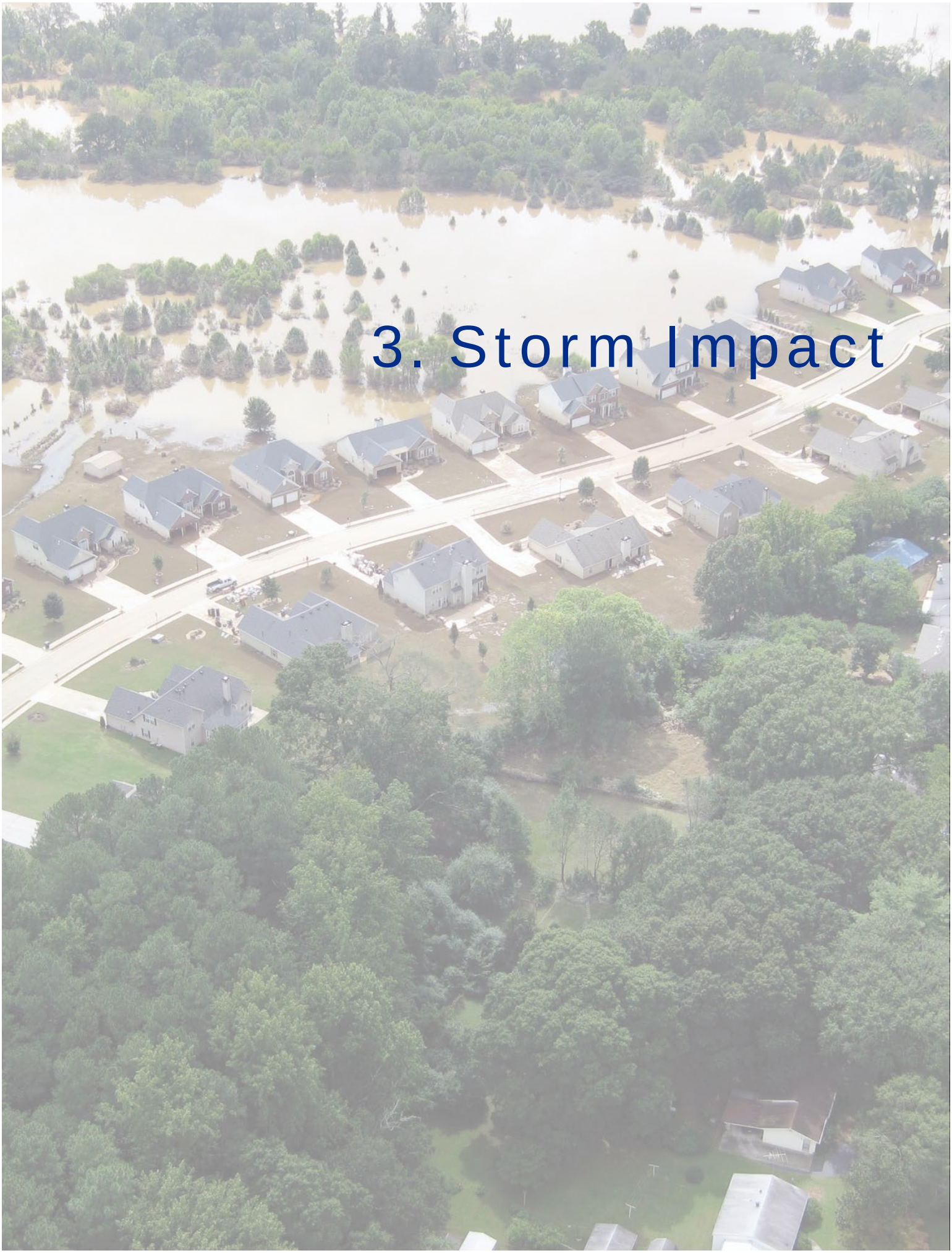
[23] *Source: NC Natural Heritage Program*
[24] *Source: NC Natural Heritage Program*
[25] *Sources: North Carolina Forest Service, Moore County Parks and Recreation Department, County website*

In terms of administrative capabilities, the County has many of the staff and the necessary plans, policies and procedures in place that are found in communities with "high" capabilities. Moore County has Emergency Management and Planning departments with the capacities to assist in implementing the resilience strategies proposed in this plan. Some of the other indicators of capability for the County include the following: Comprehensive Land Use Plan, Stormwater Management Plan, Zoning Ordinance, Subdivision Regulations, and Floodplain Management Ordinance. These plans, policies and procedures help ensure that new development in the County will be managed in a responsible manner and will take place in non-hazardous areas.

Aberdeen, Cameron, Carthage, Foxfire Village, Pinebluff, Pinehurst, Southern Pines, and Whispering Pines have "moderate" capabilities. They all have administrative resources that would likely be able to assist with implementing the strategies in this plan. In addition, they have the plans, policies and procedures in place that indicate a higher than average capability. Robbins, Taylortown, and Vass may need assistance from other agencies in order to implement the strategies in this plan as a result of more limited administrative resources.[26]

[26] *Sources: Moore County*



3. Storm Impact

3. Storm Impact

Rainfall Summary

Hurricane Matthew officially made landfall as a Category 1 storm southeast of McClellanville, South Carolina early on October 8, 2016. The track and speed of the storm resulted in nearly two days of heavy precipitation over much of North Carolina that caused major flooding in parts of the eastern Piedmont and Coastal Plain. The storm produced widespread rainfall of three to eight inches in the central regions of North Carolina and eight to more than fifteen inches in parts of eastern North Carolina. A number of locations received all-time record, one-day rainfall amounts. Many locations in the Coastal Plain of North Carolina had already received above normal rainfall in the month of September, leading to wet antecedent conditions prior to Hurricane Matthew. Total rainfall depth for Moore County is highlighted graphically in the figure below.

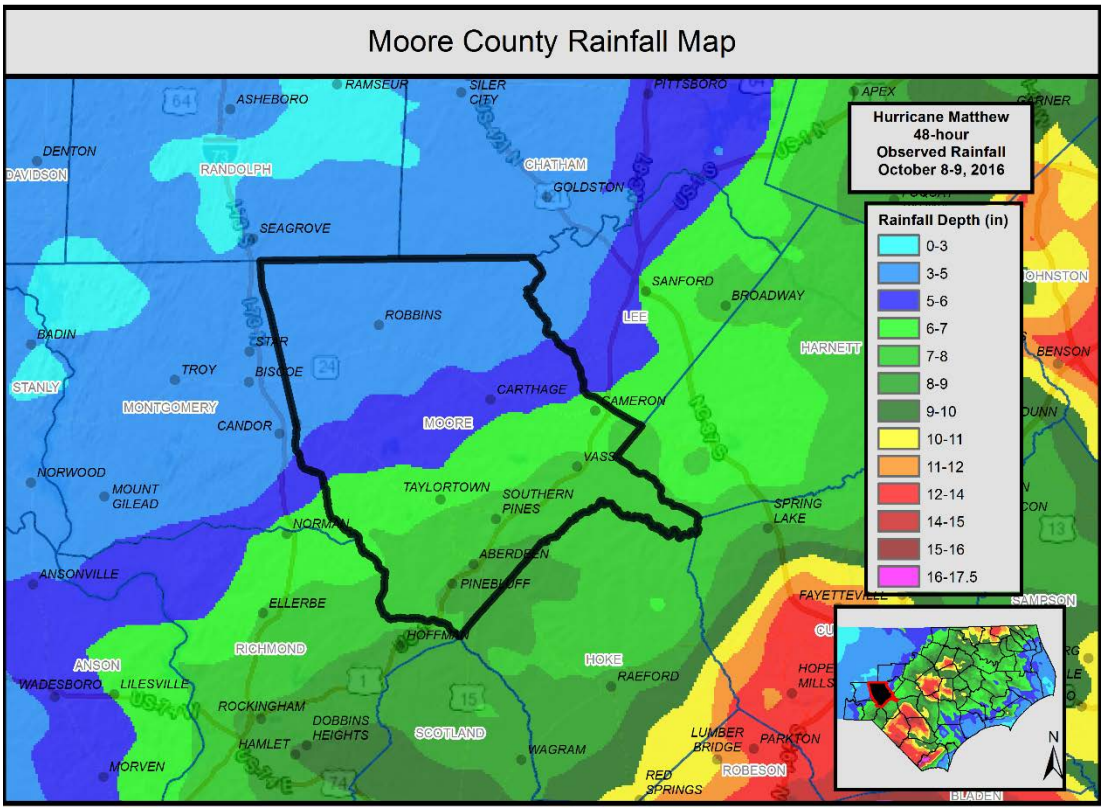


Figure 9. Hurricane Matthew 48-hour Observed Rainfall Depth

Riverine Flooding Summary

The effects of Hurricane Matthew on Moore County overall were moderate, but the county experienced some especially significant impacts in the southeastern area, which is where many of the rivers and streams (such as the Little River) within the Cape Fear River basin drain. It is also notable that flooding occurs in this part of the county even during less-severe rainfall events, which makes this area a particular hot spot for flooding. Problem areas are most notably in the southeast corner of the county in the areas between Crystal Lake Dam and Spring Lake. As no river/stream gauges are located within Moore County, additional riverine flooding data is unavailable at this time. The county has submitted a need for gauges as a high priority strategy component of this plan.

A specific example of the challenges Moore County faced during Hurricane Matthew occurred in the eastern portion of the county, south of the Town of Cameron. Here, 10 days prior to Hurricane Matthew, a tropical storm passed over the area, dropping significant rain and heavily saturating the soil. In typical rainfall events, this area is already difficult to predict hydraulically due to the hydrologic soil types in the region. With the significant rainfall from both the tropical storm and Hurricane Matthew, this problem was further compounded and local officials had to deal with a number of flooding issues in this area.

Housing Impacts

According to Individual Assistance claims as of March 17, 2017, there were 343 registrations for Individual Assistance in Moore County as a result of Hurricane Matthew. It should be noted that additional claims from Hurricane Matthew may still be pending, so this number may not reflect the final claims data from the event. This also does not take into account other historic impacts to the county or other areas of concern for flooding that may not have occurred during this storm. With that in mind, the planning team attempted to take a comprehensive look at both Hurricane Matthew impacts and any historic impacts that local officials felt would validate areas that should be considered at high risk to future flooding.

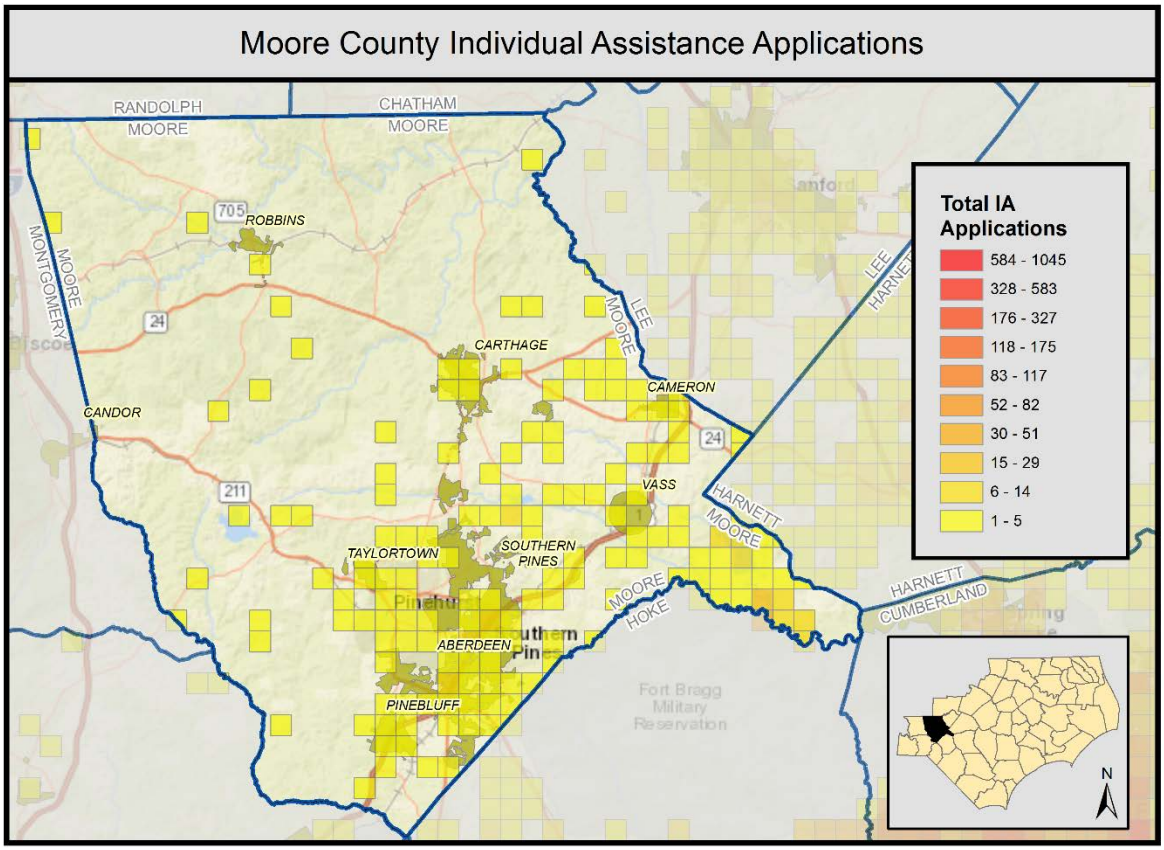


Figure 10. Moore County IA Applications by Area

Housing was certainly impacted in Moore County as a result of Hurricane Matthew. There were several homes damaged, especially in the southeast part of the county. Some of the major impacts to housing that were identified by local officials from the event include:

- **Homes Flooded from Hurricane Matthew:** Riverbend and Riverview Acres are both communities in flood-prone areas and both flooded during Hurricane Matthew. Based on historic flooding information, these communities include a significant number of repetitive loss properties. It should also be noted that it is not uncommon for the bottom floor of these elevated houses to be closed in by homeowners without local government approval and used as living space. This has frequently resulted in a larger flooding impact than otherwise would have been the case.

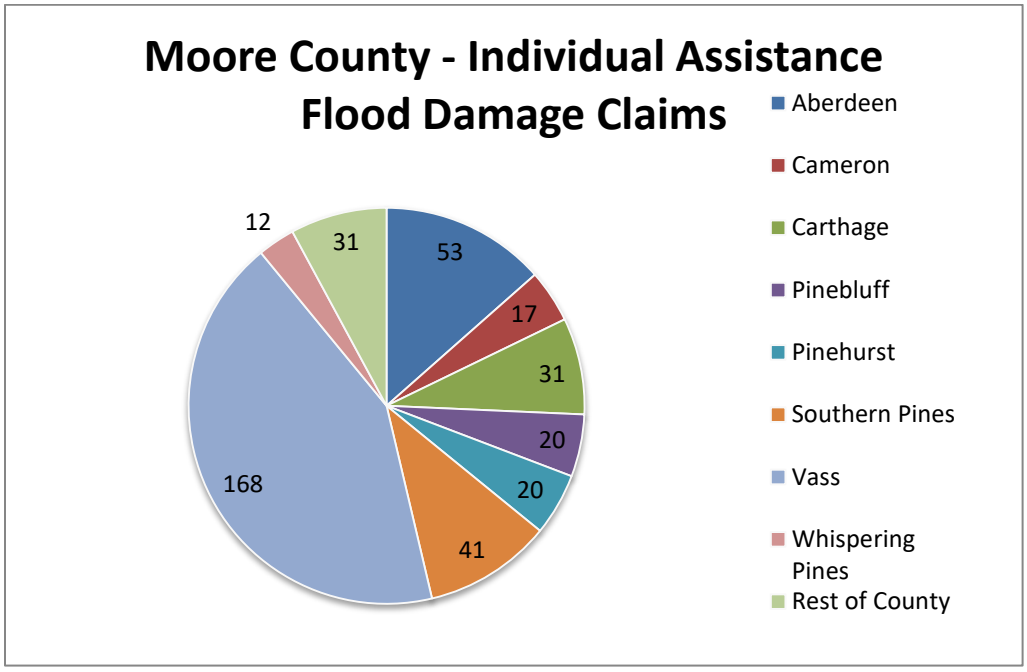


Figure 11: Number of IA Flood Damage Claims by Area

- **Areas of Frequent Flooding:** Several areas in the county have experienced frequent historic flooding events which have impacted homes and apartment buildings. One prominent example is the apartment complex on SE Broad Street which has been flooded three to four times in the last five years. Many of these issues may be related to aging or inadequate stormwater infrastructure.

Economics / Businesses / Jobs Impacts

Although there were some impacts to the economy in Moore County from Hurricane Matthew these were generally minor compared to some of the other impacts the county experienced. Some of the impacts to the economy/businesses/jobs that were identified by local officials from the event.

- **Downtown Areas Impacted:** Downtown Aberdeen contains several structures, including both commercial and residential, located in the flood zone. Many commercial parking lots flooded during Hurricane Matthew and frequently flood during other heavy rainfall events, often due to clogged storm drains.
- **Identified Economic Development Zones:** There are several communities in the county that may not have had major impacts directly from Hurricane Matthew, but which have been impacted economically over the past several years as jobs and businesses have struggled. Particularly in Cameron, Robbins, and Vass, there have been difficulties attracting businesses. There is a desire to improve growth and make these communities attractive to new businesses and commercial development.

- **Employment**: The county did not identify significant impacts from long-term employment losses or income impacts – but as there were extended power outages in the area, it is likely that hourly employees supporting the service industry were impacted.

The table below describes the impacts to the top ten employers (in terms of number of employees) in the county. These impacts were minor in all cases.

Year	Period	Company Name	Industry	Employment Range	Impact from Hurricane Matthew
2016	02	First Health Of The Carolinas Inc	Education & Health Services	1000+	No major impacts
2016	02	Moore County Schools	Education & Health Services	1000+	No major impacts
2016	02	Pinehurst Llc	Leisure & Hospitality	1000+	No major impacts
2016	02	County Of Moore	Public Administration	500-999	No major impacts
2016	02	St Joseph Of The Pines Hospital Inc	Education & Health Services	500-999	No major impacts
2016	02	Sandhills Community College	Education & Health Services	250-499	No major impacts
2016	02	Pinehurst Medical Clinic Inc	Education & Health Services	250-499	No major impacts
2016	02	Harris Teeter	Trade, Transportation, & Utilities	250-499	No major impacts
2016	02	Wal-Mart Associates Inc	Trade, Transportation, & Utilities	250-499	No major impacts
2016	02	Food Lion	Trade, Transportation, & Utilities	250-499	No major impacts

Table 3. Impacts to the Top 10 Major Employers

Infrastructure Impacts

According to Public Assistance claims, which are often tied to infrastructure damage, as of March 17, 2017, there was $17,752 obligated federally in Moore County as a result of Hurricane Matthew. It should be noted that additional claims from Hurricane Matthew may still be pending, so this number may not reflect the final claims data from the event.

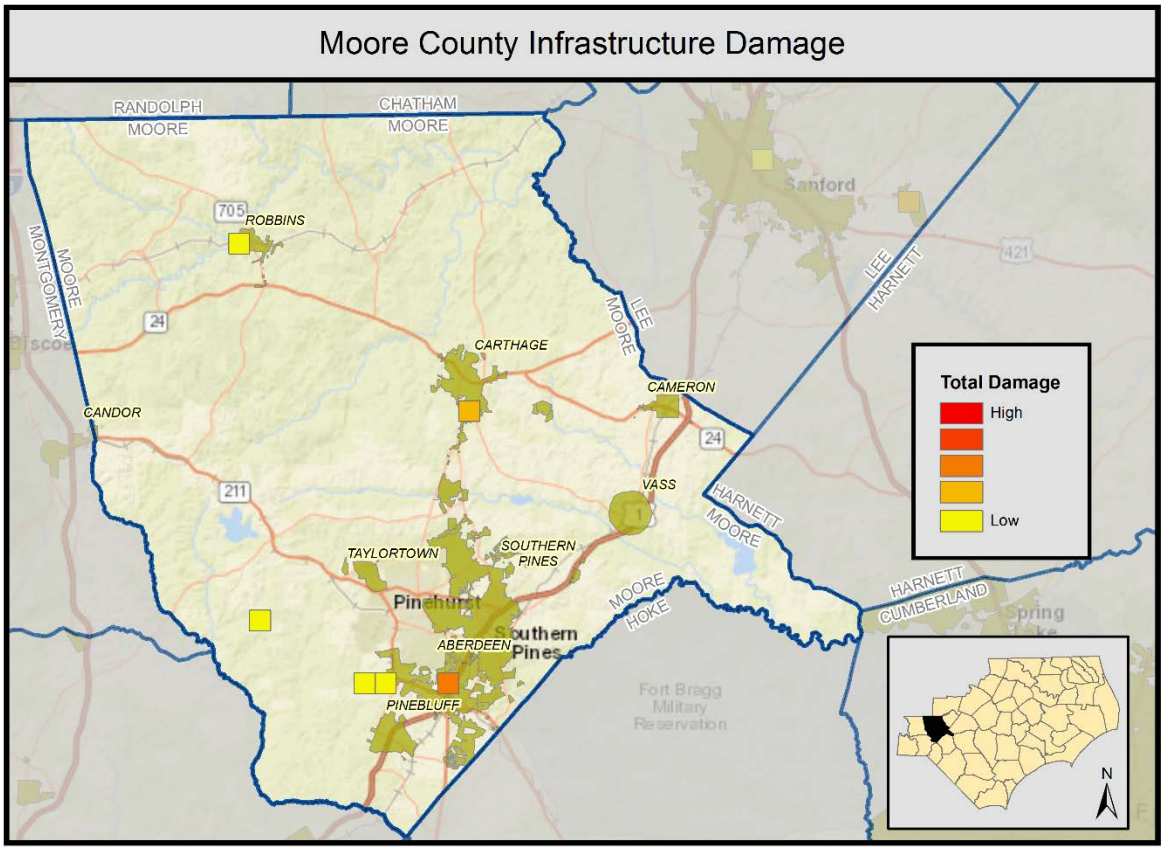


Figure 12. Moore County Infrastructure Damage

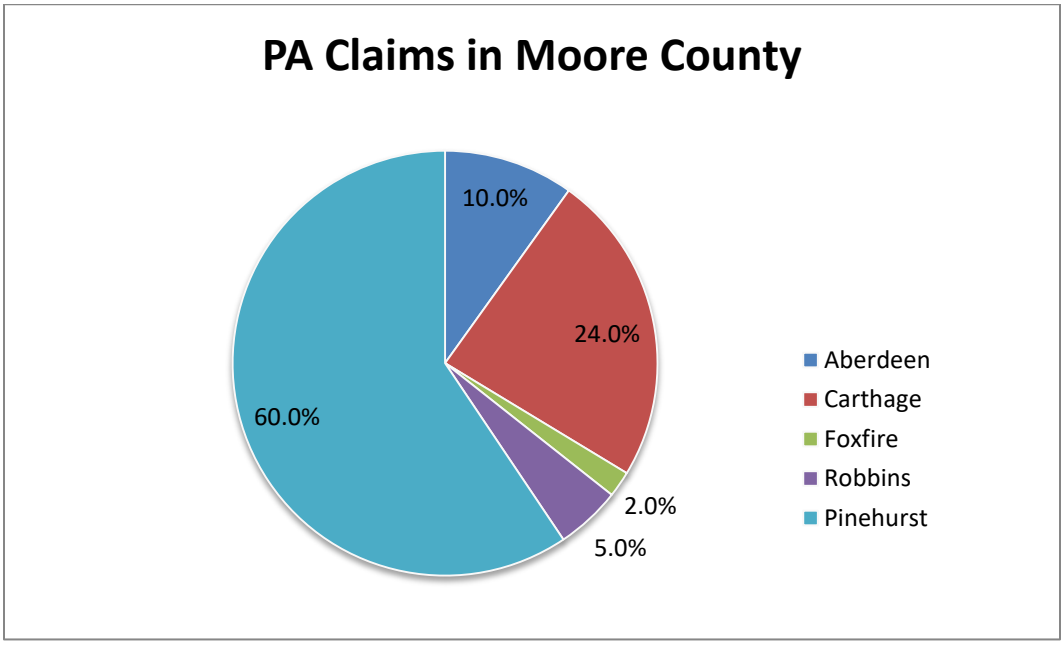


Figure 13. Moore County PA Claims by Area and Percentage

County infrastructure was one of the greatest areas of concern in the wake of Hurricane Matthew since there were several types of infrastructure that were damaged in multiple locations. Some of the major impacts to infrastructure that were identified by local officials from the event include:

- **Dam Issues:** Moore County has 61 high-hazard dams, many of them privately owned. During Hurricane Matthew, a number of these dams were not being properly monitored and/or operated. That is to say, releases from many of these dams, especially private dams, were not coordinated across the county or the region. This introduced a communication problem, as there was no organized method of monitoring, opening, and closing gates to allow for the appropriate volumes and timing of water to flow. In the end, this caused flooding problems in many areas that might have been avoided with a more coordinated system.
    - Woodlake Dam, which holds back 1,700-acre Surf Lake came very close to failing from the heavy rains of Hurricane Matthew. This threatened the Town of Vass with millions of gallons of water that might have potentially been released and spread over the town. Precautionary safety measures were taken, evacuating residents from their homes in Vass.
    - Pine Valley Pond Dam was breached during Hurricane Matthew and spilled downstream into Lake Diamond.
- **Road/Bridge Flooding:** Road and bridge overtopping are common occurrences in Moore County and impacted a number of different locations during Hurricane Matthew. Many of these locations have been historical hotspots in the county and are affected even during rainfall events that are not as extreme as hurricane/tropical storm events. For example:
    - As mentioned above, the southeast sector of the county has extensive drainage issues. Water in this area does not contract through or under structures quickly enough due to the wide flood plain in this area and potentially undersized culverts and bridges. Several locations in this area experienced overtopping, including McGill Road bridge and McPherson Road bridge. A noteworthy historical mention, when Tropical Storm Hannah hit the area five years ago the North Carolina Department of Transportation (NCDOT) took ownership of a privately owned structure and its roadway approaches to upsize a culvert that had been damaged.
    - In the northern portion of Moore County, several bridges and roadways experience flooding at least 2-3 times a year, including during Hurricane Matthew.
    - Blue Rock Road off White Rock Road washed out during Hurricane Matthew. It is a private road.
    - There was frequent flooding and overtopping of roadways and bridges downstream of Kelly Plantation Road and Cool Springs Road. Kelly Plantation Road has a low two-lane bridge that floods frequently. Cool Springs Road has a low bridge that floods three to four times per year.
    - Cabin's Creek: There are historical bridge and culvert issues here. Two major waterways coming together is causing problems. There is flat topography all along here.
    - Longleaf Drive has some minor historical street flooding issues.
    - There is isolated roadway flooding at Seven Lakes.
    - Bridges in the area of NC Highway 24/27 around the intersection of Flint Hill Church Road have been overtopped numerous times and roadways flooded.
    - Rascob Road is a flooding hotspot, which blocks emergency services routes when flooded.

- There is a low-water bridge over Glendon-Carthage Road between S. Carbonton Road and Putnam-Glendon Road. This is one of only three roads that can take you out of the county. The bridge has recently been raised, but it still floods.
- Culvert and roadway overtopping frequently occurs at Plank Road.
- N.C. Highway 705 just southwest of Zion Grove has stormwater flooding issues, which resulted in a recent fatality here.
- N.C. Highway 22 just north of McCaskill Road has a low bridge near the golf course, which was the site of a recent rescue from high water.
- There is a low bridge at Southern Pines Reservoir.
- There was a huge sinkhole and washout of road at Lakebay Road. This may or may have been addressed already by someone else, but it is not certain.
- There have been many rescues off McGill Road Bridge over the past several years.
- Lobelia Road was damaged in Hurricane Matthew, which resulted in a quick repair, but it may not have been fully upgraded.
- The Bear Creek Reservoir roadway in Robbins, which is a service road, is frequently flooded. This road provides access to the shooting range for law enforcement personnel.

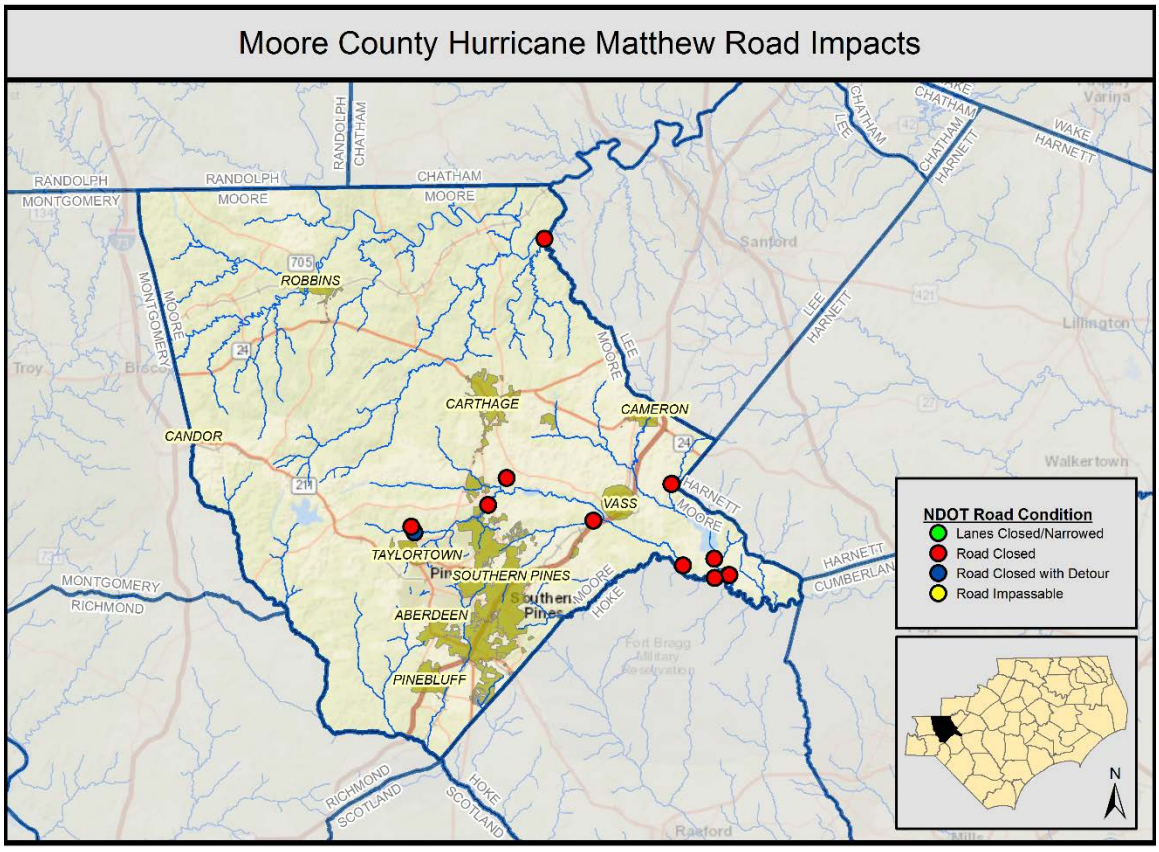


Figure 14. Impacted NCDOT Structures in Moore County

- **Water/Wastewater Infrastructure:** Water and wastewater infrastructure is critical to maintaining health and well-being of the public in the wake of a storm event. Due to the necessity of placing this infrastructure near water bodies, it is often threatened, which naturally causes a risk to flooding. During Hurricane Matthew, a number of water/wastewater facilities were impacted in Moore County.
    - SP-4, a pump station located at the intersection of U.S. Highway 1 and Midland Road, experienced overflows in its collection system and interceptors due to flows that were greater than the pumping capacity during Hurricane Matthew. Both pumps and the generator were functioning. However, the incoming flow was greater than the pump capacity due to excessive inflow. The county experienced an increase of inflow that resulted in approximately $70,000 of increased costs to process water as a result of Hurricane Matthew.
    - Power was lost at six pump stations. Permanent generators at our larger stations allowed the pump stations to pump and additional permanent or portable generators at the smaller stations would have reduced the impact.
    - Fortunately, power was not lost at the 18 well sites. The powered flickered several times, but never was lost at the wells. However, power was lost at the booster pump stations, all but two of which have permanent generators: Dawkins and Midland. Had the power have been lost at the wells, Pinehurst would have run out of water.
    - Hurricane Matthew resulted in a water line and roadway washout east of U.S. Highway 1 near the town of Vass, on Blue Rock Road (off White Rock Road).
    - The water treatment plant (Southern Pines/Carthage) became overwhelmed from Hurricane Matthew, resulting in debris in drinking water.
    - Based on historical data, Riverview and Riverbend Acres have been known to have issues with septic water running into wells, with most properties operating off private wells and septic tanks.

Ecosystems / Environmental Impacts

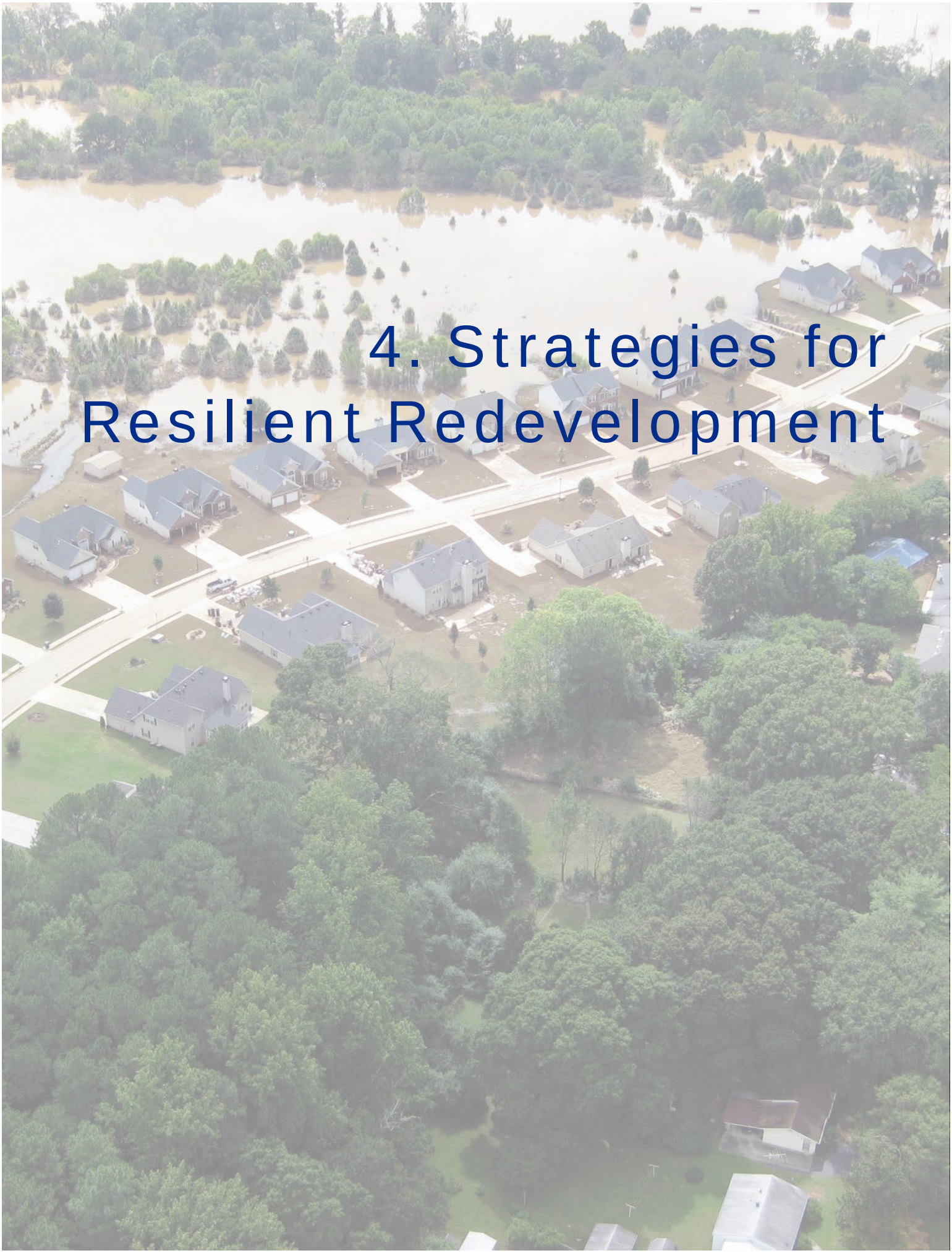
Overall, environmental impacts in Moore County as a result of Hurricane Matthew were relatively minimal. However, there were some noteworthy incidents that may not have explicitly impacted the environment and ecosystems, but which brought to light some underlying issues related to maintenance of environmental features that the county faces recurrently.

- **Southeast Sector/Little River:** In the southeast sector of the county, there is some moderate development that has taken place within designated floodplains. These locations are essentially natural areas created by the river to expand into during heavy rainfall events. In many ways, the best solution for managing these areas is to leave the floodplain undeveloped. This prevents damage to any property that may have otherwise been damaged in a flood event and also reduces the amount of impervious surface area within the floodplain, thereby allowing infiltration into the ground and decreasing runoff.

  Many of the structures that have been built in the southeast sector are located in flood zones along the Little River. In this area of the county, the Little River is relatively flat and smooth and is a beautiful feature of the landscape that has been extremely under-utilized as a recreational feature. The presence of development in identified, natural floodplains has caused not only damage to personal property, but

has also caused some harm to the natural functions of the river system. Although this may be said of many areas of the county, it is particularly evident in the southeast sector as the natural beauty and recreational potential of the area is striking and is considered a key environmental resource in the county.

- **Natural Debris Buildup Causing Flooding:** Several low-water bridges across the county (including McGill Road bridge) experienced a significant amount of debris buildup in streams. This debris is frequently in the form of downed trees and other buildup of natural remains. Indeed, one of the major causes of debris buildup is from beaver dams that are constructed and then washed out during heavy rainfall/flooding events. This debris is then caught underneath bridges and in culverts, causing a jam that backs up water upstream and results in flooding.



4. Strategies for Resilient Redevelopment

4. Strategies for Resilient Redevelopment

This section provides details about the resilience and revitalization strategies and actions identified in Moore County. These actions were identified and refined during three public meetings with local officials and county residents held in March and April 2017. The actions are tied to impacts from Hurricane Matthew and organized by the pillars of housing, economic development, infrastructure and environment. In addition to the public meetings, frequent coordination calls with County officials and data gathered from state agencies and organizations were utilized to formulate the actions listed below.

Meeting 1 was designed to introduce the community and County points of contact to the Resilient Redevelopment Planning process and goals. This meeting allowed the planning team to capture areas within the county that were damaged during Hurricane Matthew and to hear what potential mitigation actions had already been considered. Draft resilience actions were then presented at Meeting 2 of the planning process. This was done to garner general buy-in on the draft actions from the County-level planning teams and residents. More details on the actions were collected between Meetings 2 and 3 through research and follow-up phone calls and emails with the primary points of contact. Meeting 3 provided the opportunity to collect and finalize details for the draft actions. Meeting 4, scheduled in early May 2017, allowed the county points of contact to rank the identified actions, group them into High, Medium, and Low Priorities, and to approve their inclusion in the plan.

Pillar	Project/Action Count
Housing	2
Economic Development	2
Infrastructure	4
Environment	4
Grand Total	**12**

Table 4. Moore County Summary of Projects by Pillar

The following table is ordered by the rankings and priorities provided by Moore County during Meeting 4:

Pillar	Action Name	Priority	Overall Ranking
Infrastructure	IN2- Stream Gauges, Early Warning Network, and Dam Modification	**High**	**1**
Environment	EN1- Southeast Sector Revitalization and Natural Park	**High**	**2**
Environment	EN4- Hydrologic and Hydraulic Study	**High**	**3**
Infrastructure	IN1- Backup Power, Generators, Microgrids	**High**	
Housing	H1- Acquisition/Elevation of Homes	**High**	
Housing	H2- Stormwater Management System Analysis and Upgrades	**High**	
Economic Development	ED1- Increase Retention Capacity and Upgrade Stormwater Management System to Protect Businesses	**High**	
Economic Development	ED2- Extend Utilities on a Regional Scale to Encourage Development	**Medium**	
Infrastructure	IN3- Roadway/Bridge/Culvert Improvements	**Medium**	
Environment	EN2- Stream Restoration	**Medium**	
Environment	EN3- Trail System Expansion	**Low**	
Infrastructure	IN4- Seal/Elevate Manhole Covers to Reduce Inflow and Infiltration	**Low**	

Table 5. Projects by Rank

On the following pages, we have organized the projects and actions by pillar. Within each pillar, the projects are grouped by county priority. Please note that maps are provided for all projects that have a specific location within the county. Projects without maps are county-wide projects that will benefit citizens throughout the county.

Housing Strategies

High Priority Housing Strategies

Pillar	Action Name	Priority	Overall Ranking
Housing	H1- Acquisition/Elevation of Homes	**High**	
Housing	H2- Stormwater Management System Analysis and Upgrades	**High**	

Table 6. Moore High Priority Housing Summary

These projects represent the housing strategies that Moore County indicated are the highest priority to address. Additional detail can be found below:

- **H1 - Acquisition/Elevation of Damaged Homes:** Develop a program to address widespread repetitive flooding of homes and continual flood risk in the Riverbend and Riverview Acres residential communities. The county would like to use elevation, mitigation reconstruction, and/or acquisition as a part of this program.

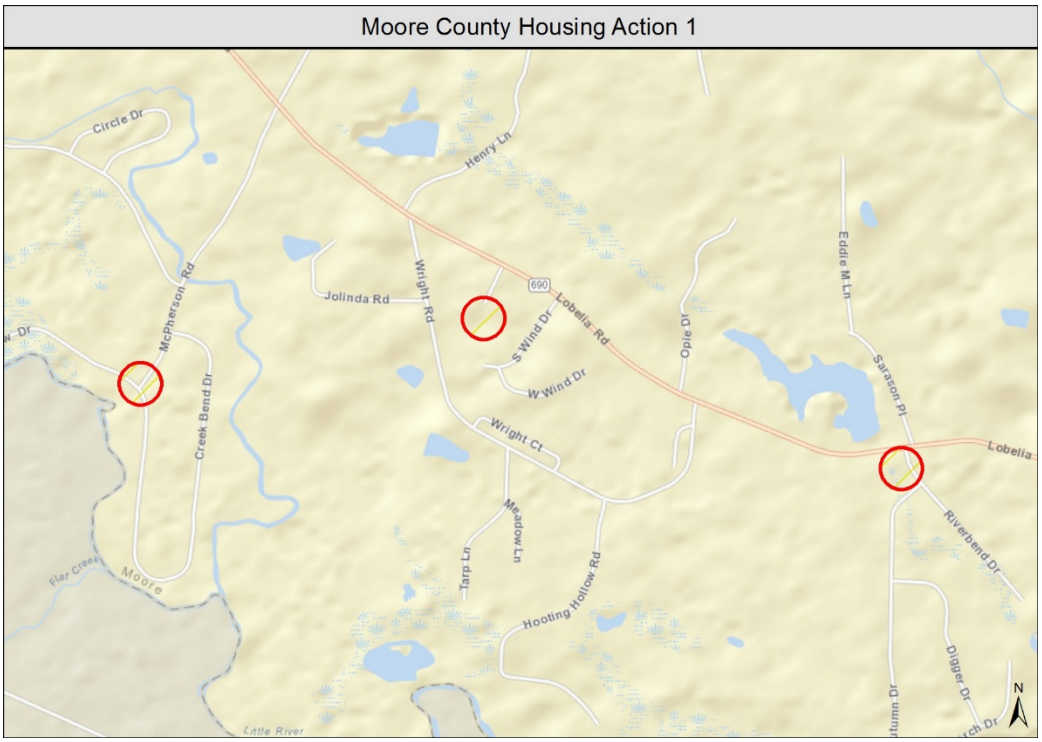


Figure 15. Acquisition/Elevation of Homes

H1- Acquisition/Elevation of Damaged Homes

County: Moore

Priority Grouping: High Priority

Priority Ranking: 0

Project Timeframe: 1-3 years

Location: Riverbend and Riverview Acres

Project Summary: Problem: Repetitive Loss Properties: Due to riverine back flow at the convergence of two rivers, overflow from upstream dams, and inadequate drainage to manage stormwater run-off, these neighborhoods/areas suffered significant flooding impacts as a result of Hurricane Matthew and prior significant rain events resulting in many Repetitive Loss structures in the area. Strategy: Develop a program to address widespread repetitive flooding of homes and continual flood risk in the Riverbend and Riverview Acres residential communities. The county would like to use elevation, reconstruction, and/or acquisition as a part of this program. The county has submitted for 4 properties through the rapid HMGP process, but there were around 40 homeowners at the initial meeting for HMGP who showed interest in a buyout or elevation. Most of these (around 75%) are mobile homes with a few single family wood-built.

Question	Response	Disposition
Articulate how this project addresses an unmet need that has been created by damage from Hurricane Matthew.	Repetitive Loss properties have been identified as a result of flooding from Hurricane Matthew as well as past significant rain events.	N/A
Consistent with existing plans (describe points of intersection/departure)	Yes - these undertakings are listed in the Hazard Mitigation Plan and in line with Local Floodplain Management regulations to reduce at risk homes located in the SFHA.	Agree
Does this project comply with existing Local and State authority (codes, plan and ordinance)?	Yes	Agree
Does this project meet the intents and goals for the Hurricane Matthew Recovery Act?	Yes	Agree
Explain any benefits or impacts to the economy of the county from this project.	Decrease in displaced community members due to flooding decrease to structural damage and potential revenue from future outdoor parks created as a result of this project.	Agree
For how long will this solution be effective?	More than 50 years	Agree
How effective is the risk reduction?	100-200 year event	Agree
How many public facilities are involved in this project (buildings and infrastructure)?	0	Agree
Is coordination with other communities/counties needed to complete this project?	No	Agree
Is this project consistent with Federal Laws	Yes	Agree
To what degree does this project adversely impact local floodplain/coastal zone management?	No Impact	Agree
To what degree will it be possible to positively quantify the environmental benefits and ROI of this project?	Medium to high confidence	N/A
What impact will this action have on the local economy/tax base?	Less than 25%	Agree
What impacts to the environment of the county will result from this project?	Positive environmental impacts will result from allowing the land to revert back to its natural floodplain function. Reducing impact from impervious services and contamination from runoff.	N/A
What is the capability of the local government to administer this project?	Medium	Agree
What is the financial range of this project?	$1M+	Agree

What is the level of public support for this project?	High	Agree
What is the technical feasibility of this project?	Higher than 75%	Agree
Who will administer this project?	County	Agree

- **H2 - Stormwater Management Analysis and System Upgrades:** Perform an updated stormwater management analysis and implement needed stormwater system upgrades to address flooding in Robbins impacting the parking lot and first floor of a subsidized apartment complex located on SE Broad Street. In Robbins, there has been flooding 3 to 4 times in the past five years and a risk reduction solution may include implementation of on-site water retention or increasing capacity of nearby Buck Branch.

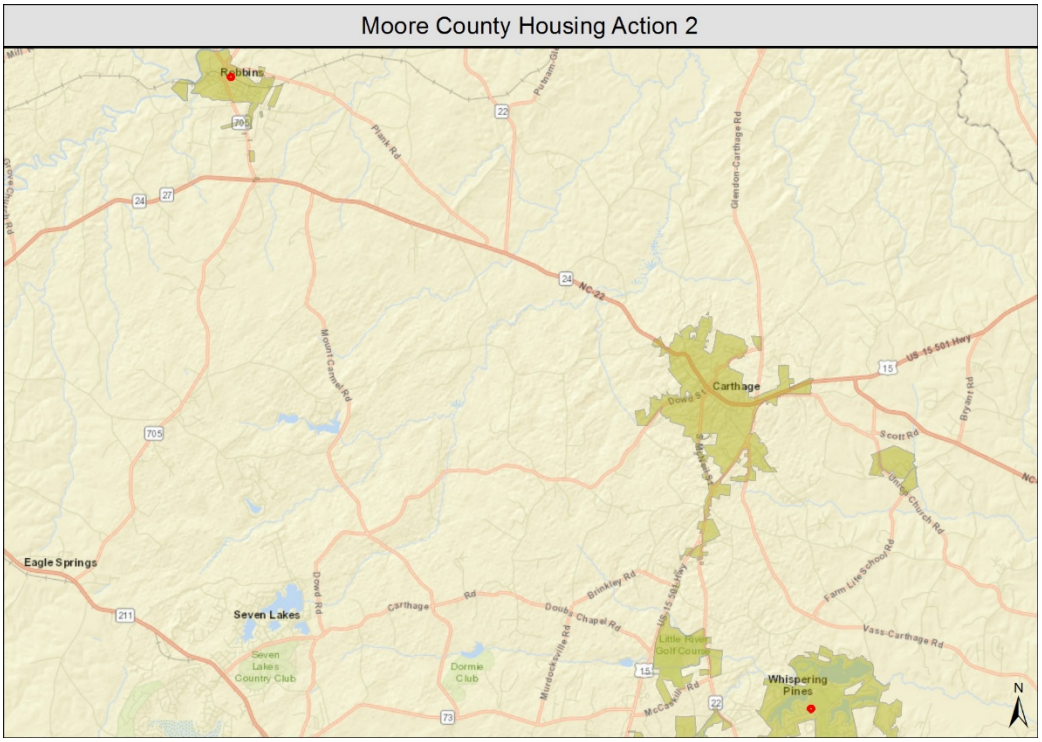


Figure 16. Stormwater Management System Analysis and Upgrades

H2- Stormwater Management Analysis and System Upgrades

County: Moore

Priority Grouping: High Priority

Priority Ranking: 0

Project Timeframe: 3-5 years

Location: SE Broad Street in Robbins (Map ID: H2)

Project Summary: Problem: Localized flooding as a result of stormwater management problems. In Robbins, the railroad and SE Broad Street are flooding and causing flooding for apartments nearby, which have flooded about 3-4 times in the last 5 years. Strategy: This multi-layered strategy will provide for an updated stormwater management analysis and system upgrades to address the street flooding, as well as integrate with the County's strategy to develop a dam monitoring system to allow for coordinated release of water during high rain events, thereby reducing impacts within the community and downstream. To reduce flood risk on SE Broad Street, a solution may be implementation of on-site water retention or increasing capacity of nearby Buck Branch.

Question	Response	Disposition
Articulate how this project addresses an unmet need that has been created by damage from Hurricane Matthew.	In Robbins the railroad and SE Broad Street are flooding and causing flooding for apartments nearby which have flooded about 3-4 times in the last 5 years.	N/A
Consistent with existing plans (describe points of intersection/departure)	Reduction of flood risk to structures is identified as a priority of the county.	N/A
Does this project comply with existing Local and State authority (codes, plan and ordinance)?	Yes	N/A
Does this project meet the intents and goals for the Hurricane Matthew Recovery Act?	Yes	N/A
Explain any benefits or impacts to the economy of the county from this project.	Improved stormwater management analysis practices and improved infrastructure would have a positive impact and benefit to the county encouraging private investment due to increased confidence in flood risk reduction.	N/A
For how long will this solution be effective?	Between 11 and 30 years	N/A
How effective is the risk reduction?	<50 year event	N/A
How many public facilities are involved in this project (buildings and infrastructure)?	1-3	N/A
Is coordination with other communities/counties needed to complete this project?	No	N/A
Is this project consistent with Federal Laws	Yes	N/A
To what degree does this project adversely impact local floodplain/coastal zone management?	No Impact	N/A
To what degree will it be possible to positively quantify the environmental benefits and ROI of this project?	Low to moderate confidence	N/A
What impact will this action have on the local economy/tax base?	Between 26 and 50%	N/A
What impacts to the environment of the county will result from this project?	Improved stormwater management reduces impact from runoff and reduction of contaminants running into waterways and collection systems.	N/A
What is the capability of the local government to administer this project?	Medium	N/A
What is the financial range of this project?	$501K - $1M	N/A
What is the level of public support for this project?	High	N/A
What is the technical feasibility of this project?	Between 51 and 75%	N/A
Who will administer this project?	County	N/A

Medium Priority Housing Strategies

No medium priority housing strategies were identified for Moore County.

Low Priority Housing Strategies

No low priority housing strategies were identified for Moore County.

Economic Development Strategies

High Priority Economic Development Strategies

Pillar	Action Name	Priority	Overall Ranking
Economic Development	ED1- Increase Retention Capacity and Upgrade Stormwater Management System to Protect Businesses	**High**	

Table 7. Moore High Priority Economic Development Summary

This project represents the economic development strategy that Moore County indicated is of a high priority to address. Additional detail on the projects can be found below:

- **ED1 - Increase Retention Capacity and Upgrade Stormwater Management System to Protect Businesses:** There are several commercial structures and businesses at-risk in downtown Aberdeen, located in the floodplain. The undertaking would look at the best combination of approaches to reduce risk and consider the following: increase retention capacity of the shallow Aberdeen Town Pond, identify additional retention areas upstream from the downtown area, streambed restoration of nearby creek and upgrades to the drainage system.

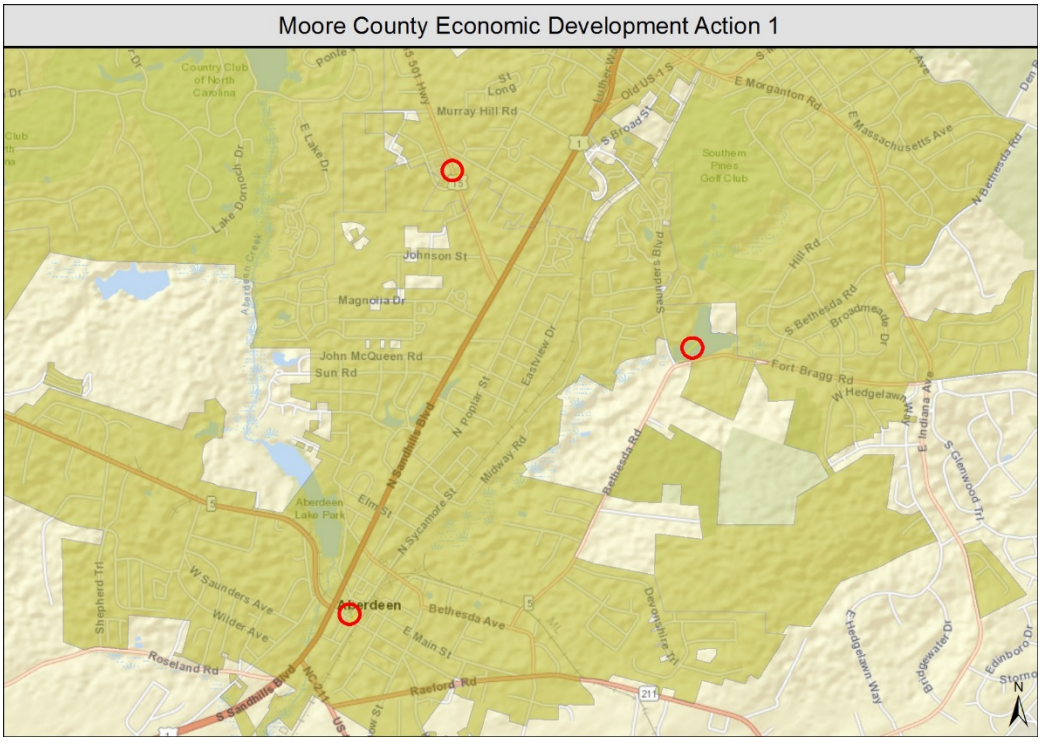


Figure 17. Increase Retention Capacity and Upgrade Stormwater Management System to Protect Businesses

ED1 - Increase Retention Capacity and Upgrade Stormwater Management System to Protect Businesses

County: Moore

Priority Grouping: High Priority

Priority Ranking: 0

Project Timeframe: 1-3 years

Location: Downtown Aberdeen

Project Summary: Problem: Localized flooding as a result of stormwater management problems. There are around 15-20 commercial structures and businesses at-risk in downtown Aberdeen as several are located in the floodplain and experienced some flooding problems south of Aberdeen Town Pond (Ransdale Pond). Water flows down towards Walmart and floods this area as well as parking lots of Bed, Bath, and Beyond and Best Buy among others. Many of these problems are likely caused by urbanization of the area and an increase in impervious pavement.

Strategy: Increase retention of Aberdeen Town Pond as it is a shallow pond. Also may need to look at upgrading drainage system. Current infrastructure is around 12 to 15 years old. The following potential options are under consideration:
• Stormwater management improvements to reduce risk
• Retention projects – increase volume of Aberdeen Town Pond (Ransdale Pond) which is currently very shallow; could be dredged to increase capacity upstream of downtown area. Could also:
• Creek running through town needs increase in capacity, restoration, and debris removal
• Add more pervious pavement
• Address concerns with land use development and increased impervious surfaces adding to run off and risk

Question	Response	Disposition
Articulate how this project addresses an unmet need that has been created by damage from Hurricane Matthew.	Localized flooding as a result of stormwater management problems. There are around 15-20 commercial structures and businesses at-risk in downtown Aberdeen. Several are located in the floodplain and experienced some flooding problems south of Aberdeen Town Pond (Ransdale Pond). Water flows down towards Walmart and floods this area as well parking lots of Bed Bath and Beyond and Best Buy among others.	N/A
Consistent with existing plans (describe points of intersection/departure)	County has identified flood risk reduction as a priority during the planning process.	Agree
Does this project comply with existing Local and State authority (codes, plan and ordinance)?	Yes	Agree
Does this project meet the intents and goals for the Hurricane Matthew Recovery Act?	Yes	Agree
Explain any benefits or impacts to the economy of the county from this project.	The economic impacts will be significant - as currently access to services and businesses is limited due to flooding of the commercial corridors.	Agree
For how long will this solution be effective?	Between 11 and 30 years	Agree
How effective is the risk reduction?	<50 year event	Agree
How many public facilities are involved in this project (buildings and infrastructure)?	1-3	Agree
Is coordination with other communities/counties needed to complete this project?	No	Agree
Is this project consistent with Federal Laws	Yes	Agree
To what degree does this project adversely impact local floodplain/coastal zone management?	No Impact	Agree
To what degree will it be possible to positively quantify the environmental benefits and ROI of this project?	Medium to high confidence	N/A

What impact will this action have on the local economy/tax base?	Less than 25%	Agree
What impacts to the environment of the county will result from this project?	Better stormwater management and increased retention can often reduce contaminants from run-off.	N/A
What is the capability of the local government to administer this project?	Medium	Agree
What is the financial range of this project?	$501K - $1M	Agree
What is the level of public support for this project?	High	Agree
What is the technical feasibility of this project?	Between 51 and 75%	Agree
Who will administer this project?	County	Agree

Medium Priority Economic Development Strategies

Pillar	Action Name	Priority	Overall Ranking
Economic Development	ED2- Extend Utilities on a Regional Scale to Encourage Development	Medium	

Table 8. Moore Medium Priority Economic Development Summary

This project represents the economic development strategy that Moore County indicated is of a medium priority to address. Additional detail on the projects can be found below:

- **ED2 - Extend Utilities on a Regional Scale to Encourage Development:** The county identified a need for extending natural gas lines throughout the county – but more specifically as part of a regional corridor that would impact and foster development in a multi-county area with stagnant industrial growth. This would include connecting to existing larger businesses to encourage continued growth as well as help build out utility infrastructure for industrial parks to support economic growth in the Town of Robbins, which is a small town in the northern part of the county where manufacturing opportunities are a focus, but have been stalled by this lack of infrastructure.

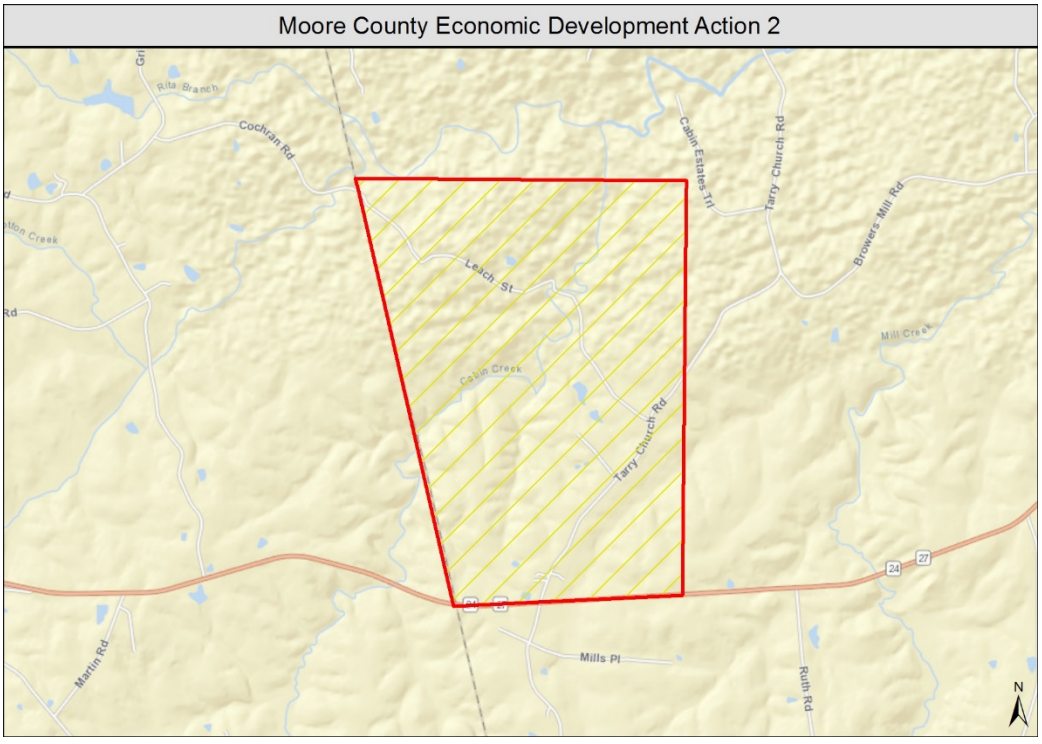


Figure 18. Extend Utilities on a Regional Scale to Encourage Development

ED2 - Extend Utilities on a Regional Scale to Encourage Development

County: Moore

Priority Grouping: Medium Priority

Priority Ranking: 0

Project Timeframe: 3 - 5 years

Location: Western Moore County Corridor and an Industrial Park at the Intersection of 24/27 and 73/74 (Map ID: ED2)

Project Summary: Problem: Lack of Utilities/Infrastructure in Industrial Park to support industry growth. Small town in the northern part of the county – manufacturing opportunities have reduced across the county.
Strategy: Utility service needs to be extended regionally to encourage future development. An extension of services could facilitate commercial and industrial enterprises and would be especially helpful in several existing industrial park locations to foster economic development in the area and provide a consistent source of natural gas. Currently, the nearest natural gas line has only been extended to Rockingham, North Carolina which is located to the south of Moore County. An extension of the line up from Rockingham along the I-73/74 corridor through Montgomery County would require approximately 30-35 miles of additional gas line. As a first step, this strategy may include a needs assessment study to identify current and future capacity needs for extending water, sewer, and gas services in the county. However, the county has identified that building out utility infrastructure for industrial parks could support economic growth in the Town of Robbins, which has been stalled by this lack of infrastructure.

Question	Response	Disposition
Articulate how this project addresses an unmet need that has been created by damage from Hurricane Matthew.	No direct unmet need - but homeowners without backup power did see a reduction in access to water and extension of utilities could help offset this impact in future events - with greater reach of natural gas.	N/A
Consistent with existing plans (describe points of intersection/departure)	County has identified need for extended utilities to support regional economic development.	Agree
Does this project comply with existing Local and State authority (codes, plan and ordinance)?	Yes	Agree
Does this project meet the intents and goals for the Hurricane Matthew Recovery Act?	Yes	Agree
Explain any benefits or impacts to the economy of the county from this project.	There could be a significant positive economic benefit by growing business and job opportunities within the county.	Agree
For how long will this solution be effective?	Between 11 and 30 years	Agree
How effective is the risk reduction?	Unknown	Agree
How many public facilities are involved in this project (buildings and infrastructure)?	1-3	Agree
Is coordination with other communities/counties needed to complete this project?	Yes	Agree
Is this project consistent with Federal Laws	Yes	Agree
To what degree does this project adversely impact local floodplain/coastal zone management?	No Impact	Agree
To what degree will it be possible to positively quantify the environmental benefits and ROI of this project?	Medium to high confidence	N/A
What impact will this action have on the local economy/tax base?	Less than 25%	Agree
What impacts to the environment of the county will result from this project?	No known impacts.	N/A
What is the capability of the local government to administer this project?	Low	Agree
What is the financial range of this project?	$1M+	Agree
What is the level of public support for this project?	Medium	Agree

What is the technical feasibility of this project?	Between 26 and 50%	Agree
Who will administer this project?	Regional	Agree

Low Priority Economic Development Strategies

No low priority economic development strategies were identified for Moore County.

Infrastructure Strategies

High Priority Infrastructure Strategies

Pillar	Action Name	Priority	Overall Ranking
Infrastructure	IN2- Stream Gauges, Early Warning Network, and Dam Modification	**High**	**1**
Infrastructure	IN1- Backup Power, Generators, Microgrids	**High**	

Table 9. Moore High Priority Infrastructure Summary

These projects represent the infrastructure strategies that Moore County indicated are the highest priority to address. Additional detail can be found below:

- **IN2 - Stream Gauges, Early Warning Network and Dam Monitoring:** Install gauges and build out an early-warning system to assist with management of flow from interconnected and interdependent series of dams throughout the county as well as address concerns with priority high risk dams. For example, Crystal Lake Dam and Woodlake Dam introduce a significant amount of risk for downstream structures and safety. As there are currently no stream gauges located within the county, priority locations have been identified as north of Lake Surf and the northern/central corridor of the county. In addition, the county recognizes a potential need at or south of Crystal Lake, near Whispering Pines and the northeastern corridor of the county. Of the 61 high risk dams located in the county, they have identified Woodlake, Lake Auman, Seven Lakes, Pine Lake, Pine Valley Pond and Thagards Lake the highest priority for consideration of monitoring and repair.

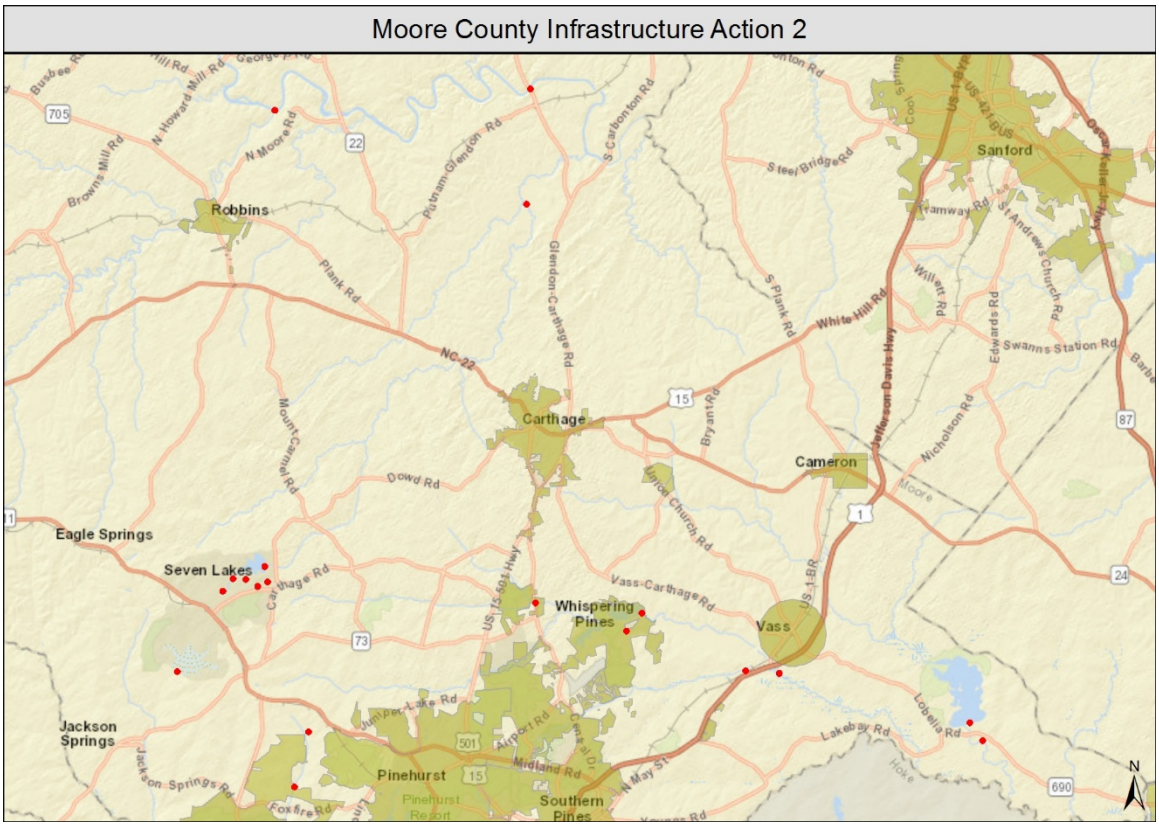


Figure 19. Stream Gauges, Early Warning Network, and Dam Modification

IN2- Stream Gauges, Early Warning Network, and Dam Modification

County: Moore

Priority Grouping: High Priority

Priority Ranking: 1

Project Timeframe: 1 -3 years

Location: Map ID: IN2, see Project Summary for locations

Project Summary: Locations: Stream Gauges: Along Little River- At or south of Crystal Lake, Above Whispering Pines, and Above Wood Lake on US-1 Corridor; Along Deep River- Near convergence with Bear Creek and Near Glendon-Carthage Road; On McClendon's Creek- Near convergence with Persimmon Glade Branch
Dams: Woodlake, Lake Auman, Seven Lakes, Thagards Lake, Crystal Lake, Pine Lake, Pine Valley Pond and Lake Diamond

Problem: Need for integrated gauges/monitoring/dam release: Information on upstream volumes and flows is often unknown. There are also a number of high hazard dams in Moore County and no way of monitoring the opening/closing of gates. Private dam owners don't always communicate or are not responsive during high rain events.

Strategy: Install gauges and build out an early-warning system to assist with management of flow from interconnected and interdependent series of dams throughout the county. For example, Crystal Lake Dam and Woodlake Dam introduce a significant amount of risk for downstream structures and safety. There are currently no stream gauges located within the county. Several are needed along the Little River and Deep River. The program should consist of the following:
• Confirmation of identified gauge locations by hydrologist and installation of gauges for monitoring of water levels and water flow from high rainfall events or dam release.
• Analysis of warning/communication systems available to provide integrated approach for water management
• Introduction of telemetry communications systems at dams
Modify and upgrade several dams that are aging and may be prone to failure. These dams are older and many are privately owned and may cause downstream flooding if they fail so dam modification or upgrades are needed. There are 61 high hazard dams in the county and officials are concerned about structural integrity of all of them. Selected dams that were of greatest concern are highlighted below with some specifications of the dams:
Dam Name Height Storage Spillway
Woodlake Dam 23 ft 10,000 acre-feet No
Lake Auman Dam 93 ft 28,014 acre-feet No
Lake Diamond Dam 23 ft 258 acre-feet No
Seven Lakes Dam #1 (Echo Lake Dam) 56 ft 1,115 acre-feet No
Seven Lakes Dam #2 (Lake Sequoia Dam) 54 ft 3,412 acre-feet No
Seven Lakes Dam #3 (Big Juniper Dam) 44 ft 422 acre-feet No
Seven Lakes Dam #4 (Longleaf Lake Dam) 44 ft 317 acre-feet No
Seven Lakes Dam #5 (Little Juniper Dam) 33 ft 105 acre-feet No
Seven Lakes Dam #7 (Ramapo Dam) 17 ft 54 acre-feet No
Crystal Lake Dam 16 ft 385 acre-feet No
Pine Lake Dam 35 ft 3,080 acre-feet No
Thagards Lake Dam 21 ft 2,505 acre-feet No
Pine Valley Pond Dam <15 ft 20 acre-feet No

The dam modification program should consist of the following:
• Dam risk analysis and potential inundation impacts
• Dam improvements to include upgraded water release mechanisms (operational gates)

Question	Response	Disposition
Articulate how this project addresses an unmet need that has been created by damage from Hurricane Matthew.	Need for integrated gauges/monitoring/dam release: Information on upstream volumes and flows is often unknown. There are also a number of high hazard dams in Moore County and no way of monitoring the opening/closing of gates. Private dam owners don't always communicate or are not responsive during high rain events.	N/A
Consistent with existing plans (describe points of intersection/departure)	County has identified a need for monitoring and notification as priority for risk reduction.	Agree
Does this project comply with existing Local and State authority (codes, plan and ordinance)?	Yes	Agree

Does this project meet the intents and goals for the Hurricane Matthew Recovery Act?	Yes	Agree
Explain any benefits or impacts to the economy of the county from this project.	Additional analysis should provide the county with a higher level of detail for those areas with downstream concerns and help reduce existing frequent and nuisance. Upon completion of the analysis the county will be able assess and consider projects i.e. drainage upgrades storm water management planning and residential/commercial elevation/reconstruction/acquisition. Coordinated efforts for water release and management will provide a higher level of security and risk reduction.	Agree
For how long will this solution be effective?	Between 11 and 30 years	Agree
How effective is the risk reduction?	50-100 year event	Agree
How many public facilities are involved in this project (buildings and infrastructure)?	4-6	Agree
Is coordination with other communities/counties needed to complete this project?	No	Agree
Is this project consistent with Federal Laws	Yes	Agree
To what degree does this project adversely impact local floodplain/coastal zone management?	No Impact	Agree
To what degree will it be possible to positively quantify the environmental benefits and ROI of this project?	Medium to high confidence	N/A
What impact will this action have on the local economy/tax base?	Less than 25%	Agree
What impacts to the environment of the county will result from this project?	Reduction of dam failure and better water management can positively impact the environment.	N/A
What is the capability of the local government to administer this project?	Medium	Agree
What is the financial range of this project?	$251K - $500K	Agree
What is the level of public support for this project?	High	Agree
What is the technical feasibility of this project?	Higher than 75%	Agree
Who will administer this project?	State	Agree

- **IN1 - Backup Power, Generators, Microgrids:** Implement a power microgrid system at one or several facilities within the community to reduce power consumption and environmental impact. Alternatively, add generator, automatic transfer switch (ATS), converters or other form of backup power to these facilities. Several ideal locations were provided by local county officials. These locations are all in need of some form of backup power:
    - Fire station in Aberdeen that has not yet started construction. Community is currently seeking disaster funding to relocate the station out of a high-risk flood area. Backup power would be a useful addition to this project.
    - Parks and Recreation Building located at US Highway 15/501 and NC Highway 22 (Hillcrest Park) will be used as a future shelter site.
    - Existing Fire Stations: County has identified a need at multiple facilities for ATS or connectors to existing ATS to support temporary generators.
    - Pump Stations: Upgrade existing facilities with ATS or connectors to support temporary generators.

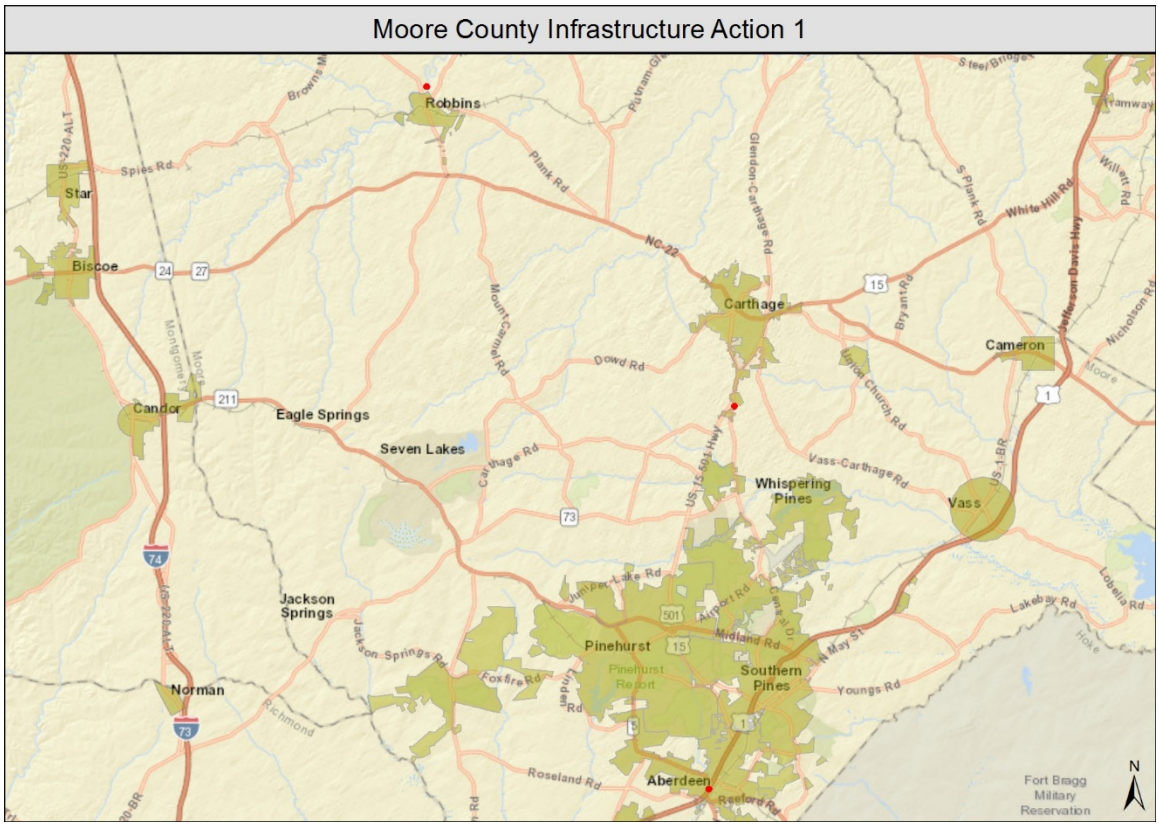


Figure 20. Backup Power, Generators, Microgrids

IN1 - Backup Power, Generators, Microgrids

County: Moore

Priority Grouping: High Priority

Priority Ranking: 0

Project Timeframe: 1 - 3 years

Location: City of Aberdeen: New Fire Station funded by PA; Parks and Recreation Facility south of Carthage in Hillcrest Park; Wastewater Treatment Plant in Robbins (Map ID: IN1)

Project Summary: Problem: Power loss and need for back-up and redundant power to provide energy assurance. Loss of power caused by flooding and downed trees from saturated soil and high wind were the primary causes.
Strategy: Overall, back-up, supplemental and redundant power is needed to create better energy assurance post-disaster and to make sure that critical facilities have sufficient power to maintain operations. Several ideal locations were provided by local county officials: Aberdeen Fire Station (~9,000 sq. ft.), Parks and Recreation Facility in Hillcrest Park (~2,500 sq. ft.), and both buildings at the Robbins Wastewater Treatment Plant (~3,500 sq. ft.). These locations are all in need of some form of backup power.
Within this strategy are several options:
• For critical facilities and shelters, provide generators, ATS or connectors for portable generators.
• Where there is a concentration of critical facilities, consider installation of a microgrid.
• Improve coordination where Electric Co-ops rely on regional power supply.

Question	Response	Disposition
Articulate how this project addresses an unmet need that has been created by damage from Hurricane Matthew.	Power loss and need for back-up and redundant power to provide energy assurance. Loss of power caused by flooding and downed trees from saturated soil and high wind were the primary causes.	N/A
Consistent with existing plans (describe points of intersection/departure)	Yes supporting ongoing operations is identified as a priority for the county.	Agree
Does this project comply with existing Local and State authority (codes, plan and ordinance)?	Yes	Agree
Does this project meet the intents and goals for the Hurricane Matthew Recovery Act?	Yes	Agree
Explain any benefits or impacts to the economy of the county from this project.	The ability to maintain ongoing operations provides positive impacts to the economy of the county.	Agree
For how long will this solution be effective?	Between 11 and 30 years	Agree
How effective is the risk reduction?	50-100 year event	Agree
How many public facilities are involved in this project (buildings and infrastructure)?	4-6	Agree
Is coordination with other communities/counties needed to complete this project?	No	Agree
Is this project consistent with Federal Laws	Yes	Agree
To what degree does this project adversely impact local floodplain/coastal zone management?	No Impact	Agree
To what degree will it be possible to positively quantify the environmental benefits and ROI of this project?	Medium to high confidence	N/A
What impact will this action have on the local economy/tax base?	No Impact	Agree
What impacts to the environment of the county will result from this project?	Providing ongoing power to STP can positively impact the environment as it may provide for decrease in any contamination.	N/A
What is the capability of the local government to administer this project?	High	Agree
What is the financial range of this project?	$101K - $250K	Agree

What is the level of public support for this project?	High	Agree
What is the technical feasibility of this project?	Higher than 75%	Agree
Who will administer this project?	County	Agree

Medium Priority Infrastructure Strategies

Pillar	Action Name	Priority	Overall Ranking
Infrastructure	IN3- Roadway/Bridge/Culvert Improvements	Medium	

Table 10. Moore Medium Priority Infrastructure Summary

This project represents the infrastructure strategy that Moore County indicated is of a medium priority to address. Additional detail can be found below:

- **IN3 - Roadway/Bridge/Culvert Improvements:** Upgrade culvert/bridge/roadway locations identified by local officials and residents:
    - McGill Road bridge
    - McPherson Road bridge
    - Blue Rock Road (off White Rock Road) culvert
    - Kelly Plantation Road bridge over McLendons Creek
    - Kelly Planation Road over Persimmon Glade Branch
    - Cool Springs Road bridge
    - Cabin's Creek roadway
    - Longleaf Drive roadway
    - Seven Lakes roadway
    - Railroad Tracks in Cameron NC Highways 24 and 27 roadway/culvert
    - Rascob Road roadway/bridge
    - Glendon-Carthage Road- Low water bridge between S. Carbonton Road and Putnam-Glendon Road
    - Plank Road roadway/culvert
    - NC Highway 705 roadway/culvert
    - NC Highway 22 low bridge over Little River
    - Southern Pines Reservoir low bridge
    - Lakebay Road roadway
    - Lobelia Road roadway/culvert
    - Old Reservoir Road / Bear Creek Reservoir roadway (Robbins)
    - Possum Run off E. Old Plank Road roadway/bridge

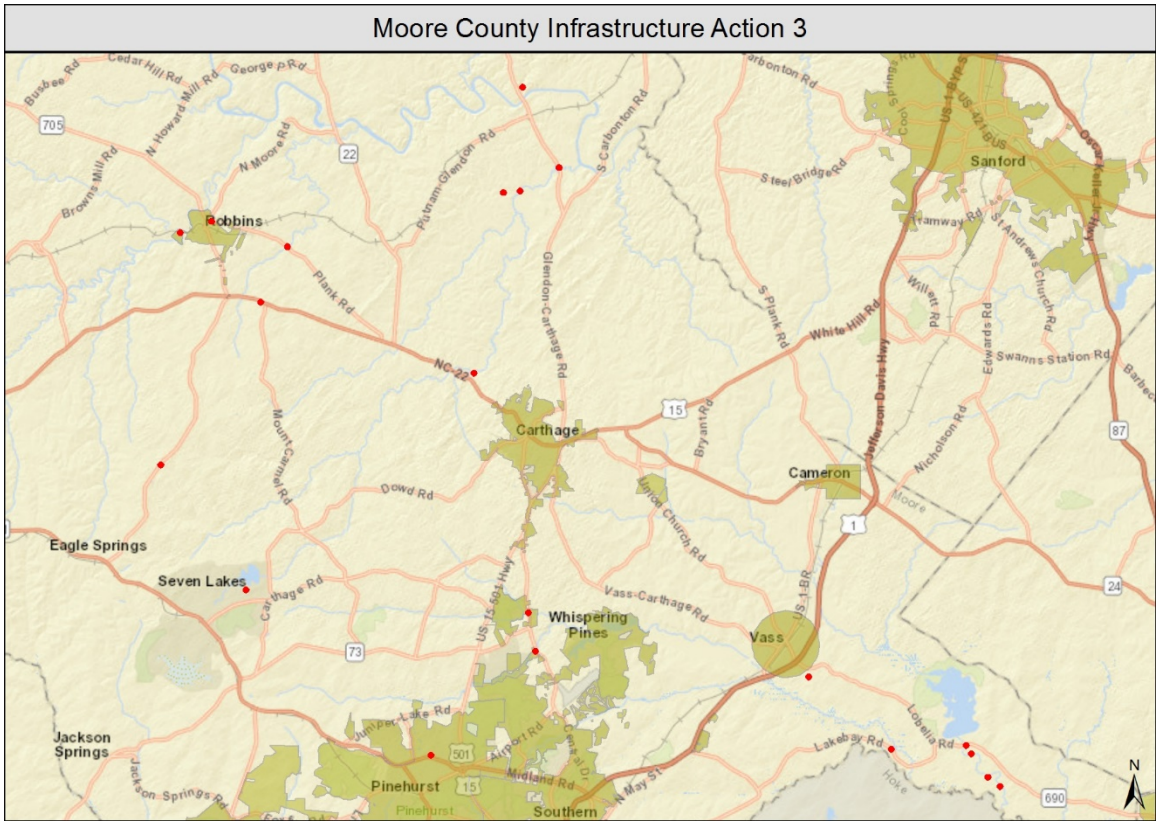


Figure 21. Roadway/Bridge/Culvert Improvements

IN3- Roadway/Bridge/Culvert Improvements

County: Moore

Priority Grouping: Medium Priority

Priority Ranking: 0

Project Timeframe: 1-3 years

Location: Multiple Locations (Map ID:IN3)

Project Summary: Problem: Roadways and road crossings (bridges and culverts) were inundated with water and damage occurred to structural components impacting overall integrity of the structures. These issues occurred due to high rains during Hurricane Matthew, but these infrastructure elements are also impacted during more frequent (yearly) significant rain events.
Strategy: Carry out structural improvements to roadways, bridges, culverts, and other infrastructure that have been damaged and upgrade to make more resilient. This will include, among other actions, roadway/bridge elevations, culvert upsizes, etc. In addition, it may be necessary to leverage existing data and studies to develop an updated assessment of the Bridge and Road Inventory impacted by Hurricane Matthew as well as structures identified at risk during more frequent (1-2/year) significant rain events affecting the county – many located in the SFHA. Prioritize the most at risk structures and develop an implementation plan to address deficiencies in current infrastructure through above techniques and develop a plan for future development needs to ensure integration of resiliency design measures and best practices to facilitate a reduced need for future upgrades as the county grows as well as offsetting potential future flood risk impacts.
Road Name Roadway / Bridge / Culvert Length / Span / Size* Description of Damage
McGill Road (SR2017) Bridge L=82 ft
W=24 ft Significant flooding of bridge during Hurricane Matthew and historically. Many rescues off of this bridge over the past several years.
McPherson Road (SR2018) Bridge L=62 ft
W=20 ft Significant flooding of bridge during Hurricane Matthew and historically.
Blue Rock Road Roadway L=100 ft Roadway washout on this private road during Hurricane Matthew.
Kelly Plantation Road (SR1640) over McLendons Creek Bridge L=116 ft
W=24 ft Low two-lane bridge that floods frequently.
Kelly Plantation Road (SR1640) over Persimmon Glade Branch Bridge L=60 ft
W=18 ft From intersection with Cool Springs Road and downstream, frequent flooding and overtopping of roadways and bridges. Low two-lane bridge that floods frequently.
Cool Springs Road (SR1628) Roadway/Bridge L=90 ft
W=14 ft From intersection with Kelly Plantation Road and downstream, frequent flooding and overtopping of roadways and bridges. Low bridge that floods three to four times a year.
Cabins Creek Road (SR2167) Roadway L=1 mi Two major waterways coming together here are causing flooding issues. Flat topography all along here.
Longleaf Drive Roadway L=0.5 mi Minor street flooding issues.
Seven Lakes Drive (SR1239) Roadway L=100 ft Isolated roadway flooding here.
NC 24-27 Roadway/Culvert L=30 ft (culvert) Culvert in this area have been overtopped numerous times and roadway flooded.
Road Name Roadway / Bridge / Culvert Length / Span / Size* Description of Damage
Rascob Road (SR1619) Roadway/Bridge L=70 ft
W=14 ft Flooding hotspot, which blocks emergency services routes when flooded.
Glendon Carthage Road (SR1006) Bridge L=200 ft
W=30 ft Low-water bridge between S. Carbonton Road and Putnam-Glendon Road. Only one of three roads that can take you out of the county. Has recently been raised, but still floods.
Plank Road (SR1477) Roadway/Culvert L=100 ft
W=30 ft Culvert and roadway overtopping frequently occurs.
NC-705 Roadway/Culvert L=30 ft (culvert) Stormwater flooding issues, which resulted in a recent fatality here.
NC-22 over Little River Low Bridge/Culvert L=105 ft
W=36 ft Low bridge near golf course, which has had a recent rescue from high water.
Southern Pines Reservoir Low Bridge L=20 ft
W=18 ft Low bridge here.
Lakebay Road (SR2023) Roadway Washout L=100 ft Huge sinkhole and washout of road occurred here. This may or may not have been addressed already by someone.
Lobelia Road Roadway/Culvert L=30 ft (culvert) Damaged in Hurricane Matthew, which resulted in a quick repair, but may not have been fully upgraded.
Possum Run (Off E Old Plank Rd) Roadway/Bridge L=15 ft
W=30 ft Bridge and roadway flooding due to pond overflowing.
Old Reservoir Road Culvert L=30 ft (culvert) Culvert too small on the west side of Robbins.

*Approximate measurements obtained by aerial imagery or local officials. Assumptions were made based on available information.

Question	Response	Disposition
Articulate how this project addresses an unmet need that has been created by damage from Hurricane Matthew.	Roadways and road crossings (bridges and culverts) were inundated with water and damage occurred to structural components impacting overall integrity of the structures. These issues occurred due to high rains during Hurricane Matthew but these infrastructure elements are also impacted during more frequent (yearly) significant rain events.	N/A
Consistent with existing plans (describe points of intersection/departure)	County has identified risk reduction to key infrastructure as a priority.	Agree
Does this project comply with existing Local and State authority (codes, plan and ordinance)?	Yes	Agree
Does this project meet the intents and goals for the Hurricane Matthew Recovery Act?	Yes	Agree
Explain any benefits or impacts to the economy of the county from this project.	There are many aspects of these projects that provide a positive ROI for road improvements bridge upgrades and culverts upgrades. The primary impact is improving access during a flood event – especially for EMS and rescue services. The potential for loss of life (especially if access is limited on a frequent basis from EMS services) – can provide a strong ROI for infrastructure improvements affecting residents and at risk residences.	Agree
For how long will this solution be effective?	Between 11 and 30 years	Agree
How effective is the risk reduction?	50-100 year event	Agree
How many public facilities are involved in this project (buildings and infrastructure)?	>6	Agree
Is coordination with other communities/counties needed to complete this project?	No	Agree
Is this project consistent with Federal Laws	Yes	Agree
To what degree does this project adversely impact local floodplain/coastal zone management?	No Impact	Agree
To what degree will it be possible to positively quantify the environmental benefits and ROI of this project?	Medium to high confidence	N/A
What impact will this action have on the local economy/tax base?	Less than 25%	Agree
What impacts to the environment of the county will result from this project?	unknown	N/A
What is the capability of the local government to administer this project?	Medium	Agree
What is the financial range of this project?	$1M+	Agree
What is the level of public support for this project?	Medium	Agree
What is the technical feasibility of this project?	Higher than 75%	Agree
Who will administer this project?	County	Agree

Low Priority Infrastructure Strategies

Pillar	Action Name	Priority	Overall Ranking
Infrastructure	IN4- Seal/Elevate Manhole Covers to Reduce Inflow and Infiltration	Low	

Table 11. Moore Low Priority Infrastructure Summary

This project represents the infrastructure strategy that Moore County indicated is of a lower priority to address. Additional detail can be found below:

- **IN4 - Seal/Elevate Manhole Covers to Reduce Inflow and Infiltration:** Reduce stormwater inflow and prevent increased costs during storm events to the City of Robbins.

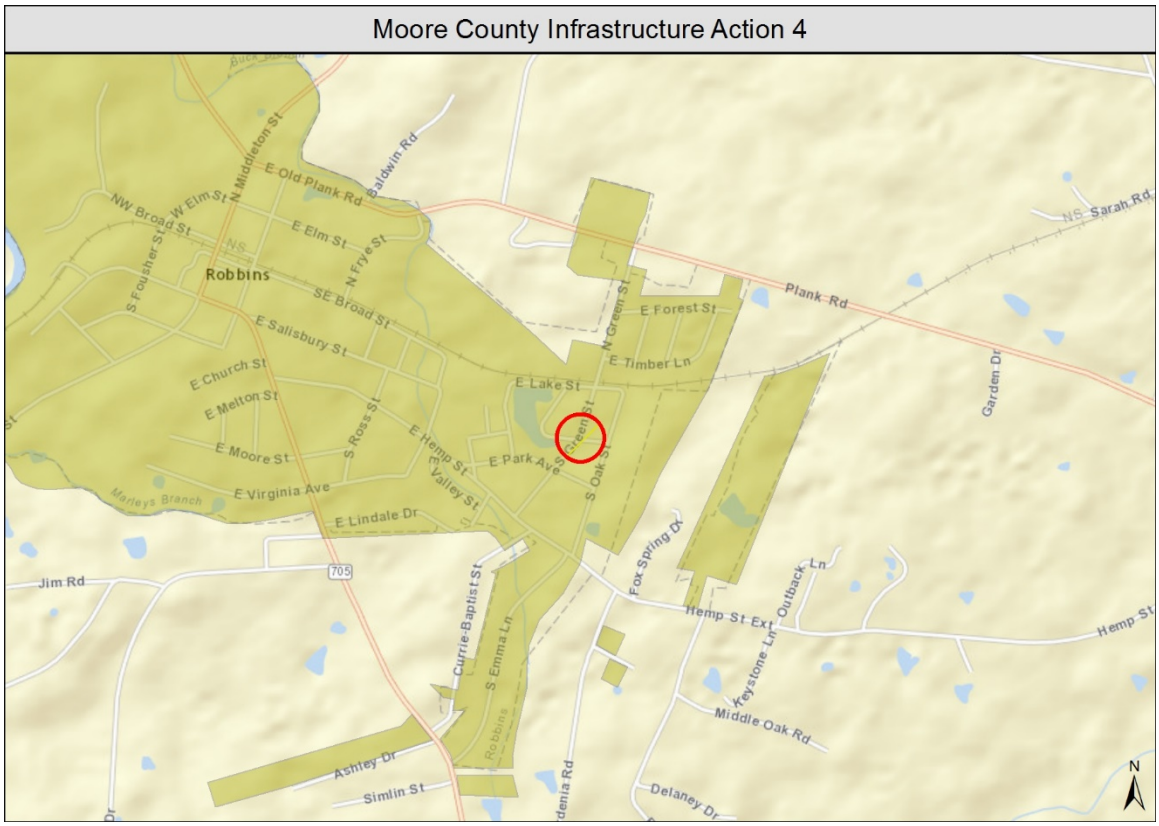


Figure 22. Seal/Elevate Manhole Covers to Reduce Inflow and Infiltration

IN4- Seal/Elevate Manhole Covers to Reduce Inflow and Infiltration

County: Moore

Priority Grouping: Low Priority

Priority Ranking: 0

Project Timeframe: 1-3 years

Location: Town of Robbins manholes (Map ID: IN4)

Project Summary: Problem: Manholes allowing water to enter system during high rainfall events: There are 27 manholes in Robbins that are currently in need of replacement/rehabilitation and around 13 in creek beds.
Strategy: The county identified sealing/elevating manholes as the most effective and cost efficient approach to reducing the increase of inflow during high rainfall events. This action will reduce infiltration and inflow from Robbins.

Question	Response	Disposition
Articulate how this project addresses an unmet need that has been created by damage from Hurricane Matthew.	Manholes allowing water to enter system during high rainfall events: There are 27 manholes in Robbins that are currently in need of replacement/rehabilitation and around 13 in creek beds.	N/A
Consistent with existing plans (describe points of intersection/departure)	City of Robbins has identified this as a priority for their community.	Agree
Does this project comply with existing Local and State authority (codes, plan and ordinance)?	Yes	Agree
Does this project meet the intents and goals for the Hurricane Matthew Recovery Act?	Yes	Agree
Explain any benefits or impacts to the economy of the county from this project.	Sealing manholes will reduce costs overall to the community which will help save money overall for investment in other projects (Economic Development)	Agree
For how long will this solution be effective?	Between 11 and 30 years	Agree
How effective is the risk reduction?	50-100 year event	Agree
How many public facilities are involved in this project (buildings and infrastructure)?	>6	Agree
Is coordination with other communities/counties needed to complete this project?	No	Agree
Is this project consistent with Federal Laws	Yes	Agree
To what degree does this project adversely impact local floodplain/coastal zone management?	No Impact	Agree
To what degree will it be possible to positively quantify the environmental benefits and ROI of this project?	Low to moderate confidence	N/A
What impact will this action have on the local economy/tax base?	Less than 25%	Agree
What impacts to the environment of the county will result from this project?	A number of the manholes are located in existing stream beds which provides a high level of risk for infiltration and potential contamination	N/A
What is the capability of the local government to administer this project?	High	Agree
What is the financial range of this project?	$251K - $500K	Agree
What is the level of public support for this project?	Medium	Agree
What is the technical feasibility of this project?	Higher than 75%	Agree
Who will administer this project?	County	Agree

Environmental, Ecosystem and Agricultural Strategies

High Priority Environmental Strategies

Pillar	Action Name	Priority	Overall Ranking
Environment	EN1- Southeast Sector Revitalization and Natural Park	**High**	**2**
Environment	EN4- Hydrologic and Hydraulic Study	**High**	**3**

Table 12. Moore High Priority Environmental Summary

These projects represent the environmental strategies that Moore County indicated are the highest priority to address. Additional detail can be found below:

- **EN1 - Southeast Sector Revitalization and Natural Park:** From Crystal Lake Dam down to Spring Lake (southeast corner of county) create a recreational park and a natural, preserved, open space area that can be used to foster eco-tourism in the southeast sector through various recreational activities such as walking, running, biking, hiking, kayaking, and fishing among others. This strategy may involve potential buyout and redevelopment to increase open space and will require trail development and stream restoration to improve natural areas for recreation.

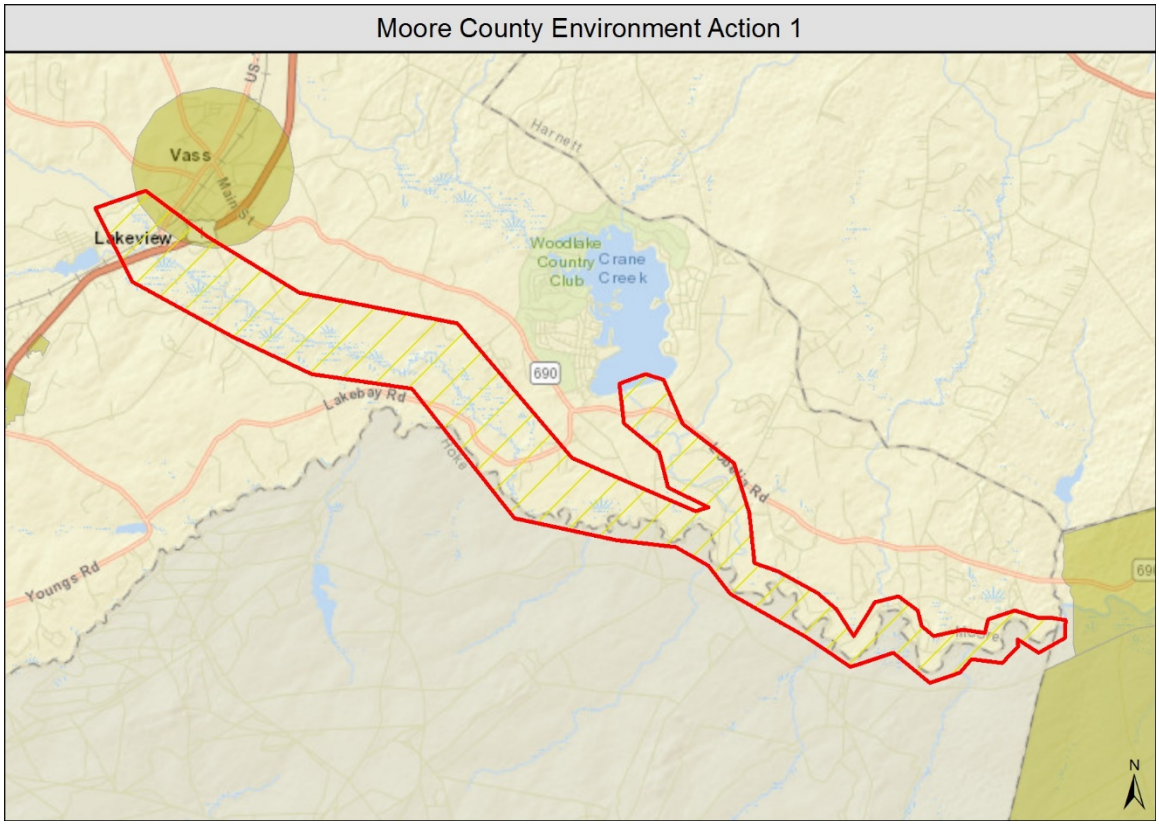


Figure 23. Southeast Sector Revitalization and Natural Park

EN2 - Stream Restoration

County: Moore

Priority Grouping: Medium Priority

Priority Ranking: 0

Project Timeframe: 1-3 years

Location: Eastern section of Little River from Crystal Lake Dam to Spring Lake Streams, Crane Creek around McGill Road and north to US-1, Bear Creek, Deep River (Map ID: EN2)

Project Summary: Problem: Impaired stream system causing flooding. As a result of Hurricane Matthew, many trees and other debris litter waterways across the County. During heavy rains, this debris will continue to dam up water and alter flows. These unnatural changes in the water flow puts more properties at risk to future flooding. In many cases, the stream's natural channel has been degraded and is in need of restoration.
Strategy: Restoration of streams, including but not limited to debris removal, streambank stabilization, and naturalization of channel.

Question	Response	Disposition
Articulate how this project addresses an unmet need that has been created by damage from Hurricane Matthew.	Impaired stream system causing flooding. As a result of Hurricane Matthew many trees and other debris litter waterways across the County. During heavy rains this debris will continue to dam up water and alter flows. These unnatural changes in the water flow puts more properties at risk to future flooding. In many cases the stream's natural channel has been degraded and is in need of restoration.	N/A
Consistent with existing plans (describe points of intersection/departure)	The county has identified stream restoration as a significant need to address repetitive flooding in the county.	N/A
Does this project comply with existing Local and State authority (codes, plan and ordinance)?	Yes	N/A
Does this project meet the intents and goals for the Hurricane Matthew Recovery Act?	Yes	N/A
Explain any benefits or impacts to the economy of the county from this project.	The benefits of restoring rivers and streams through debris removal and embankment repair can provide positive impacts to the surrounding environment and wildlife as well as providing a resource for outdoor enthusiasts to enjoy the waterways for a variety of activities.	N/A
For how long will this solution be effective?	Less than 10 years	N/A
How effective is the risk reduction?	<50 year event	N/A
How many public facilities are involved in this project (buildings and infrastructure)?	0	N/A
Is coordination with other communities/counties needed to complete this project?	No	N/A
Is this project consistent with Federal Laws	Yes	N/A
To what degree does this project adversely impact local floodplain/coastal zone management?	Unknown	N/A
To what degree will it be possible to positively quantify the environmental benefits and ROI of this project?	Medium to high confidence	N/A
What impact will this action have on the local economy/tax base?	Less than 25%	N/A
What impacts to the environment of the county will result from this project?	Stream restoration through debris removal can also reduce impacts of high rainfall events – allowing water to flow unobstructed through waterways – reducing impacts to land and structures.	N/A

What is the capability of the local government to administer this project?	High	N/A
What is the financial range of this project?	$501K - $1M	N/A
What is the level of public support for this project?	Medium	N/A
What is the technical feasibility of this project?	Higher than 75%	N/A
Who will administer this project?	County	N/A

- **EN4 - Hydrologic and Hydraulic Study:** Perform hydrologic assessment of southeast area of county, near US Highway 1 and Cameron, to assist in better understanding and more accurately predicting downstream risk during high rainfall events. It should also be noted that Hydrologic and Hydraulic (H&H) studies will be integral in determining the implementation of the previous strategies.

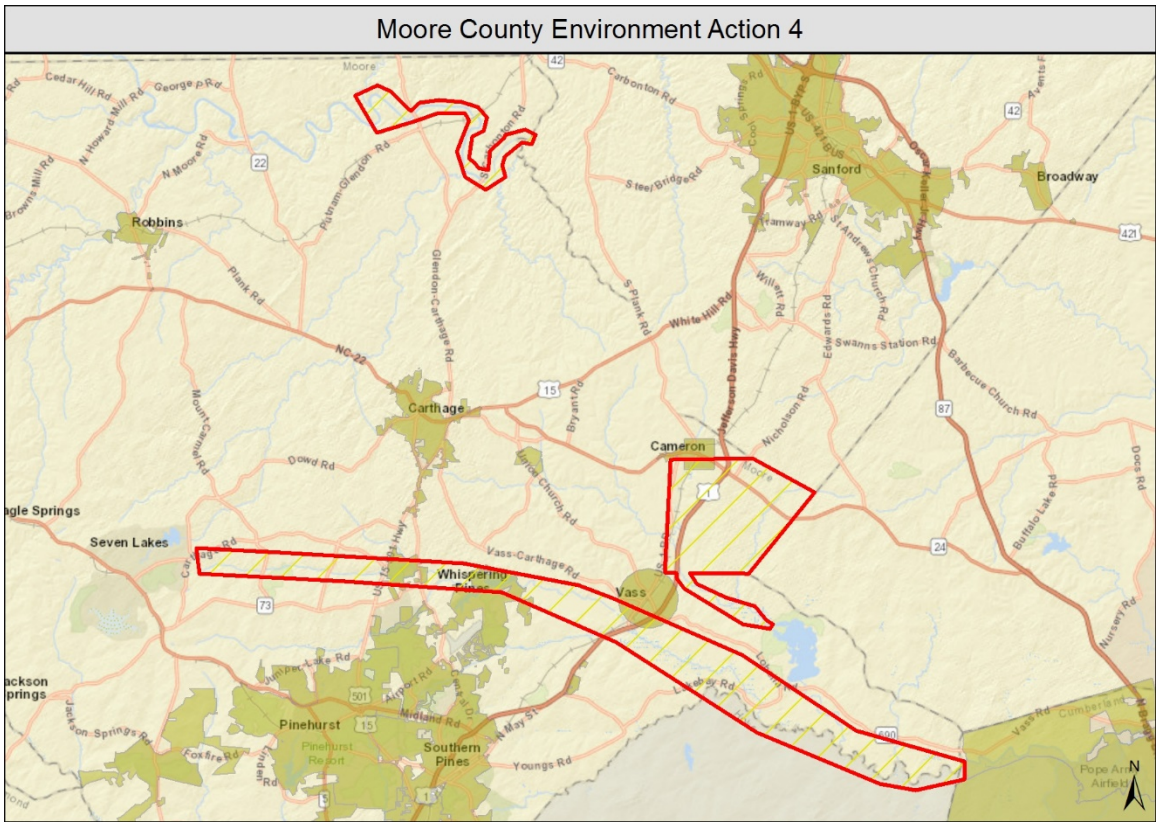


Figure 24. Hydrologic and Hydraulic Study

EN4- Hydrologic and Hydraulic Study

County: Moore

Priority Grouping: High Priority

Priority Ranking: 3

Project Timeframe: 1-3 years

Location: Eastern section of Little River from Crystal Lake Dam to Spring Lake Streams, Crane Creek around McGill Road and north to US-1, Deep River, eastern county near Cameron (Map ID: EN4)

Project Summary: Problem: Frequent Flooding Occurs and Cause is not Well-Understood or Mapped. Several areas where flood risk is unknown or current mapping appears to be inaccurate. Notable problem area due to hydrology concerns in east county near Cameron – soil composition makes determination of saturation and downstream risk hard to determine.

Strategy: A need for an updated analysis of flood risk has been identified by the county for specified area to better understand and more accurately determine downstream risk during high rainfall events. Localized analysis should assist the community in better planning and mitigation of future damages.
Hydrologic and Hydraulic Studies
Floodplain Mapping
Detailed Studies
Additional Modeling

Question	Response	Disposition
Articulate how this project addresses an unmet need that has been created by damage from Hurricane Matthew.	Frequent Flooding Occurs and Cause is not Well-Understood or Mapped. Several areas where flood risk is unknown or current mapping appears to be inaccurate. Notable problem area due to hydrology concerns in east county near Cameron – soil composition makes determination of saturation and downstream risk hard to determine.	N/A
Consistent with existing plans (describe points of intersection/departure)	County Regional and State agencies identify H & H studies as a high priority for risk identification and education for the communities.	Agree
Does this project comply with existing Local and State authority (codes, plan and ordinance)?	Yes	Agree
Does this project meet the intents and goals for the Hurricane Matthew Recovery Act?	Yes	Agree
Explain any benefits or impacts to the economy of the county from this project.	Upon completion of the analysis the county will be able assess and consider projects i.e. drainage upgrades storm water management planning and residential/commercial elevation/reconstruction/acquisition. All of these undertakings have a consistent positive impact and risk reduction to the community – facilitating resilience.	Agree
For how long will this solution be effective?	Less than 10 years	Agree
How effective is the risk reduction?	50-100 year event	Agree
How many public facilities are involved in this project (buildings and infrastructure)?	0	Agree
Is coordination with other communities/counties needed to complete this project?	Yes	Agree
Is this project consistent with Federal Laws	Yes	Agree
To what degree does this project adversely impact local floodplain/coastal zone management?	No Impact	Agree
To what degree will it be possible to positively quantify the environmental benefits and ROI of this project?	High confidence	N/A

What impact will this action have on the local economy/tax base?	Less than 25%	Agree
What impacts to the environment of the county will result from this project?	Additional analysis should provide the county with a higher level of detail for those areas with repetitive and nuisance flooding.	N/A
What is the capability of the local government to administer this project?	Medium	Agree
What is the financial range of this project?	$501K - $1M	Agree
What is the level of public support for this project?	High	Agree
What is the technical feasibility of this project?	Higher than 75%	Agree
Who will administer this project?	County	Agree

Medium Priority Environmental Strategies

Pillar	Action Name	Priority	Overall Ranking
Environment	EN2- Stream Restoration	Medium	

Table 13. Moore Medium Priority Environmental Summary

This project represents the environmental strategy that Moore County indicated is of a medium priority to address. Additional detail can be found below:

- **EN2 - Stream Restoration:** Restoration of streams, including but not limited to debris removal, streambank stabilization, and naturalization of channel. Specific locations identified by local county officials include the streams going under McGill Road and several low-water bridges outlined under the infrastructure strategies pillar that are experiencing backed up water. Robbins also identified Bear Creek and Deep River as water resources currently impacting and increasing risk to the surrounding areas.

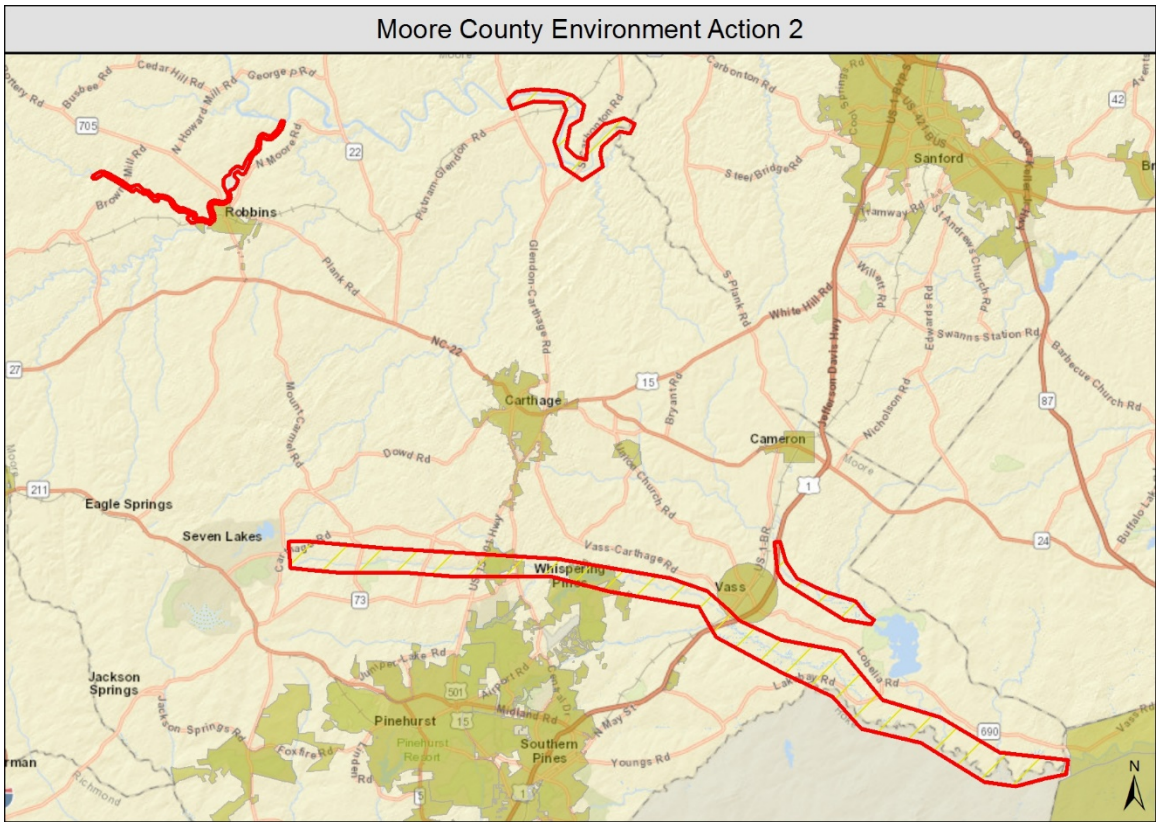


Figure 25. Stream Restoration

EN2 - Stream Restoration

County: Moore

Priority Grouping: Medium Priority

Priority Ranking: 0

Project Timeframe: 1-3 years

Location: Eastern section of Little River from Crystal Lake Dam to Spring Lake Streams, Crane Creek around McGill Road and north to US-1, Bear Creek, Deep River (Map ID: EN2)

Project Summary: Problem: Impaired stream system causing flooding. As a result of Hurricane Matthew, many trees and other debris litter waterways across the County. During heavy rains, this debris will continue to dam up water and alter flows. These unnatural changes in the water flow puts more properties at risk to future flooding. In many cases, the stream's natural channel has been degraded and is in need of restoration.
Strategy: Restoration of streams, including but not limited to debris removal, streambank stabilization, and naturalization of channel.

Question	Response	Disposition
Articulate how this project addresses an unmet need that has been created by damage from Hurricane Matthew.	Impaired stream system causing flooding. As a result of Hurricane Matthew many trees and other debris litter waterways across the County. During heavy rains this debris will continue to dam up water and alter flows. These unnatural changes in the water flow puts more properties at risk to future flooding. In many cases the stream's natural channel has been degraded and is in need of restoration.	N/A
Consistent with existing plans (describe points of intersection/departure)	The county has identified stream restoration as a significant need to address repetitive flooding in the county.	N/A
Does this project comply with existing Local and State authority (codes, plan and ordinance)?	Yes	N/A
Does this project meet the intents and goals for the Hurricane Matthew Recovery Act?	Yes	N/A
Explain any benefits or impacts to the economy of the county from this project.	The benefits of restoring rivers and streams through debris removal and embankment repair can provide positive impacts to the surrounding environment and wildlife as well as providing a resource for outdoor enthusiasts to enjoy the waterways for a variety of activities.	N/A
For how long will this solution be effective?	Less than 10 years	N/A
How effective is the risk reduction?	<50 year event	N/A
How many public facilities are involved in this project (buildings and infrastructure)?	0	N/A
Is coordination with other communities/counties needed to complete this project?	No	N/A
Is this project consistent with Federal Laws	Yes	N/A
To what degree does this project adversely impact local floodplain/coastal zone management?	Unknown	N/A
To what degree will it be possible to positively quantify the environmental benefits and ROI of this project?	Medium to high confidence	N/A
What impact will this action have on the local economy/tax base?	Less than 25%	N/A
What impacts to the environment of the county will result from this project?	Stream restoration through debris removal can also reduce impacts of high rainfall events – allowing water to flow unobstructed through waterways – reducing impacts to land and structures.	N/A

What is the capability of the local government to administer this project?	High	N/A
What is the financial range of this project?	$501K - $1M	N/A
What is the level of public support for this project?	Medium	N/A
What is the technical feasibility of this project?	Higher than 75%	N/A
Who will administer this project?	County	N/A

Low Priority Environmental Strategies

Pillar	Action Name	Priority	Overall Ranking
Environment	EN3- Trail System Expansion	Low	

Table 14. Moore Low Priority Environmental Summary

This project represents the environmental strategy that Moore County indicated is of a lower priority to address. Additional detail can be found below:

- **EN3 - Trail System Expansion:** Extend the trail around Aberdeen Lake to increase the flood buffer area around the lake and enhance recreational opportunities for citizens. Additionally, Robbins has identified a need to protect, improve and extend Bear Creek Trails near the reservoir, as well as trails around the Mill Pond located in town to provide retention for stormwater in the urbanized area and reduce risk.

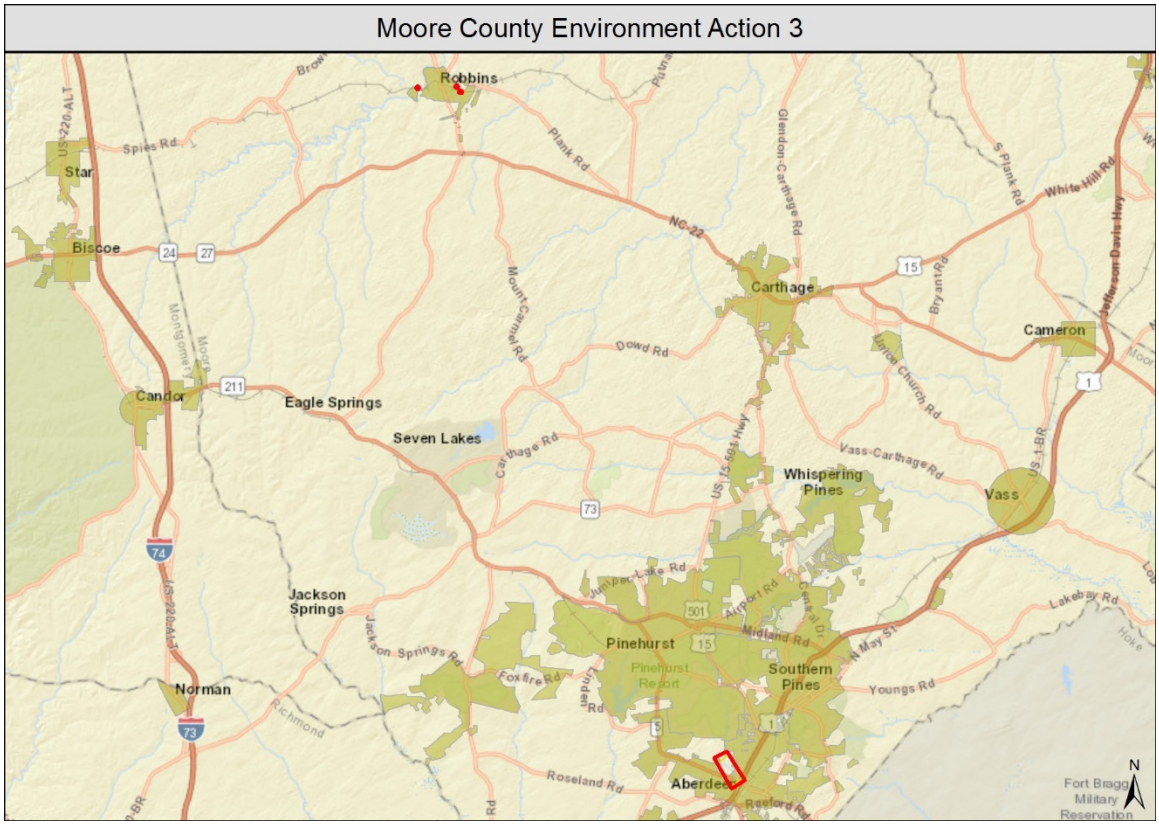


Figure 26. Trail System Expansion

EN3- Trail System Expansion

County: Moore

Priority Grouping: Low Priority

Priority Ranking: 0

Project Timeframe: 3-5 years

Location: Aberdeen Lake Trail, Bear Creek Trails, Bear Creek-Robbins-Mill Pond Trail (Map ID: EN3)

Project Summary: Problem: Risk of Flooding around Lake and Other Water Bodies. Historically, heavy rainfall events have caused flooding of lakes and other water bodies in the county. As a result, communities have constructed trail systems to serve as buffers, but these are incomplete in many cases.

Strategy: Extend the trail around Aberdeen Lake to increase the flood buffer area around the lake and enhance recreational opportunities for citizens. The town would like to extend the trails by about half a mile. Additionally, Robbins has identified a need to protect, improve and extend Bear Creek Trails near the reservoir, as well as trails around the Mill Pond located in town and provide retention for stormwater in the urbanized area and provide for risk reduction. The end goal for Robbins is to extend the existing Bear Creek Trail system to downtown where there is a green space that the town would like to turn into a picnic area/festival grounds with a stage. This would then connect east to another green space area around the Mill Pond and would create an interconnected system of trails between the urbanized area of the town and the Bear Creek Trails and Mill Pond that is about 1.5 miles.

Question	Response	Disposition
Articulate how this project addresses an unmet need that has been created by damage from Hurricane Matthew.	Risk of Flooding around Lake and Other Water Bodies. Historically heavy rainfall events have caused flooding of lakes and other water bodies in the county. As a result communities have constructed trail systems to serve as buffers but these are incomplete in many cases.	N/A
Consistent with existing plans (describe points of intersection/departure)	The communities have identified the projects as key priorities for increasing a positive impact on the environment.	N/A
Does this project comply with existing Local and State authority (codes, plan and ordinance)?	Yes	N/A
Does this project meet the intents and goals for the Hurricane Matthew Recovery Act?	Yes	N/A
Explain any benefits or impacts to the economy of the county from this project.	Open space can be turned into recreational space and used to promote eco-tourism and improve the desirability of surrounding areas to new growth. (Economic Development)	N/A
For how long will this solution be effective?	Between 11 and 30 years	N/A
How effective is the risk reduction?	Unknown	N/A
How many public facilities are involved in this project (buildings and infrastructure)?	1-3	N/A
Is coordination with other communities/counties needed to complete this project?	No	N/A
Is this project consistent with Federal Laws	Yes	N/A
To what degree does this project adversely impact local floodplain/coastal zone management?	No Impact	N/A
To what degree will it be possible to positively quantify the environmental benefits and ROI of this project?	Low to moderate confidence	N/A
What impact will this action have on the local economy/tax base?	Less than 25%	N/A
What impacts to the environment of the county will result from this project?	Growth of green space can provide increased tourism traffic to enjoy parks and outdoor activities. The increased traffic can contribute to increased revenue for local business and potentially increase value of property. This may contribute to	N/A

	an overall growth of the economy and increased tax base for the surrounding communities and the county	
What is the capability of the local government to administer this project?	Medium	N/A
What is the financial range of this project?	$101K - $250K	N/A
What is the level of public support for this project?	Medium	N/A
What is the technical feasibility of this project?	Higher than 75%	N/A
Who will administer this project?	County	N/A

Summary

The draft resilience strategies and actions introduced in this section are further detailed in the Appendix. Implementation has already begun for some of these actions but for those that have not already been funded, the State of North Carolina will begin a process of prioritizing the actions and seeking to match a funding stream to each action. Those that are not matched with a funding source will be added to the State's Unmet Needs Report. Funding for Unmet Needs will be sought through additional funding from Congress and from the North Carolina General Assembly. Any action that cannot be matched to a funding source should be incorporated into the County's Hazard Mitigation Plan for consideration for future funding. It is important to seek to implement as many of these actions as feasible. Doing so will significantly contribute to helping improve the resiliency of North Carolina's communities.