

Hurricane Matthew Resilient Redevelopment Plan

Dare County



May 2017

Version 1.2

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Change Log

Version	Date	Summary of Changes
1.1	6/15/17	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 25 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) initiative 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.

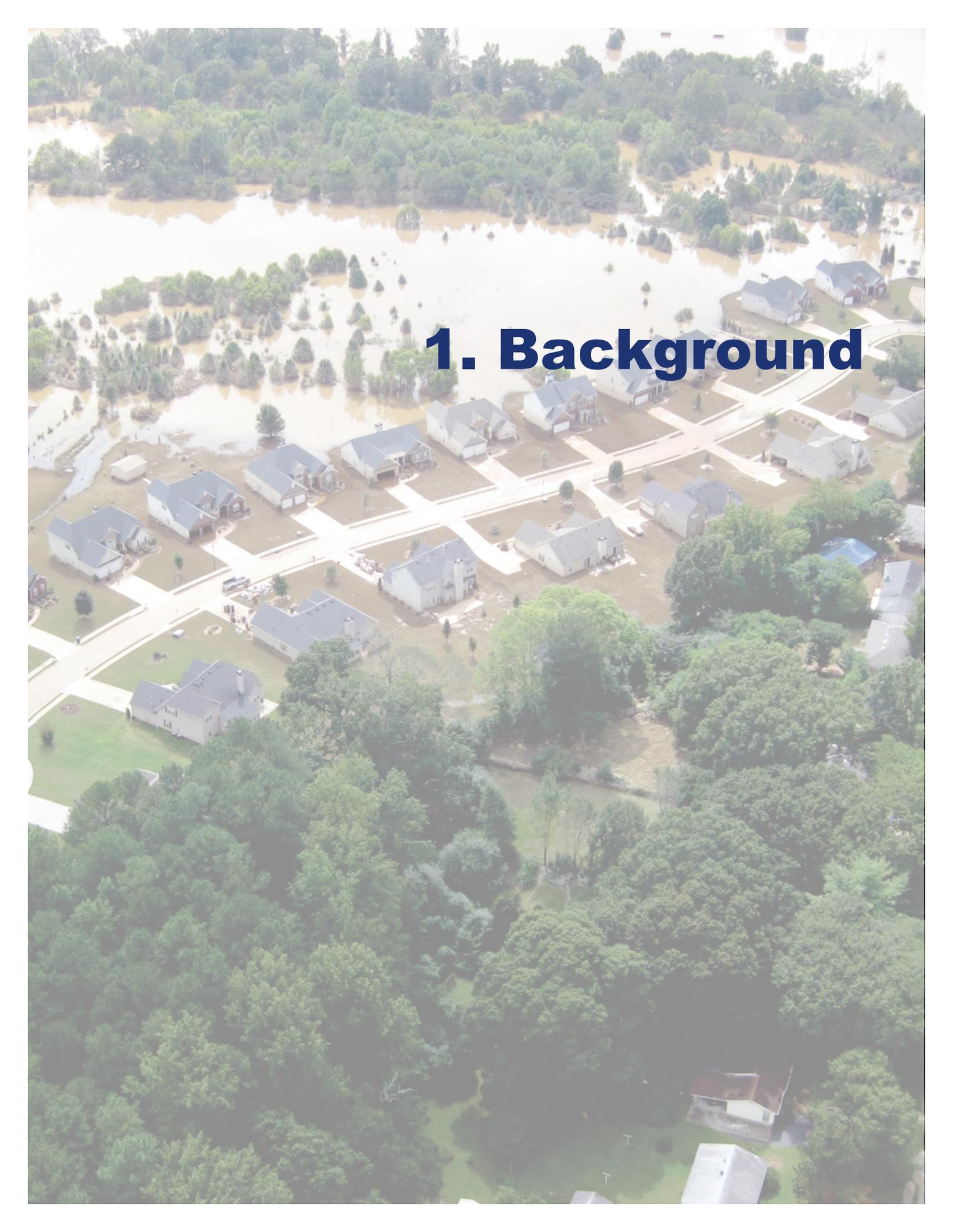
Implementation of the proposed projects and actions described in this plan is subject to applicable federal, state, and local laws and regulations. Proposed projects or actions may be eligible for state or federal funding, or could be accomplished with municipal, nonprofit, or private investments. However, 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, Dare County has identified 28 projects in four pillars: Housing, Economic Development, Infrastructure, and Environment. Details of these projects can be found in Section 4 of this plan.

Pillar	Project/Action Count
Housing	1
Economic Development	4
Infrastructure	20
Environment	3
Grand Total	28

Table 1. Dare 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

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.

- There were 81,832 individuals registered for FEMA/state assistance.

² Governor McCrory's Request for Federal Assistance for Hurricane Matthew Recovery, November 14, 2016

- 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) recommendation 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 initiative 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 initiative 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 initiative 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. Four 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 affected 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.

Meeting 4 – NCEM presented actions developed during the course of the planning process and allowed the county to rank actions; apply High, Medium, or Low Prioritization; and approve inclusion of the actions in the final 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 resilient 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.

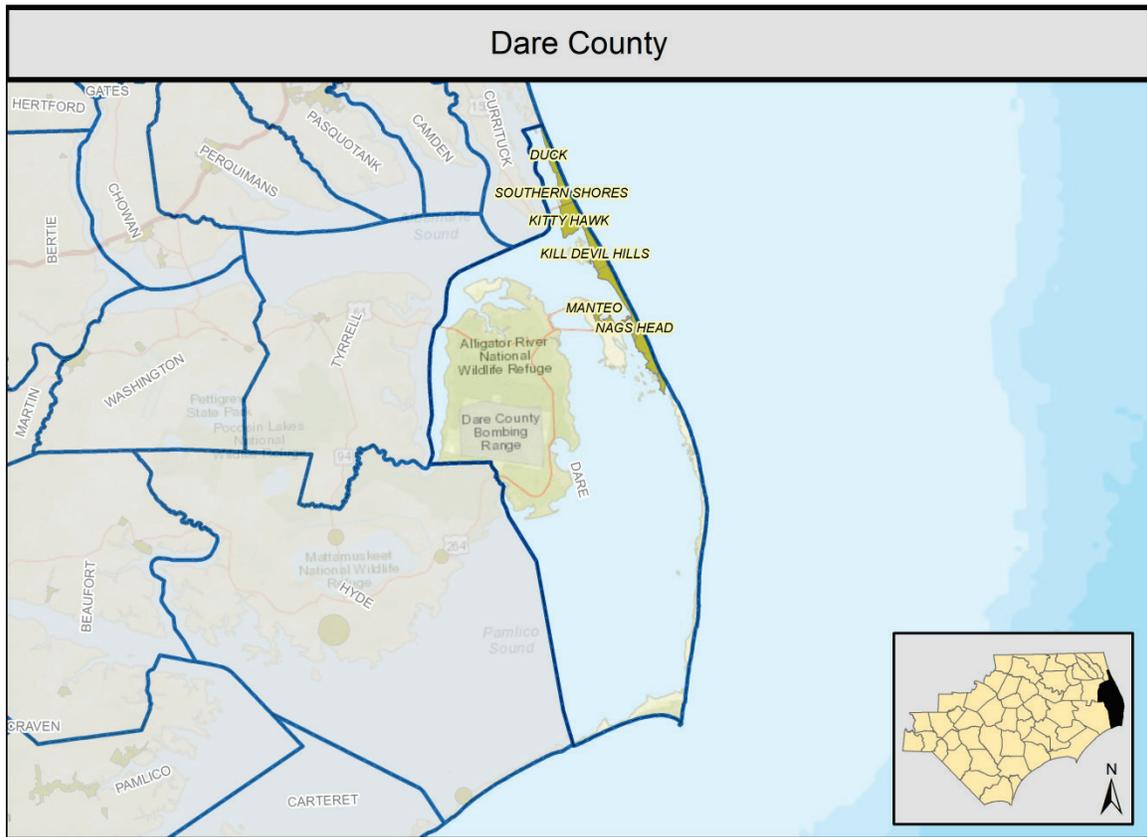
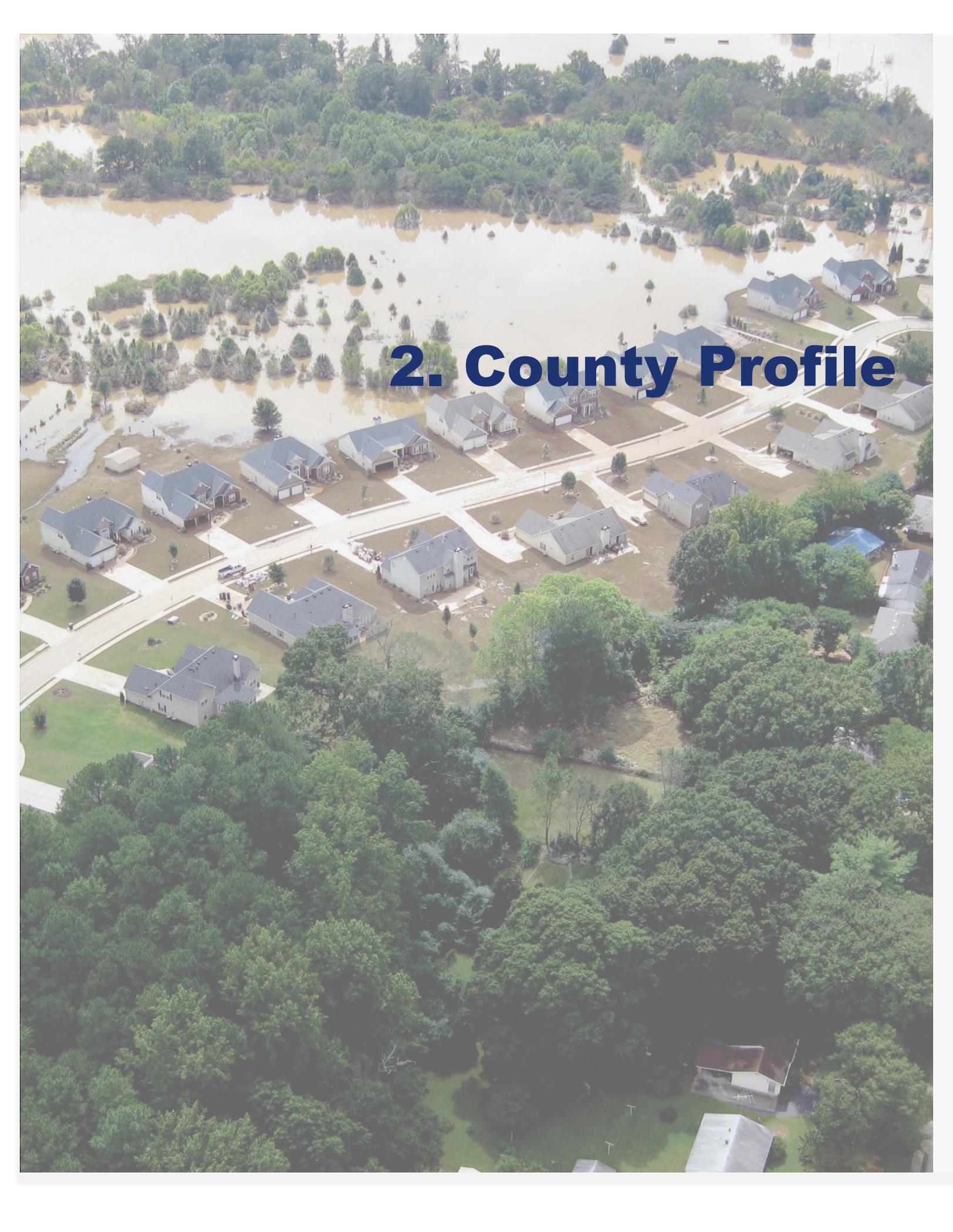


Figure 2. Dare County and Neighboring Counties

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.

An aerial photograph showing a residential neighborhood that has been severely flooded. The water is a murky, brown color and has inundated the yards and streets between several houses. The houses are mostly two-story structures with grey roofs. In the foreground, there is a dense forest of green trees. The overall scene depicts significant water damage and flooding in a suburban area.

2. County Profile

2. County Profile

Dare County is located in far eastern North Carolina along the coast. It is comprised of six towns: Duck, Kill Devil Hills, Kitty Hawk, Manteo, Nags Head, and Southern Shores. The county is also comprised of nine census-designated places: Avon, Buxton, Frisco, Hatteras, Manns Harbor, Rodanthe, Salvo, Wanchese and Waves. Its current total population as of 2015 was 34,863. This section provides a profile of housing, economics, infrastructure, environment, and administration within Dare County.

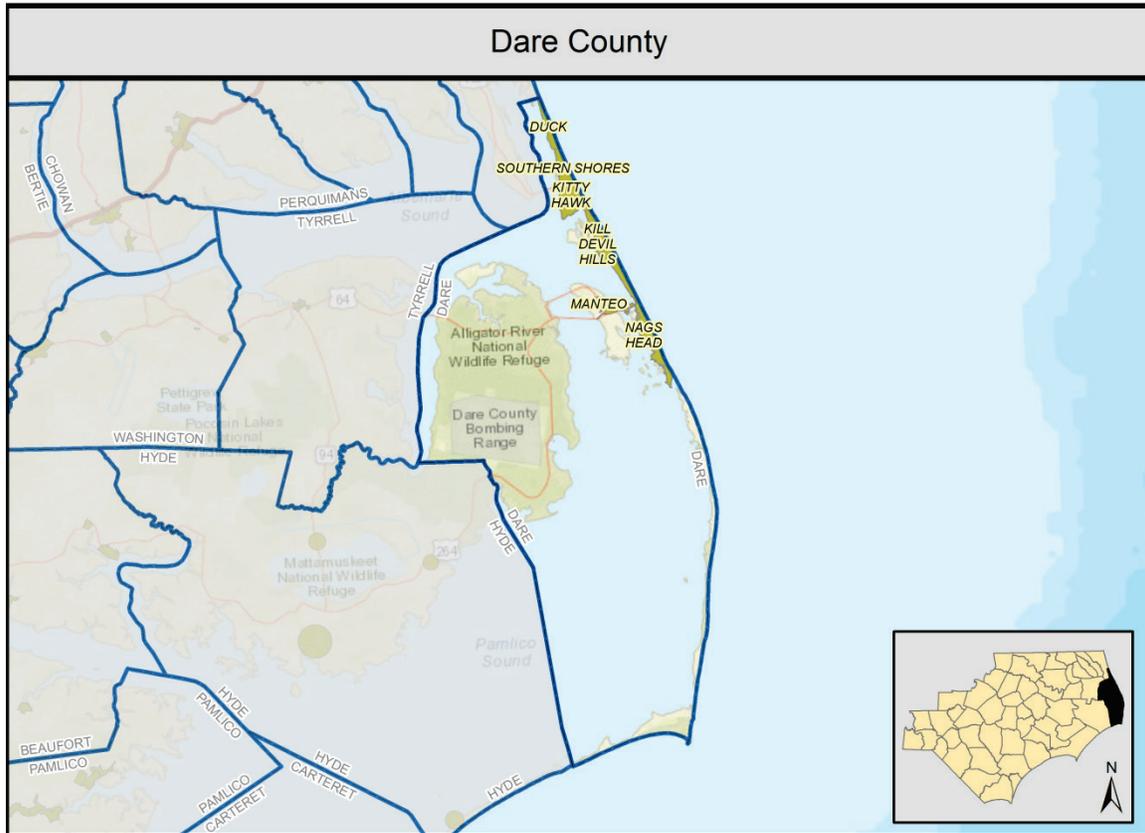


Figure 3. Dare Base Map

Demographic Profile

Demographics for Dare County and census-designated places within the county 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

Dare County has a population of 34,893. Kill Devil Hills is the most populous town within Dare County with a population of 6,881 and Duck is the least populous town with a population of 534. Wanchese is the most populous census-designated place within Dare County with a population of 1,475 and Waves is the least populous census-designated place with a population of 65.³

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

Population Change (2000 to 2010)

The Dare County population has grown between the 2000 and 2010 Census. In 2000 the population was 29,967 and in 2010 it was 33,920. The population increased by 3,953 people, or more than 13 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 Dare County is 45, which is higher than North Carolina median. Within Dare County, the Hatteras population has the oldest median age, 60, and the Manns Harbor population has the youngest median age, 37.¹

Race and Ethnicity

Dare County is mostly White (90 percent) with other races constituting the remaining 10 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.

Within Dare County, Avon and Rodanthe are predominantly White while Manns Harbor has the lowest percent White at 77 percent. The Town of Manteo has the highest Black or African American population with almost 10 percent. In Manns Harbor, over 10 percent of the population identifies as Some Other Race. The Latino population in Dare County is 7 percent compared to 9 percent for North Carolina. Manns Harbor has the largest Latino population (25 percent) while Frisco, Rodanthe and Salvo do not have Latino populations according to the census data.⁵

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
Avon CDP	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Buxton CDP	81.4%	0.0%	0.0%	0.0%	0.0%	18.6%	0.0%	18.6%
Frisco CDP	84.7%	0.0%	15.3%	0.0%	0.0%	0.0%	0.0%	15.3%
Hatteras CDP	99.8%	0.0%	0.0%	0.2%	0.0%	0.0%	0.0%	0.2%
Manns Harbor CDP	77.6%	0.5%	0.0%	0.0%	0.0%	10.3%	11.5%	22.4%
Rodanthe CDP	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Salvo CDP	93.8%	0.0%	0.0%	0.0%	0.0%	0.0%	6.3%	6.3%
Wanchese CDP	98.8%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%	1.2%
Waves CDP	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Duck town	98.7%	0.7%	0.0%	0.6%	0.0%	0.0%	0.0%	1.3%
Kill Devil Hills town	92.0%	0.5%	0.2%	0.2%	0.0%	5.3%	1.8%	8.0%

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 B02001, "Race" and Table B03002, "Hispanic or Latino Origin by Race."

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
Kitty Hawk town	99.3%	0.0%	0.0%	0.3%	0.0%	0.0%	0.4%	0.7%
Manteo town	82.2%	9.5%	1.0%	0.3%	0.0%	5.9%	1.2%	17.8%
Nags Head town	93.8%	1.6%	0.0%	0.6%	0.0%	3.2%	0.8%	6.2%
Southern Shores town	94.7%	0.0%	2.0%	0.4%	0.0%	0.1%	2.9%	5.3%
Dare County	90.4%	2.2%	0.8%	0.5%	0.0%	3.7%	2.4%	9.6%
North Carolina	69.5%	21.5%	1.2%	2.5%	0.1%	3.0%	2.4%	30.5%

Table 2. Dare County Race and Ethnicity

Limited English Proficiency

Limited English Proficiency (LEP) is defined as populations 18 years or older that speak English less than very well. In Dare County, most of individuals identified as LEP speak Spanish (2.5 percent) while others speak Asian/Pacific languages. Similarly, the primary language group for LEP individuals in North Carolina is Spanish. Within Dare County, Kill Devil Hills has the largest LEP population. The primary language group for LEP populations in Kill Devil Hills is Spanish. In Nags Head, the primary language group is Asian/Pacific languages while most Towns and CDPs do not have a LEP population according to census data.⁶

Poverty

In Dare County, 8 percent of the population is below the poverty level compared to 17 percent of the North Carolina population. In Manteo 18 percent, Kill Devil Hills 11 percent, Frisco CDP 15 percent and Rodanthe CDP 24 percent of the populations are below the poverty level. In Towns and CDPs with populations over 1,000 the following percentages are below poverty level: Buxton CDP 6 percent, Kitty Hawk 7 percent, Manns Harbor 9 percent, Nags Head 9 percent, Southern Shores 2 percent and Wanchese CDP at 6 percent.⁷

Low and Moderate Income Individuals

In Dare County, 40 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.⁸

Median Household Income

The median household income of the population 25 to 64 years old is \$56,489 in Dare County and \$53,097 in North Carolina. Southern Shores is the highest median household income for this age group, \$107,094, and Manteo has the lowest: \$44,996. Median household income was not available for Avon, Frisco, Manns Harbor, Rodanthe, Salvo and Waves CDPs.⁹

6 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.

7 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.

8 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/>

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

Zero Car Households¹⁰

In Dare County, 3.9 percent of households do not have a vehicle available compared to 7 percent of North Carolina households. Within Dare County, Rodanthe has the highest percentage of households without access to a vehicle, 49 percent, while Buxton, Hatteras and Waves CDPs have the lowest percentage: 0 percent.

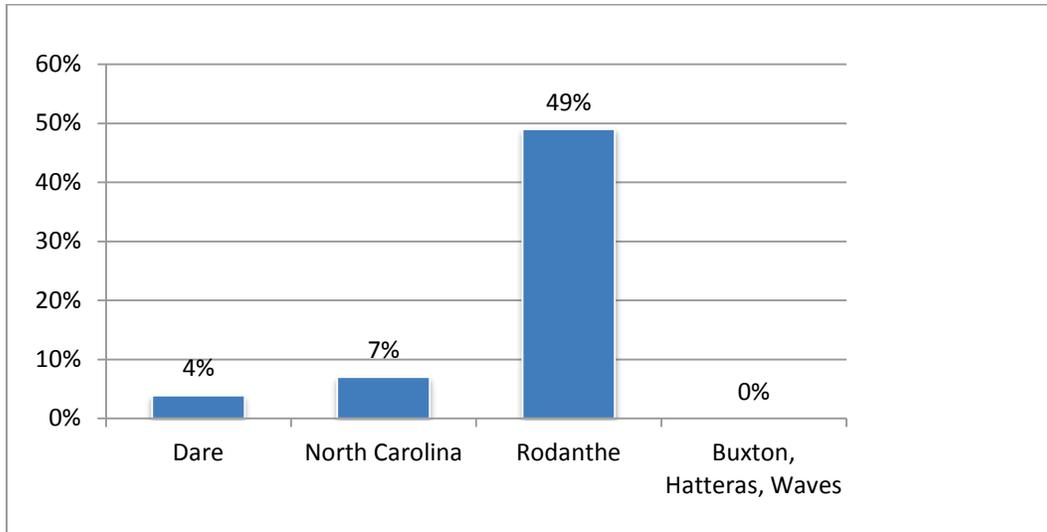


Figure 4. Zero Car Households by Percentage

Commuting: Travel Time to Work, Means of Transportation¹¹

The majority of Dare County residents commute alone to work by vehicle, 81 percent, which is similar to North Carolina average of 81 percent. Within Dare County, Salvo and Waves CDPs have the largest percentage of commuters commuting alone, 100 percent, and Rodanthe has the least: 0 percent.

None of the Towns or CDPs has any residents commuting by public transportation. In comparison, 1 percent of North Carolina commuters use public transportation. A greater percentage of Dare County residents commute by walking, bike, or motorcycle than the North Carolina average of 2 percent.

The mean commute time to work for Dare County residents is 18.7 minutes. In comparison, the North Carolina mean commute time is 24.7 minutes. Within Dare County, Rodanthe has the shortest mean commute time at 7.8 minutes while Southern Shores has the longest at 23.7 minutes. Mean Vehicle Commute Time was not available for the following CDPs: Frisco, Salvo and Waves.

¹⁰ Source: US Census Bureau, American Community Survey 5-year Estimates (2011-2015), Table B25044 Tenure by Vehicles Available.

¹¹ 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)."

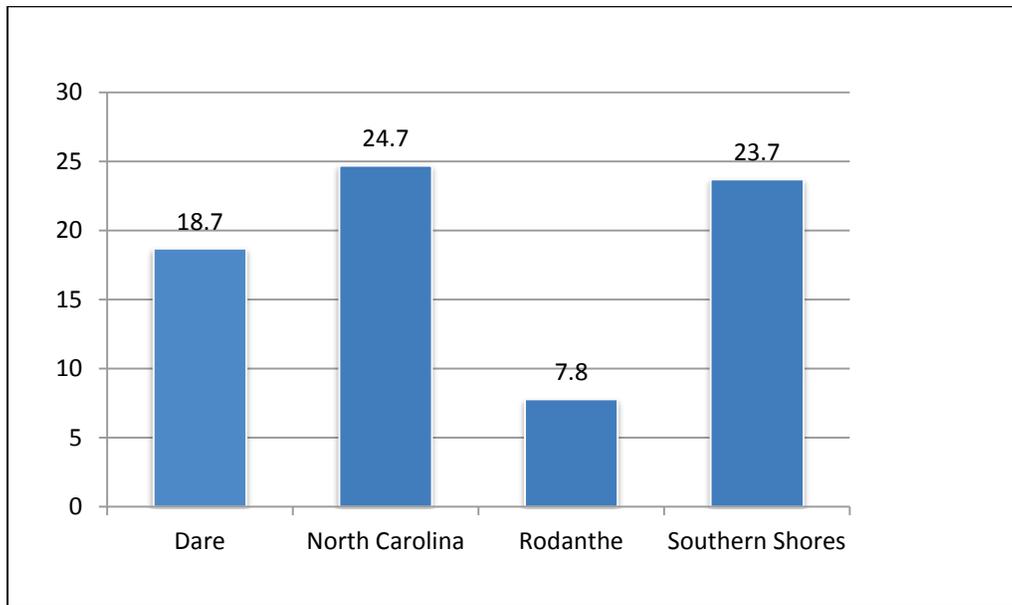


Figure 5. Mean Commute Time to Work in Minutes

Housing Profile¹²

Dare County has over 33,863 housing units, 79 percent of which are single-family homes, 15 percent multi-family units, and 6 percent manufactured housing.

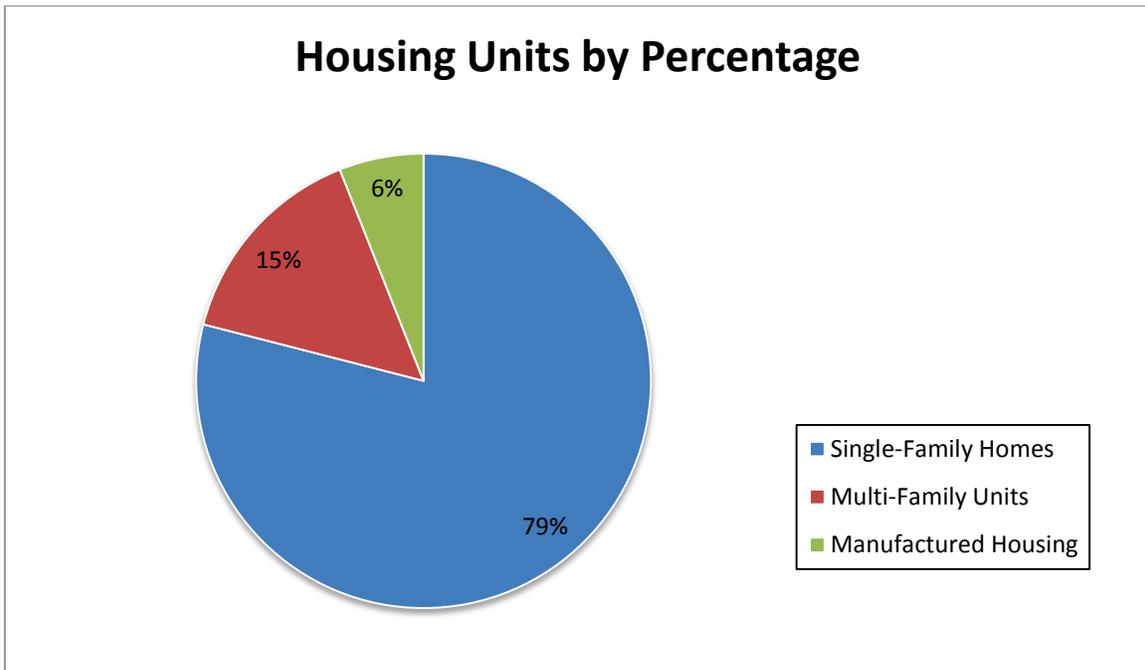


Figure 6. Housing Units by Percentage

In Dare County 56 percent of housing units are vacant, which is significantly higher than the percentage for North Carolina at 15 percent. Within Dare County, Duck has the largest percentage of vacant housing units, 90 percent, while Wanchese CDP has the least: 19 percent. An important note for Dare County is the area's

¹² 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

significant short-term rental market which impacts the percent of vacant and occupied housing throughout the County.

Of the occupied housing units, 68 percent are owner-occupied compared to 65 percent in North Carolina; 32 percent are renter-occupied compared to 35 percent in North Carolina.

The median housing value in Dare County \$283,400. In comparison, the median housing value in North Carolina is \$137,834. Within Dare County, Duck has the highest median housing value: \$581,300. Manns Harbor has the lowest median housing value: \$144,700.

According to the National Housing Preservation Database, Dare County has 143 affordable housing units.

Economic/Business Profile

Dare County is home to an array of businesses catering to the short-term rental and tourism industries, such as accommodation and food services, retail trade and real estate and rental and leasing.¹³

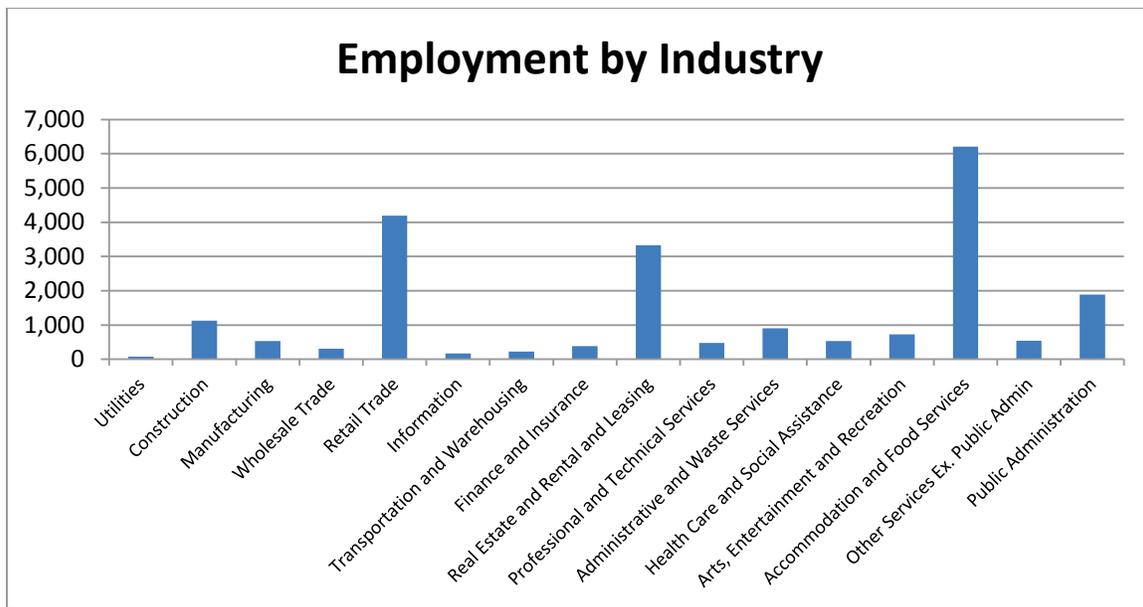


Figure 7. Employment by Industry

According to the US Census Bureau’s Longitudinal-Employer Household Dynamics Program, the largest concentrations of jobs within Dare County are in the Manteo, Kill Devil Hills and Kitty Hawk areas with spot concentrations of employee in Duck and Avon CDP.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 Dare County is

13 Source: AccessNC – North Carolina Department of Commerce, April 2017: <http://accessnc.nccommerce.com/DemoGraphicsReports/pdfs/countyProfile/NC/37065.pdf>
 14 Source: US Census Bureau Longitudinal-Employer Household Dynamics Program

20,069.¹⁵ Within Dare County, Waves CDP has the largest percentage of residents 16 years or over in the labor force, 88 percent, while Frisco CDP has the smallest: 38 percent.^{Error! Bookmark not defined.}

The civilian unemployment rate in Dare County is 7.0 percent. In comparison, the North Carolina civilian unemployment rate is 5.1 percent.¹⁵ Within Dare County, Rodanthe has the highest civilian unemployment rate at 42 percent while Avon, Frisco, Hatteras and Waves CDPs have the lowest: 0 percent.¹⁶

Tourism in Dare County creates large seasonal shifts in average daily populations and employment associated with the tourism industry. This cyclical shifts results in unemployment ranges from as low as percent in the peak tourism season to over 15 percent in the off peak tourism season.¹⁶

Major Employers

The top ten employers in Dare County¹⁷ represent the education and health service industries, public administration, financial activities, trade, transportation and utilities, and are listed in order of total employees.

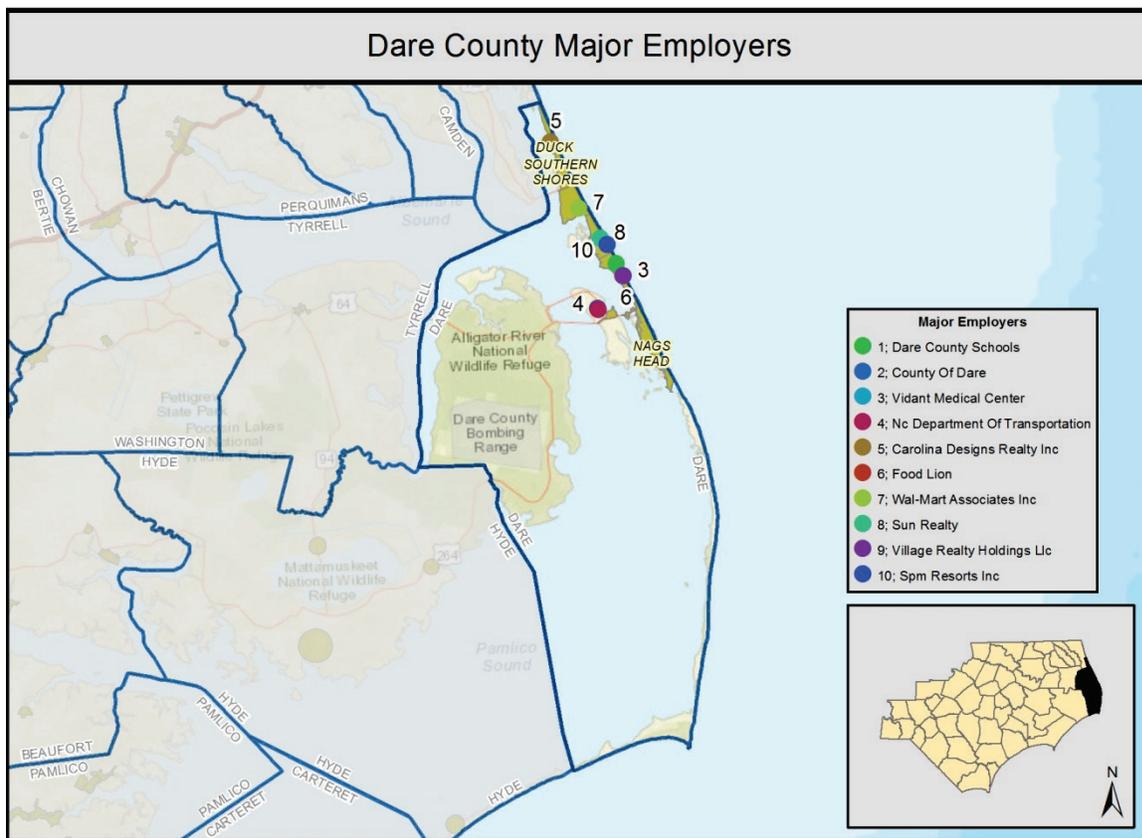


Figure 8. Major Employers by Number of Employees

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

17 Sources: NC Department of Commerce

Economic Development¹⁸

The Dare County 2020 Economic Development and Diversification Strategic Plan was prepared by NC State University for the Dare County Board of Commissions and presented in December, 2016. The report recommended a series of priority strategies broken into three one year periods. Year one strategies include the hiring of an economic development focused employee by the County, partnerships with the Outer Banks Chamber of Commerce and Outer Banks Visitor Bureau, establishment of an economic development coordinating council and development of a public economic development dashboard.

Year two strategies include support for the Coastal Studies Institute and National Sailing Center, positioning the Outer Banks Hospital as a regional hub for medical service, development of new flexible space for businesses, and exploring the development of a Public-Private Partnership for economic development services.

Year three strategies focus on extended delivery of economic development services and the development of metrics as indices of progress.

Economic development assets include the Wanchese Seafood Industrial Park, Manns Harbor and other locations which have several boat building businesses with an economic impact of over 1,000 jobs. The College of The Albemarle's Boat Building Pre-Employment Training Program provides skills for elite boat building manufacturing that contributes over \$100 million in revenue for Dare County.

Commercial fishing in Dare County provides an annual economic benefit of over 600 jobs and \$25 million in economic impact. Seafood packing and processing provides a further 150 jobs and over \$30 million in economic impact.

Tourism associated with National Park Service sites contribute 2.8 million visitors to the County which supports over 2,600 jobs and \$212 million in cumulative benefits.

¹⁸ Sources: Dare County Economic Development and Diversification Plan

Infrastructure Profile

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

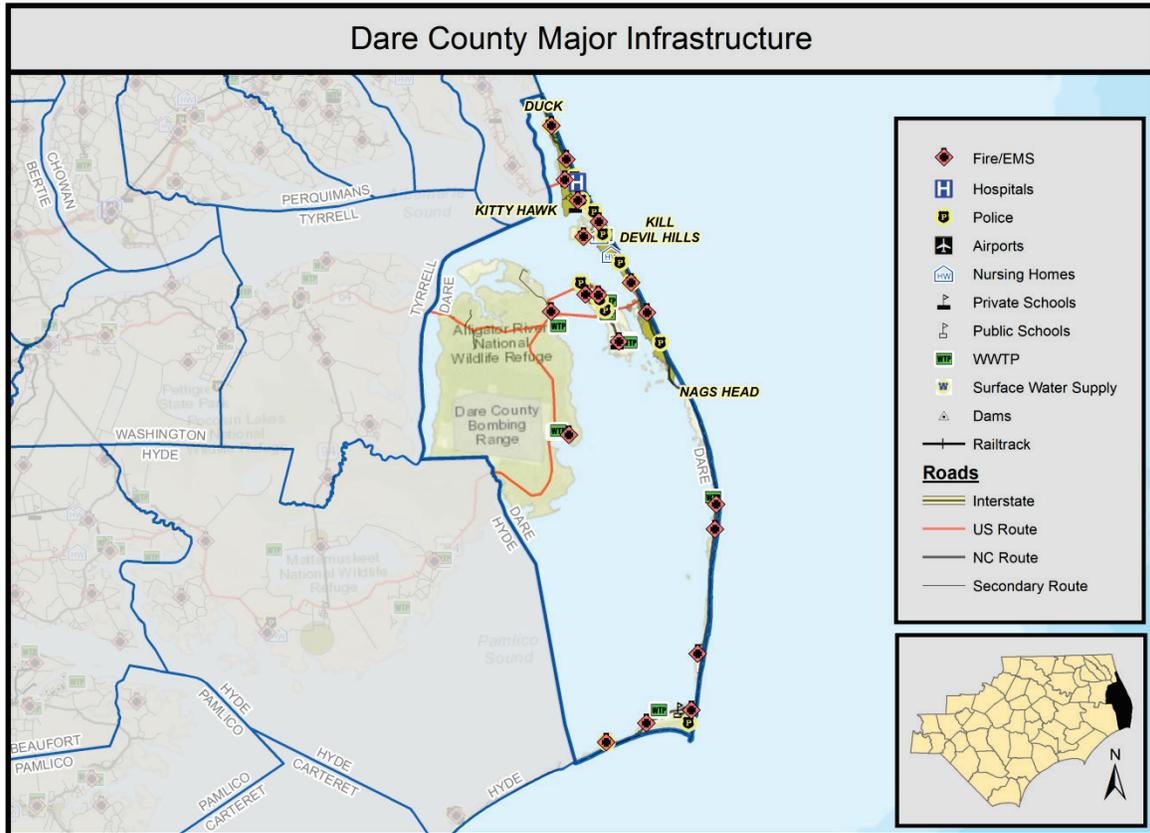


Figure 9. Dare County Major Infrastructure

Transportation

Dare County is connected to the region by US 128 and US 64. US 158 is a major north-south highway that provides Dare County with access via the Wright Memorial Bridge to Currituck County to the north and west. US 64 is a major east-west highway that provides Dare County with access I-95 and Raleigh.

Three bridges provide access to the eastern areas of Dare County, the Wright Memorial Bridge over the Currituck Sound and the Virginia Dare Memorial Bridge and Manns Harbor Bridge over the Croatan Sound.

NC Dept. of Transportation operates ferry services from Hatteras to Ocracoke Island. The route is a 60 minute ferry around the Hatteras Inlet Crab Spawning Sanctuary.

Dare County has two general aviation airports. The Dare County Regional Airport (MQI) is a public airport located one mile northwest of Manteo. The airport has two asphalt runways; 4,300 and 3,303 feet. The airport provides FedEx Feeder operations for the region. Billy Mitchell Airport (HSE) is a public use airport located four miles from Hatteras. The airport is located within the Cape Hatteras National Seashore and is owned by the National Park Service. The airport has one 3,000 foot asphalt runway.

Health

Outer Banks Hospital is the only hospital located in Dare County and is a critical access hospital. It is partnership between Vidant Health and Chesapeake Regional Healthcare. The hospital opened in 2002 and is located in Nags Head at 4800 South Croatan Hwy (U.S. 158).

Education¹⁹

Dare County Public Schools administer five elementary, two middle, and two high schools, in addition to a secondary school with a focus on coastal studies. College of The Albemarle is community college located in the Albemarle region of northeastern North Carolina with a satellite campus in Manteo. The college is part of the North Carolina Community College System and has over 2,100 students across its main campus and three satellite campuses.

Water

Dare County's Cape Hatteras water system includes 81 miles of distribution lines, has a water storage capacity of 4.2 million gallons per day (MGD). The system operates the Cape Hatteras Water Treatment Plant with a permitted capacity of 2 MGD. The system has one permitted wastewater facility with a capacity of 2 MGD.

The Dare County Regional water system operates 247 miles of distribution lines and has water storage capacity of 17.655 million gallons. The system operates two water treatments plants, each with a permitted capacity of 5 MGD. The system has two permitted wastewater facilities with a combined permitted capacity of just over 1.5 MGD.

The Dare County Rodanthe-Waves-Salvo water system operates 26 miles of distribution lines and a water storage capacity of 1.2 million gallons. The system operates one water treatment plant with a permitted capacity of 1.25 MGD. The system has one permitted wastewater facility with a capacity of 0.3 MGD.

The Stumpy Point Water and Sewer District operates 3 miles of water distribution lines and has a water storage capacity of 0.085 million gallons. The system operates the Stumpy Point Water Plant with a permitted capacity of 0.06 MGD and one wastewater facility with a permitted capacity of 0.043 MGD.

Kill Devil Hills operates a municipal water and sewer system with 80 miles of distribution lines and water storage capacity of 1.65 million gallons. Manteo operates a municipal water and sewer with 15 miles of distribution lines and storage capacity of 0.3 million gallons. Manteo has one permitted wastewater facility for a capacity of 0.6 MGD. Nags Head operates a municipal water and sewer system with 100 miles of distribution lines and a water storage capacity of 2.0 million gallons²⁰.

Power

Dare County has one power plant located in Buxton. The petroleum power plant has a net summer capacity of 15 megawatts²¹.

¹⁹ Sources: Dare County Public Schools and College of The Albemarle

²⁰ Sources: NC Division of Water Resources, Local Water Supply Plans; and the Neuse Regional Water and Sewer Authority

²¹ Source: US Department of Energy, US Energy Mapping System

Environmental Profile

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

Water Resources

Over 75 percent of the total area of Dare County is water (1,179 square miles). Dare County includes the Roanoke, Croatan, Albemarle and Pamlico Sounds, as well as the Atlantic Ocean. Dare County borders the Alligator River with Tyrrell County and includes extensive wetlands. Many of the Coastal Wetlands are rated as exceptional Depression Swamp Forest or Substantial Pocosin coastal wetlands. Dare County also contains extensive salt/brackish marsh coastal wetlands²².

Natural and Managed Areas

According to the NC Natural Heritage Program, there are extensive natural areas of high, very high, or exceptional value in Dare County. Some of the largest of the exceptional value natural areas include: Alligator River Swamp Forest (39,605 acres), Dare County Pocosin (42,477 acres), Pea Island National Wildlife Refuge (5,898 acres), Hatteras Island Middle Section (3,027 acres), Buxton Woods (4,195 acres), Bodie Island Ponds, Marshes and Dunes (2,007 acres), Nags Head Woods/Run Hill (1,521 acres), and Mashoes Marsh (5,174 acres).

There are several managed areas under federal, state, local and private ownership within Dare 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 Dare County include: the Alligator River National Wildlife Refuge (148,493 acres), Cape Hatteras National Seashore (21,188 acres), Kitty Hawk Woods Coastal Reserve (1,840 acres), Dare County Open Space (926 acres), and Roanoke Island Marshes Game Land (2,388 acres).

The US Navy and Air Force share use of the Dare County Bombing Range which encompasses 46,000 acres of marshland, forest and open space overlapping with some of the Alligator River National Wildlife Refuge.²²

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 within the Alligator River National Wildlife Refuge, Cape Hatteras National Seashore, Roanoke Island Marshes Game, and Kitty Hawk Woods Coastal Reserve. These areas all rank a 10, with 10 being the highest possible score. Other areas of the county rank 5 to 7. Most of the county is rated a 10.²²

Parks and Recreation

The Dare County Parks and Recreation Department maintains 18 parks across three divisions: Northern Beach, Roanoke Island/Mainland and Hatteras Island. Dare County parks provide a range of park and recreation facilities from soccer and baseball fields to skate parks, basketball courts and playgrounds. Dare County operates two indoor facilities: The Roanoke Island Youth Center in Manteo and the Fessenden Center in Buxton.

²² Source: NC Natural Heritage Program

The following towns also provide municipal park and recreation services: Duck provides one 11 acre park and boardwalk, Kitty Hawk provides one park, Kill Devil Hills provides one trail and one regional park, Nags Head provides five parks and Manteo provides four parks and operates several historical resources open to the public.²³

Administrative Profile

The administrative capabilities of Dare County and the municipalities within the County are discussed in great detail within the *Albemarle Regional Hazard Mitigation Plan* in place, which was approved by FEMA in May, 2015. The assessment evaluates the capabilities of the County and municipalities to implement mitigation actions across the areas of administrative and technical capabilities, planning and regulatory capabilities, financial capabilities, educational and outreach capabilities and legal and political capabilities. Many more details about the capabilities of Dare County and the municipalities can be found in that document.

Dare County recently completing a new Emergency Operation Center (EOC) located at 370 Airport Road in Manteo. The \$14 million, 18,000 square foot center includes 911 services for Dare, Tyrrell and Hyde Counties, a 3,400 square mile area. The EOC houses administrative offices for Dare County EMS, Dare County Emergency Management and Dare County Fire Marshall.

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. Dare County has Emergency Management Services 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, Zoning Ordinance, Subdivision Regulations, Floodplain Management Ordinance, Stormwater Management Plan. These plans, policies and procedures help ensure that new development in the County will be done in a responsible manner and in non-hazardous areas.

The Towns of Nags Head, Kill Devil Hills, Kitty Hawk, Southern Shore and Manteo have Planning departments that would likely be able to assist with implementing the strategies in this plan as well. While their capabilities may not be as robust as those at the County level, they would still be considered to have “moderate” capabilities. For example, all towns in Dare County, as well as the County itself participate in the Community Rating System which indicates their willingness to go above and beyond the minimum standard of the NFIP. Smaller communities and towns within Dare County have what would be considered “limited” capabilities and will likely need additional assistance in the administration and implementation of projects due to their limited staff capacity.

23 Sources: NC Natural Heritage Program, Dare County Parks and Recreation Department

An aerial photograph showing a residential neighborhood severely impacted by flooding. The houses, which are mostly two-story structures with grey roofs, are surrounded by deep, brown floodwater. The water has inundated the yards and streets, leaving only the roofs and some trees visible above the surface. The background shows a dense line of trees, also partially submerged. The overall scene depicts significant property damage and displacement.

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 3-8 inches in the central regions of North Carolina and 8 to more than 15 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 received above normal rainfall in the month of September leading to wet antecedent conditions prior to Hurricane Matthew. Total rainfall depth for Dare County is highlighted graphically in the figure below.

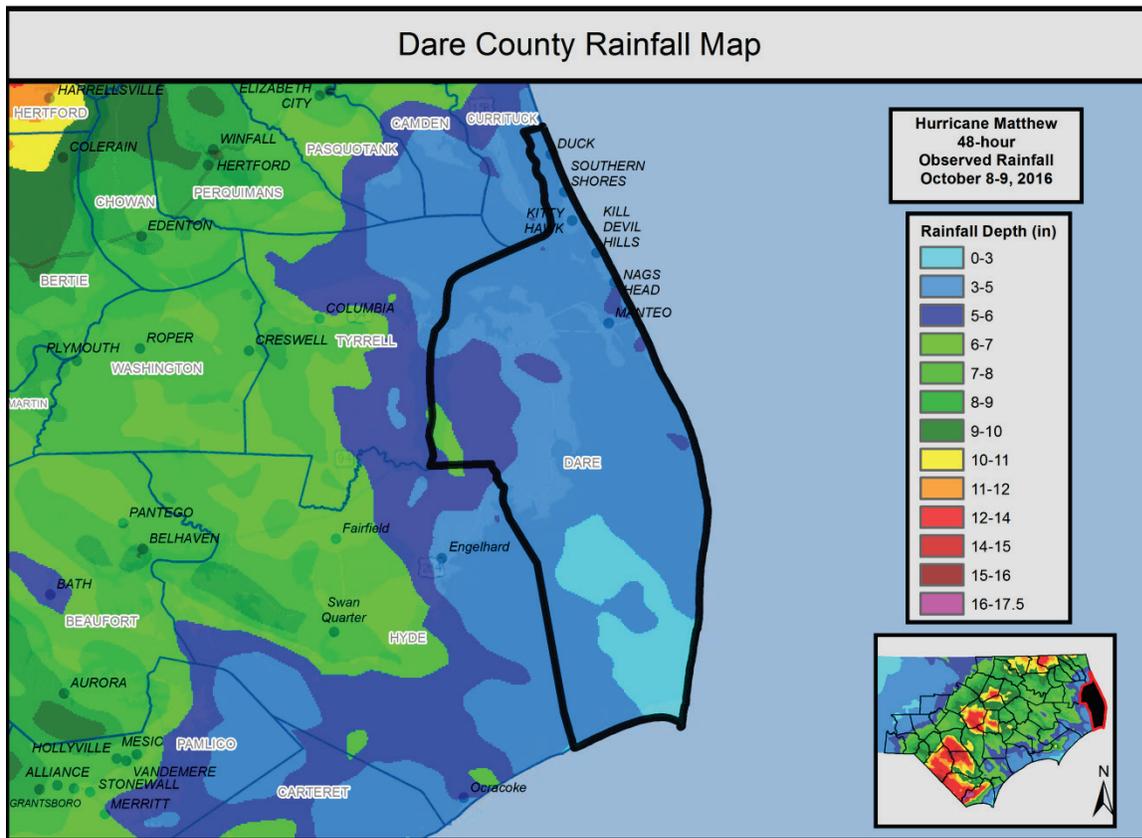


Figure 10. 48-hour Observed Rainfall Depth (October 8-9, 2016)

Coastal Flooding Summary

USGS and NOAA coastal/tidal station records were analyzed along the North Carolina Coast. The Hurricane Matthew peak surge elevations were compared to the FEMA flood recurrence intervals. Approximate recurrence interval was determined for each site and this information is summarized for Dare County in Table 3.

Map ID	County	Site Description	Body of Water	Peak Matthew Surge (ft)	Estimated Recurrence Interval
64	Dare	Roanoke Sound at US highway 64/264 Pond Island	Sound	4.3	500
65	Dare	USACE Research Pier	Open Coast	3.3	<10

Map ID	County	Site Description	Body of Water	Peak Matthew Surge (ft)	Estimated Recurrence Interval
21	Dare	Lighthouse View Motel	Open Coast	7.4	500
33	Dare	Bulkhead at sound behind Scott's Boat Yard	Sound	6.5	500
12	Dare	Rodanthe Pier	Open Coast	6.3	100
15	Dare	Avon Fishing Pier	Open Coast	6.1	100
2	Dare	Hilton Garden Inn Pier	Open Coast	5.9	50
26	Dare	Cape Hatteras Ferry Terminal	Sound	5.9	500
22	Dare	Avon Seafood	Sound	4.7	500
6	Dare	The Landings at Sugar Creek	Sound	4.2	500
35	Dare	Oregon Inlet access area at south end of Herbert Bonner Bridge	Sound	3.5	100
18	Dare	Waves Village Watersports Resort	Sound	3.4	50
66	Dare	Currituck Sound @ US Hwy 158 near Point Harbor	Sound	3.1	50
1	Dare	Paper Canoe Restaurant at Currituck Sound	Sound	2.8	50
41	Dare	Boat launch area next to Oregon Inlet USCG station	Sound	2.6	10

Table 3. Dare County USGS Surge gage data

The USGS data validates what was experienced in the county. Details of impacts categorized under housing, economic, infrastructure, and environment are included in the following sub-sections.

Housing

According to Individual Assistance claims as of March 21, 2017, there were 1,121 impacted houses in Dare County as a result of Hurricane Matthew. It should be noted that additional claims from Hurricane Matthew might 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.

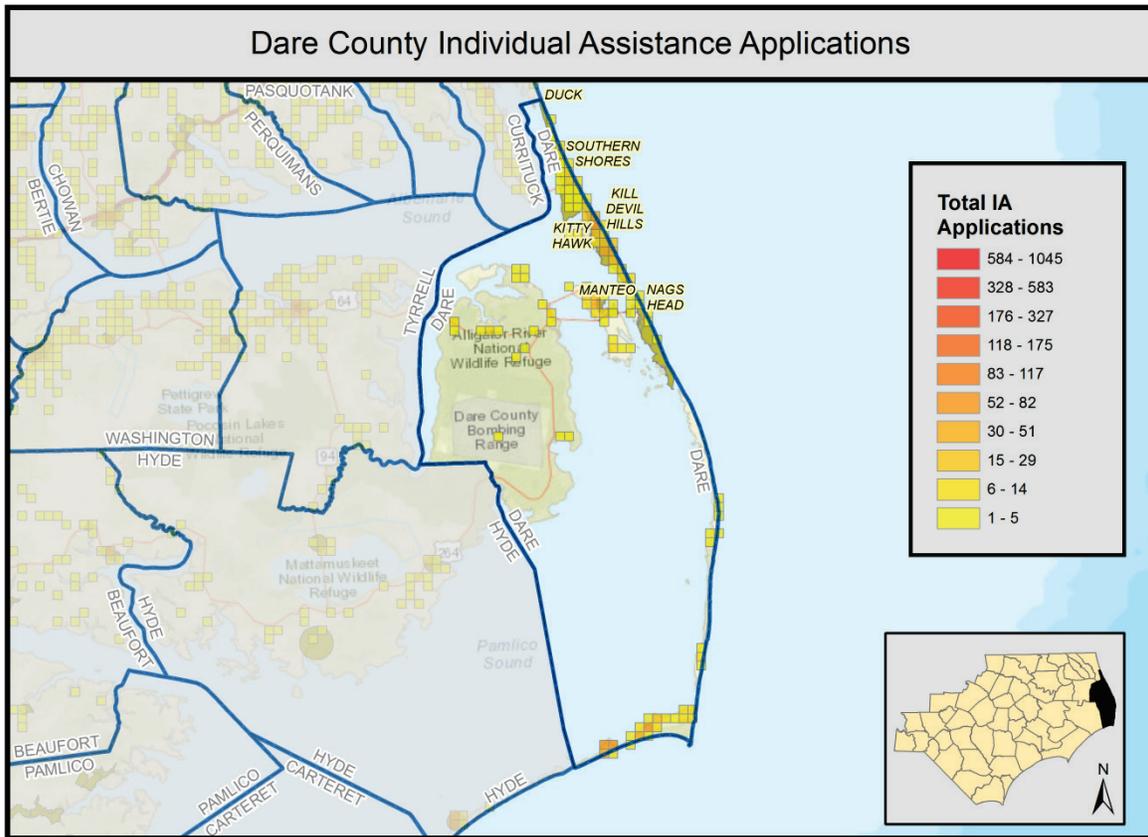


Figure 11. Dare County IA Applications by Area

During Hurricane Matthew many residential, commercial and government owned structures that have never seen flood waters were inundated. Flash flooding and storm surge brought waters not just into historical flood zones but into many X zones and shaded X zones damaging residential structures.

Historically, the County has used FEMA hazard mitigation grant funds to elevate residential structures. While this program has delivered benefits, it has not allowed all structures to be elevated due to criteria limitations. The bullets below summarize some of the major impacts to housing that were identified by local officials from the event.

- Homes Impacted from Hurricane Matthew:** Impacts from flash flooding to homes was throughout Dare County with pockets of areas in Hatteras Village, Frisco, Buxton and Kill Devil Hills. Some areas are repetitive losses while other areas were unique to the rainfall event of Hurricane Matthew. Many of the affected properties are located outside of the Special Flood Hazard Area (SFHA) and are not eligible for federal funding.

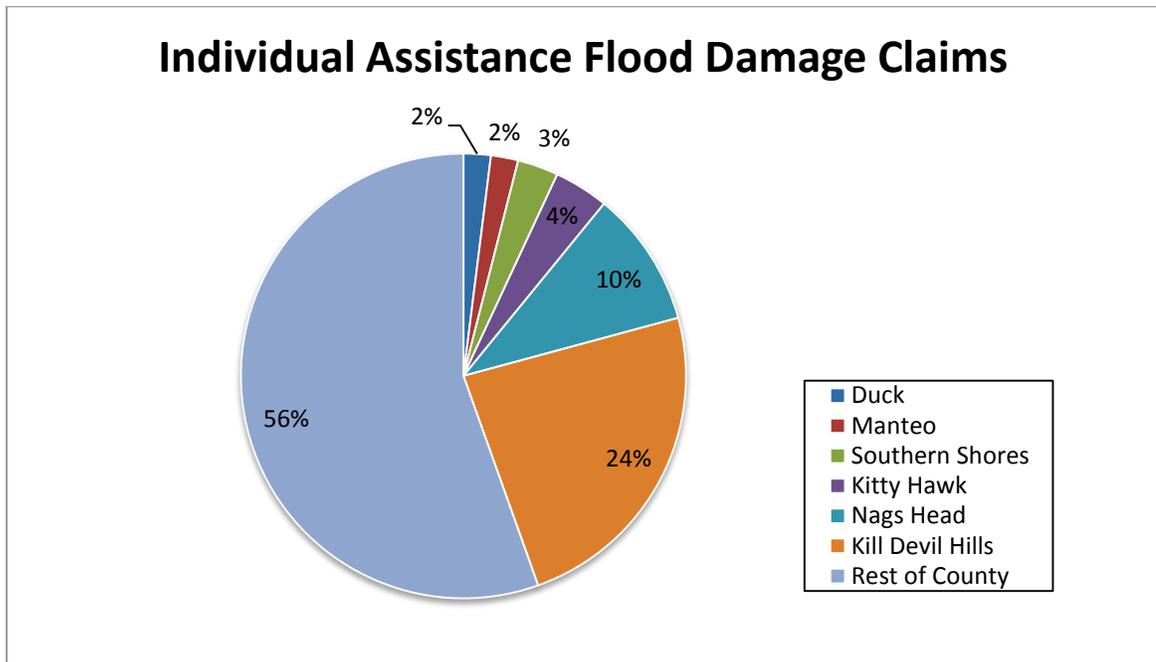


Figure 12. IA Flood Damage Claims by Area

Economics / Business / Jobs

Although there were some impacts to the economy in Dare County from Hurricane Matthew these were generally minor compared to some of the other impacts the county experienced.

In Dare County, shoreline protection efforts have been underway for decades. In the past, efforts have been more reactive than proactive. The reactive approach occurred following damage sustained by a major storm. The proactive approach began with the first engineered beach in Nags Head in 2011. During Hurricane Matthew, that beach sustained damage but it did not fail and kept the community safe from ocean storm surge. On the opposite side of the spectrum is the repeated failure of the dune system in Kitty Hawk that leads to ocean overwash destroying a portion of NC12 and flooding parts of the community. Ocean beaches in Southern Shores and Avon sustained notable damaged during Hurricane Matthew.

In Nags Head, the damage to the engineered beach is anticipated to be repaired using approximately \$20 million in matching FEMA Public Assistance grant funding. In Kitty Hawk, the repair cost will be borne by the NCDOT, Town and impacted property owners. While proactive engineered beach solutions are scheduled to begin in Duck, Southern Shores, Kitty Hawk, Kill Devil Hills and Buxton this spring, a long-term strategy that brings engineered beaches across the entire Dare County coastline has led to repeated damage and impacts to the tourism industry.

The bullets below summarize some of the impacts to the economy and industries that were identified by local officials from the event.

- Beach Impacts and Tourism:** Tourism related to one of Dare County’s greatest natural assets, the beach, is the largest source of employment and tax revenues for the County. During Hurricane Matthew several areas of the beach experienced significant erosion and overwash. Beach engineering projects and re-nourishments are anticipated in several communities; however, a long-term proactive solution is needed.

- **Seafood Industry Impacts:** During Hurricane Matthew critical waterways were degraded by shifting sands and shoaling. The entrance to the Wanchese Seafood Industrial Park became impassable and required emergency dredging. Shoaling in other inlets and waterways occurred impacting the ability of recreational and commercial fishermen to safely utilize these critical waterways for recreation and/or commercial purposes.

Infrastructure

According to Public Assistance claims, which are often closely tied to infrastructure, as of March 21, 2017 there were \$22,046 of claims in Dare 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.

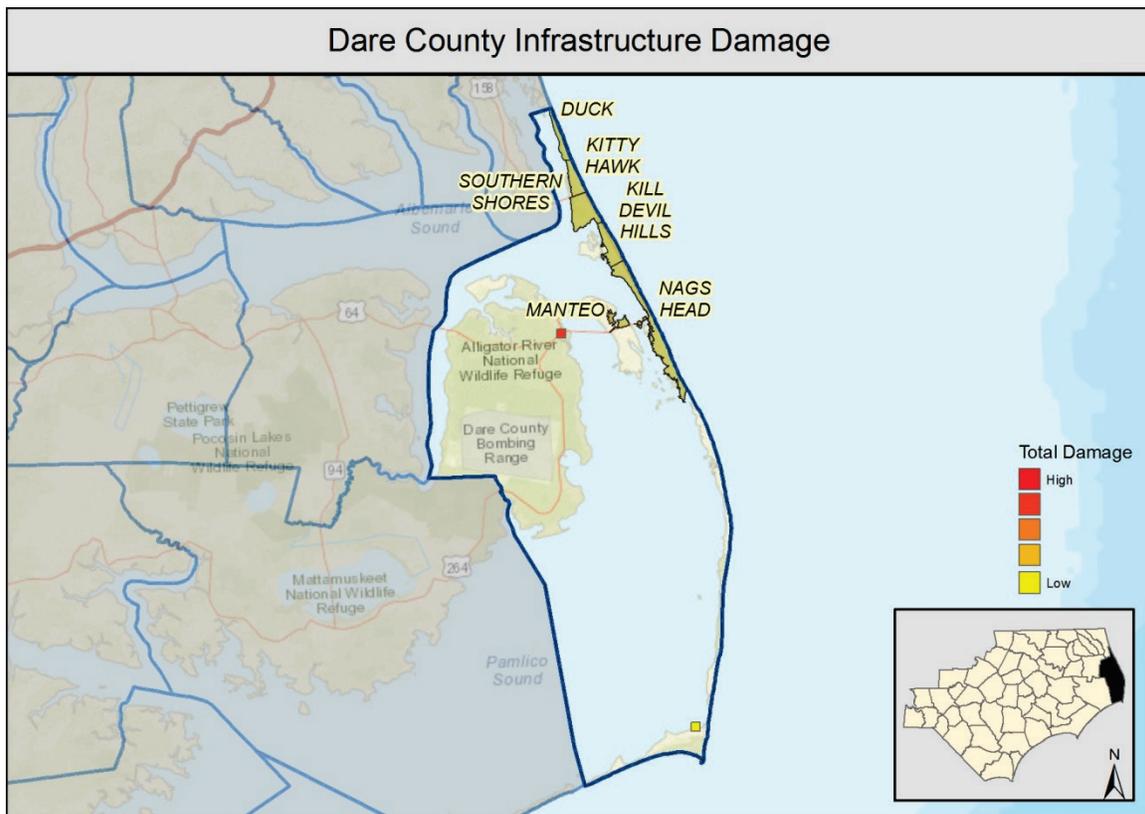


Figure 13. Dare County Infrastructure Damage

County infrastructure was one of the greatest areas of concern in the wake of Hurricane Matthew as there were several types of infrastructure that were damaged in multiple locations. The stormwater management infrastructure was not directly damaged by Hurricane Matthew, but instead a lack in capacity and components lead to damage from flash flooding. The bullets below summarize some of the major impacts to infrastructure that were identified by local officials from the event.

- **Storm Surge and Flood Monitoring and Alerting:** Local officials noted a lack of a monitoring and alerting system along the Soundside of the County. A flood gauge system would provide information on storm surge levels and possible impacts prior to when evacuation decisions must be made. During Hurricane Matthew, warning was not provided to residents until just hours before tropical storm force winds of

potential storm surge forecast projections of 3-5 feet. Other areas of North Carolina where an appropriate flood gauge system has been integrated into the NCEM Flood Inundation Monitoring and Alerting Network (FIMAN) ample warning of flood impacts was provided.

- **Government Facilities:** The flash flooding impacted community facilities curtailing the County’s ability to provide emergency and routine services before, during, and after the storm. 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. In Frisco, this contributed to the loss of a residential structure to fire due to water levels that made a response by first responders impossible. For example:
 - Three volunteer fire stations and one EMS facility were flooded which impacted the County’s ability to respond to emergency and routine services in Buxton, Frisco and Hatteras Village;
 - The Cape Hatteras Secondary School in Buxton had floodwater encroachment which threatened the facility,
 - Two lift stations in Manteo lost power and were unable to operate during and after Hurricane Matthew, and
 - A Nags Head a nursing home was on emergency generator power for days due to damage to the electric distribution system that feeds the facility.
- **Stormwater Management:** While in most locations the existing stormwater management infrastructure did not fail, it was inadequate for the water amounts that were experienced during Hurricane Matthew. The County’s stormwater system does not have capacity for rainfall events such as Hurricane Matthews, includes overgrown or clogged ditches, culvert, canals, and channels that restrict the free flow of stormwater to outflows and is not an interconnected system across municipalities.

Stormwater management in Dare County is a complex balancing act between several competing factors such as, economic development, natural resource preservation, flood control, and water quality. Frequent flooding can curtail investment and tourism in a County where tourism is a critical part of the economy. The desire to limit flooding must be tempered by the need to limit pollutant loads to critical waterbodies such as the Roanoke Sound and Atlantic Ocean. Degradation of the waterways can lead to beach closures and shellfishing closures, which can also have an impact on tourism and the economy.

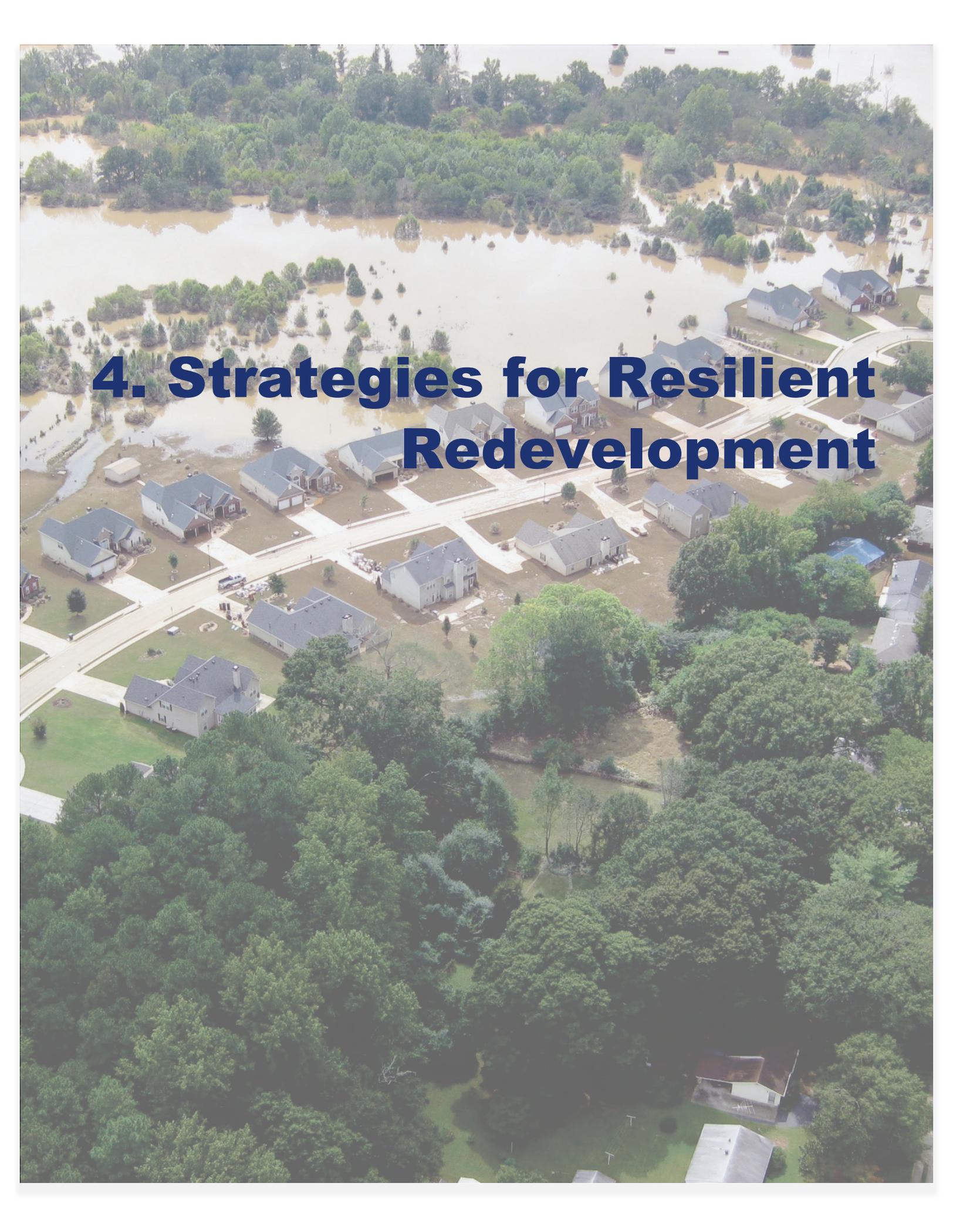
- Ponding occurred during rainfall events due to limited drainage features and flat topography. This ponding created a public safety hazard making driving conditions hazardous, forcing bicyclists and pedestrians in the roadway. In areas where stormwater drainage system exists, property owners often fill the swales in their front yard for aesthetic purposes creating a disjointed drainage system that doesn’t efficiently convey runoff. Other areas suffered from high groundwater elevations that limited infiltration.
- Flooding impacts were observed during Hurricane Matthew at the following locations: NC 12 and Ocean Blvd intersection and the NC 12 and Thirteenth Ave. intersection in Southern Shores. The majority of NC 12, the Town owned and maintained portion of Ocean Blvd., and most of the Town owned and maintained Avenues east of NC 12 were subject to significant flooding in Southern Shores and numerous secondary roads in Buxton, Frisco and Hatteras Village.
- Flooding impacts along Memorial Blvd. in Kill Devil Hills, north of Ocean Bay Blvd.

- Outfalls along US 158, West Landing Drive, West First St., and NCDOT Canal (S01 Watershed Backbone) in Kill Devil Hills, Hatteras Village and Nags Head experienced flooding due to inadequate piping, ditch and culvert sizes, and overgrown or clogged ditches and canals.
 - Inadequate stormwater system S015 near the Dare Center in Kill Devil Hills resulted in flash flooding in area and around the fire station.
 - Inadequate stormwater system S10 in Kill Devil Hills along Raymond Ave. and open –channel sections along Raymond and Bickett ST. to US 158 resulted in flash flooding.
 - Lack of adequate stormwater management along Town of Kill Devil Hills maintained streets resulted in flash flooding.
- **Natural Debris Buildup in Canals and Ditches:** Local officials noted a general, but imminent, concern for the buildup of storm-generated debris in the canals, ditches and waterways throughout Dare County. Observed flooding in areas was linked to debris in ditches and water bodies. Debris blocking drainage ditches, swales and channels resulted in lives at risk, housing and businesses flooded, and delay in recovery. In addition, shoaling in inlets and waterways occurred impacting the ability of recreational and commercial fishermen to safely utilize critical waterways for recreation and/or commercial purposes.

Ecosystems / Environment

Overall, environmental impacts in Dare 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 currently that can lead to repetitive losses.

- **Shoreline Damage:** While engineered beaches can be used to bring resiliency to the oceanfront they cannot be used to protect Dare County’s soundside coastline. During Hurricane Matthew sound side impacts were seen in Hatteras Village, Frisco, Buxton, Salvo and Manteo. The lack of soundside monitoring and shoreline protection exacerbated impacts related to storm surge. With little notice of projected 3-5 feet of water above ground at Hatteras Island from soundside flooding, ample warning to the community of potential flooding impacts was not available.



4. Strategies for Resilient Redevelopment

4. Strategies for Resilient Redevelopment

This section provides details about the resilience and revitalization strategies and actions identified in Dare 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	1
Economic Development	4
Infrastructure	20
Environment	3
Grand Total	28

Table 4. Dare County Summary of Projects by Pillar

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

Pillar	Action Name	Priority	Overall Ranking
Infrastructure	Infrastructure Action 1: County Comprehensive Stormwater Management Plan	High	1
Economic Development	Economic Development Action 3: County Shoreline Protection Strategy	High	2
Infrastructure	Infrastructure Action 2: Soundside Water Level Monitoring and Alerting	High	3
Infrastructure	Infrastructure Action 11: County Canals and Ditch Maintenance	High	4
Housing	Housing Action 1: Residential Structure Elevation	High	5
Economic Development	Economic Development Action 2: Waterways Maintenance and Dredging	High	6
Infrastructure	Infrastructure Action 3: Critical Infrastructure Protection	High	7
Economic Development	Economic Development Action 1: Commercial and Government Structure Elevation	High	8

Pillar	Action Name	Priority	Overall Ranking
Environment	Environment Action 2: Town of Duck Wetland Restoration	High	9
Infrastructure	Infrastructure Action 13: Town of Southern Shores – Canal Maintenance	High	10
Infrastructure	Infrastructure Action 10: Town of Kitty Hawk – Outfalls and Pumping Stations	High	11
Infrastructure	Infrastructure Action 4: Memorial Boulevard Trunk Line	High	12
Infrastructure	Infrastructure Action 14: Town of Nags Head – Comprehensive Stormwater Plan	High	13
Infrastructure	Infrastructure Action 16: Town of Kitty Hawk – Rabbit Hollow Housing Stormwater Management	High	14
Infrastructure	Infrastructure Action 6-A: Groundwater Management Systems	High	15
Infrastructure	Infrastructure Action 7: Town of Nags Head “Gallery Row” Watershed Stormwater Management	High	16
Infrastructure	Infrastructure Action 6-B: Groundwater Management Systems	High	17
Infrastructure	Infrastructure Action 8: Park Service Ocean Outfall	High	18
Infrastructure	Infrastructure Action 5-A: Upgrade Major Outfall Systems	High	19
Economic Development	Economic Development Action 4: Town of Nags Head Ocean Shoreline Management Plan and Implementation	High	20
Infrastructure	Infrastructure Action 5-B: Upgrade Major Outfall Systems	High	21
Infrastructure	Infrastructure Action 15: Town of Nags Head – Stormwater and Nuisance Flooding	High	22
Infrastructure	Infrastructure Action 5-C: Upgrade Major Outfall Systems	High	23
Environment	Environment Action 3: Town of Nags Head – Coastal Resiliency Outreach	High	24
Environment	Environment Action 1: Estuarine Shoreline Management Plan and Implementation	High	25
Infrastructure	Infrastructure Action 17: Town of Nags Head – Comprehensive Dune Management Plan Implementation	High	26
Infrastructure	Infrastructure Action 9: Town of Nags Head - Stormwater Pump Stations	High	27
Infrastructure	Infrastructure Action 12: Town of Nags Head – Decentralized Wastewater Management	High	28

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	Housing Action 1: Residential Structure Elevation	High	5

Table 6. Dare High Priority Housing Summary

This project represents the housing strategy that Dare County indicated is the highest priority to address. Additional detail on the projects can be found below:

- **Residential Structure Elevation:** Develop a program to assess and identify funding for repetitive flooding of homes and continual flood risk of PRE-FIRM residential communities, or those constructed before the initial National Flood Insurance Program in 1974 (or Pre-Flood Insurance Rate Map [FIRM]).
- **This is a county-wide project, so no project area map has been included.**

Housing Action 1: Residential Structure Elevation

County: Dare

Priority Grouping: High Priority

Priority Ranking: 5

Project Timeframe: 1 – 3 years

Location: Hatteras Village, Frisco, Buxton , Kill Devil Hill

Project Summary: Structure elevation is needed for homes to prevent them from flooding. Structures currently outside the flood zone map should be considered.

Question	Response	Disposition
Articulate how this project addresses an unmet need that has been created by damage from Hurricane Matthew.	A lot of affected properties is located outside Special Flood Hazard Area (SFHA) and not eligible for federal funding. Elevating these homes would prevent flooding and protect private properties fewer damaged homes that were impacted by Hurricane Matthew.	N/A
Consistent with existing plans (describe points of intersection/departure)	Yes – Regional Hazard Mitigation Plan Dare County Land Use Policies for Hazard Mitigation	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.	Elevating buildings would prevent flooding and protect private properties fewer damaged homes and displacement possibilities	Agree
For how long will this solution be effective?	More than 50 years	Agree
How effective is the risk reduction?	Unknown	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?	No Impact	Agree
What impacts to the environment of the county will result from this project?	None	N/A
What is the capability of the local government to administer this project?	High	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

Economic Development Strategies

High Priority Economic Development Strategies

Pillar	Action Name	Priority	Overall Ranking
Economic Development	Economic Development Action 3: County Shoreline Protection Strategy	High	2
Economic Development	Economic Development Action 2: Waterways Maintenance and Dredging	High	6
Economic Development	Economic Development Action 1: Commercial and Government Structure Elevation	High	8
Economic Development	Economic Development Action 4: Town of Nags Head Ocean Shoreline Management Plan and Implementation	High	20

Table 7. Dare High Priority Economic Development Summary

These four projects represent the economic development strategies that Dare County indicated are the highest priority to address. Additional detail on the projects can be found below:

- **County Shoreline Protection Strategy:** Rebuild and/or enhance shoreline infrastructure with engineered ocean beaches or living shoreline for all of Dare County. Kill Devil Hills currently has a successful shoreline protection and monitoring program that can be analyzed for best practices and application to all of Dare County. Environmental regulations, ownership, identification of funding and impacts of seasonal tourism are all potential challenges.
- **This is a county-wide project, so no project area map has been included.**

Economic Development Action 3: County Shoreline Protection Strategy

County: Dare

Priority Grouping: High Priority

Priority Ranking: 2

Project Timeframe: 1 – 3+ years

Location: County-wide

Project Summary: Shoreline Protection Strategy. Impacted areas: Hatteras Village, Frisco, Buxton, Salvo, Manteo, Kill Devil Hills, all ocean / soundfront communities.

Rebuild and/or enhance shoreline infrastructure with engineered ocean beaches or living shorelines for all of Dare County.

Question	Response	Disposition
Articulate how this project addresses an unmet need that has been created by damage from Hurricane Matthew.	1.4 million cubic yards of shoreline sand was lost during Matthew in the Town of Nags Head alone which impacts the dunes and beaches.	N/A
Consistent with existing plans (describe points of intersection/departure)	Albemarle Regional Hazard Mitigation Plan Dare County Land Use Policies for Hazard Mitigation local community land use plans CAMA land use plans	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.	A maintained and healthy beach and shoreline is vital to the economy of Dare County for tourism. A continuous dune system is also a vital infrastructure element that protects homes businesses and other infrastructure from storm surge.	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)?	>6	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?	Unknown	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?	Currently permitted on oceanfront in Kill Devil Hills; Environmental permitting required in some other areas– limits in work period due to turtle nesting Soundside constraints;	N/A
What is the capability of the local government to administer this project?	High	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

- **Waterway Maintenance and Dredging:** Dredging of waterways and inlets to maintain appropriate pre-storm depth and width would minimize impacts of future storms and reduce the down-time of affected businesses and the displacement of jobs, primarily in the Wanchese Seafood Industrial Park.
- **This is a county-wide project, so no project area map has been included.**

Economic Development Action 2: Waterways Maintenance and Dredging

County: Dare

Priority Grouping: High Priority

Priority Ranking: 6

Project Timeframe: 1 year plus on-going thereafter as needed

Location: Waterway Maintenance and Dredging - Wanchese Seafood Industrial Park, Hatteras and Oregon inlets

Project Summary: Dredge waterways and inlets to maintain appropriate pre-storm depth and width would minimize the impacts storm events may bring and allow quicker repairs.

Question	Response	Disposition
Articulate how this project addresses an unmet need that has been created by damage from Hurricane Matthew.	Lack of maintenance of critical waterways impacts areas businesses by force longer periods of shut-down following storm events in order to dredge/clear waterways.	N/A
Consistent with existing plans (describe points of intersection/departure)	Albemarle Regional Hazard Mitigation Plan Dare County Land Use Policies for Hazard Mitigation NCDOT CTP importance	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.	Would decrease displacement of industry jobs allowing protection of jobs and increase in revenue immediately following storms.	Agree
For how long will this solution be effective?	Less than 10 years	Agree
How effective is the risk reduction?	<50 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?	Less than 25%	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?	Impacts associated with spoil areas and changing currents with water flow.	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?	Medium	Agree
What is the technical feasibility of this project?	Higher than 75%	Agree
Who will administer this project?	County	Agree

- **Commercial and Government Structure Elevation:** Develop a program to assess and identify funding for repetitive flooding of commercial and government facilities or continual flood risk of Pre-FIRM properties, or those constructed before the initial National Flood Insurance Program in 1974 (or Pre-Flood Insurance Rate Map [FIRM]). The costs associated with elevating commercial or governmental facilities may be higher than residential properties; however, the potential to reduce the economic impacts from flash flooding, such as the displacement of jobs, has a high return on investment.
- **This is a county-wide project, so no project area map has been included.**

Economic Development Action 1: Commercial and Government Structure Elevation

County: Dare

Priority Grouping: High Priority

Priority Ranking: 8

Project Timeframe: 1 – 3+ years (depending on project priority)

Location: Hatteras Village, Frisco, Buxton , Kill Devil Hill

Project Summary: Structure elevation is needed for commercial structures, and government facilities to prevent them from flooding. Structures currently outside the flood zone map should be considered.

Question	Response	Disposition
Articulate how this project addresses an unmet need that has been created by damage from Hurricane Matthew.	Affected properties is located outside Special Flood Hazard Area (SFHA) and not eligible for federal funding; Many may be PRE-FIRM structures.	N/A
Consistent with existing plans (describe points of intersection/departure)	Yes – Albemarle Regional Hazard Mitigation Plan Dare County Land Use Policies for Hazard Mitigation	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.	Elevating buildings would prevent flooding and protect private properties fewer damaged businesses and displacement of jobs.	Agree
For how long will this solution be effective?	More than 50 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?	Less than 25%	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?	No Impact	Agree
What impacts to the environment of the county will result from this project?	Limited impacts likely	N/A
What is the capability of the local government to administer this project?	High	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

- **Town of Nags Head Ocean Shoreline Management Plan and Implementation:** Develop a long-term shoreline management plan that considers the environmental, legal, financial, physical, and regulatory issues and constraints that will need to be addressed to conduct ocean shoreline management over a 30-year time period. In 2011 the Town of Nags Head conducted the largest locally funded beach nourishment project in U.S. history by renourishing approximately ten miles of beach with 4.6 million cubic yards (MCY) of sand at a cost of \$36 million dollars. Approximately 1.4 MCY of sand was lost during Hurricane Matthew.



Figure 14. Economic Development Action 4: Nags Head Ocean Shoreline Management Plan and Implementation

Economic Development Action 4: Town of Nags Head Ocean Shoreline Management Plan and Implementation

County: Dare

Priority Grouping: High Priority

Priority Ranking: 20

Project Timeframe: 1 year for Plan,
Implementation 3+ years

Location: Town of Nags Head oceanfront shoreline, Approximately 11 miles

Project Summary: Develop a long-term shoreline management plan that considers the environmental, legal, financial, physical, and regulatory issues and constraints that will need to be addressed to conduct ocean shoreline management over a 30-year time horizon.

Question	Response	Disposition
Articulate how this project addresses an unmet need that has been created by damage from Hurricane Matthew.	It is important to protect and build the dune systems as a means of protection for infrastructure and property	N/A
Consistent with existing plans (describe points of intersection/departure)	Albemarle Regional Hazard Mitigation Plan Dare County Land Use Policies for Hazard Mitigation Town of Nags Head Comprehensive Plan North Carolina Beach and Inlet Management Plan	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 oceanfront shoreline system provide needed protection and act as a barrier to storm surge and ocean overwash experienced during nor'easters hurricanes and tropical events	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)?	>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?	Less than 25%	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?	They are a source of immeasurable natural value and the primary resource on which the town's future depends.	N/A
What is the capability of the local government to administer this project?	High	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?	Local	Agree

Infrastructure Strategies

High Priority Infrastructure Strategies

Pillar	Action Name	Priority	Overall Ranking
Infrastructure	Infrastructure Action 1: County Comprehensive Stormwater Management Plan	High	1
Infrastructure	Infrastructure Action 2: Soundside Water Level Monitoring and Alerting	High	3
Infrastructure	Infrastructure Action 11: County Canals and Ditch Maintenance	High	4
Infrastructure	Infrastructure Action 3: Critical Infrastructure Protection	High	7
Infrastructure	Infrastructure Action 13: Town of Southern Shores – Canal Maintenance	High	10
Infrastructure	Infrastructure Action 10: Town of Kitty Hawk – Outfalls and Pumping Stations	High	11
Infrastructure	Infrastructure Action 4: Town of Kill Devil Hills - Memorial Boulevard Trunk Line	High	12
Infrastructure	Infrastructure Action 14: Town of Nags Head – Comprehensive Stormwater Plan	High	13
Infrastructure	Infrastructure Action 16: Town of Kitty Hawk – Rabbit Hollow Housing Stormwater Management	High	14
Infrastructure	Infrastructure Action 6-A: Groundwater Management Systems	High	15
Infrastructure	Infrastructure Action 7: Town of Nags Head “Gallery Row” Watershed Stormwater Management	High	16
Infrastructure	Infrastructure Action 6-B: Groundwater Management Systems	High	17
Infrastructure	Infrastructure Action 8: Park Service Ocean Outfall	High	18
Infrastructure	Infrastructure Action 5-A: Upgrade Major Outfall Systems	High	19
Infrastructure	Infrastructure Action 5-B: Upgrade Major Outfall Systems	High	21
Infrastructure	Infrastructure Action 15: Town of Nags Head – Stormwater and Nuisance Flooding	High	22
Infrastructure	Infrastructure Action 5-C: Upgrade Major Outfall Systems	High	23
Infrastructure	Infrastructure Action 17: Town of Nags Head – Comprehensive Dune Management Plan Implementation	High	26
Infrastructure	Infrastructure Action 9: Town of Nags Head - Stormwater Pump Stations	High	27
Infrastructure	Infrastructure Action 12: Town of Nags Head – Decentralized Wastewater Management	High	28

Table 8. Dare High Priority Infrastructure Summary

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

- **Dare County Comprehensive Stormwater Management Plan and Implementation:** Perform an updated stormwater management analysis to determine how to address current and future stormwater management throughout the County to reduce short-term flooding impacts.
 - Town of Nags Head - Develop long-range plan to progressively improve the town's stormwater drainage infrastructure.
- **This is a county-wide project, so no project area map has been included.**

Infrastructure Action 1: County Comprehensive Stormwater Management Plan

County: Dare

Priority Grouping: High Priority

Priority Ranking: 1

Project Timeframe: 1 – 3+ years (depending on project priority); 1 year for planning, 3 years for implementation

Location: Countywide

Project Summary: Develop a comprehensive stormwater management plan to determine current and future stormwater system needs. Implement stormwater management solutions.

Question	Response	Disposition
Articulate how this project addresses an unmet need that has been created by damage from Hurricane Matthew.	Outdated stormwater management plans need updating and funding to implement. Damage was experienced throughout the county from Hurricane Matthew due to lack of implementation of priority projects.	N/A
Consistent with existing plans (describe points of intersection/departure)	Albemarle Regional Hazard Mitigation Plan Dare County Land Use Plan NCDOT-CTP existing storm water management plans and land use plans of local 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.	Traffic impacts and property impacts for home and businesses.	Agree
For how long will this solution be effective?	Between 31 and 50 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?	Yes	Agree
Is this project consistent with Federal Laws	Yes	Agree
To what degree does this project adversely impact local floodplain/coastal zone management?	Unknown	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?	No Impact	Agree
What impacts to the environment of the county will result from this project?	Extensive permitting may be required and a high water table may impact type of implementation strategy needed.	N/A
What is the capability of the local government to administer this project?	High	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

- **Soundside Water Level Monitoring and Alerting:** Install gauges and perform Hydrologic & Hydraulic study for buildout of an early-warning system to assist in alerting residents of soundside storm surge. A countywide system on the soundside is needed to provide information on storm surge water levels and possible impacts prior to the time that evacuation decisions must be made. A flood gauge system will be implemented to collect data and send alerts about water levels.
- **This is a county-wide project, so no project area map has been included.**

Infrastructure Action 2: Soundside Water Level Monitoring and Alerting

County: Dare

Priority Grouping: High Priority

Priority Ranking: 3

Project Timeframe: 1 year – 3+ years

Location: County-wide; 14 locations Hatteras Village, Frisco, Buxton, Avon, Tri-Villages area, Stumpy Point, Roanoke Island, Manteo, Nags Head, Kill Devil Hills, Colington, Kitty Hawk, Southern Shores, Duck

Project Summary: Soundside Water Level Monitoring and Alerting: A countywide system on the Soundside is needed to provide information on storm surge water levels and possible impacts prior to when evacuation decisions must be made. A flood gauge system will be implemented to collect data and send alerts about water levels.

Question	Response	Disposition
Articulate how this project addresses an unmet need that has been created by damage from Hurricane Matthew.	Countywide system on the Soundside is needed to provide information on storm surge water levels and possible impacts prior to when evacuation decisions must be made. A flood gauge system will be implemented to collect data and send alerts about water levels. During Matthew the warning of soundside storm surge was received too late for preparations.	N/A
Consistent with existing plans (describe points of intersection/departure)	Albemarle Regional Hazard Mitigation Plan and Dare County Land Use Plan.	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.	High – Could save lives if warned early More preparations – less unanticipated impacts less emergency response	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)?	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?	No Impact	Agree
What impacts to the environment of the county will result from this project?	None	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?	High	Agree
What is the technical feasibility of this project?	Higher than 75%	Agree
Who will administer this project?	County	Agree

- **County Canal and Ditch Maintenance:** Implement “snag-and-pull” projects to clear out canals and ditches, thus allowing stormwater to better flow through the channels and reduce flooding effects in adjacent areas.
- **This is a county-wide project, so no project area map has been included.**

Infrastructure Action 11: County Canals and Ditch Maintenance

County: Dare

Priority Grouping: High Priority

Priority Ranking: 4

Project Timeframe: 1 year

Location: County-wide: specifically Kitty Hawk Village (generally areas west of US 158 corridor)& US 158 to Kitty Hawk Bay in Kill Devil Hills

Project Summary: Funding for “snag-and-pull” projects to clear out canals and ditches, thus allowing stormwater to better flow through the channels and reduce flooding effects in adjacent areas.

Question	Response	Disposition
Articulate how this project addresses an unmet need that has been created by damage from Hurricane Matthew.	Lack of project caused damage during Hurricane Matthew	N/A
Consistent with existing plans (describe points of intersection/departure)	Albemarle Regional Hazard Mitigation Plan and Kitty Hawk Land Use Plan	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.	Reduce short-term flooding effects in adjacent areas.	Agree
For how long will this solution be effective?	Less than 10 years	Agree
How effective is the risk reduction?	<50 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?	No Impact	Agree
What impacts to the environment of the county will result from this project?	None	N/A
What is the capability of the local government to administer this project?	High	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?	Local	Agree

- **Critical Infrastructure Protection:** Make improvements to protect critical infrastructure facilities throughout the County. Several ideal locations were provided by local county officials. These locations are:
 - Buxton, Frisco and Hatteras Volunteer Fire Stations
 - Cape Hatteras Secondary School
 - Manteo lift stations
 - Nags Head nursing home
 - EMS facilities
 - Water and wastewater infrastructure, specifically in the Town of Duck.
- **This is a county-wide project, so no project area map has been included.**

Infrastructure Action 3: Critical Infrastructure Protection

County: Dare

Priority Grouping: High Priority

Priority Ranking: 7

Project Timeframe: 3 years

Location: Buxton, Frisco, Hatteras EMS facilities/Cape Hatteras Secondary School/Manteo lift stations/Nags Head nursing home/ Fire Stations, Duck, All County communities

Project Summary: Critical Infrastructure Protection: Provide new protections to critical EMS facilities, powerlines/utilities, water and wastewater infrastructure, and public institutions (i.e., schools, community centers, town/county facilities), and streets

Question	Response	Disposition
Articulate how this project addresses an unmet need that has been created by damage from Hurricane Matthew.	Critical infrastructure facilities were impacted by Hurricane Matthew throughout Dare County. Infrastructure ranges from utilities fire stations lift stations to schools and nursing homes. Facilities impacts were primarily from short-term flooding but could also include high wind damage.	N/A
Consistent with existing plans (describe points of intersection/departure)	Dare County Land Use Policies and Albemarle Regional Hazard Mitigation Plan	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.	Maintain utility services (electricity water sewer communications) throughout and in the aftermath of a storm. Reducing the down time will have significant positive impacts on the economy of the Outer Banks.	Agree
For how long will this solution be effective?	Between 31 and 50 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?	Unknown	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?	Minimum impacts if any.	N/A
What is the capability of the local government to administer this project?	High	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

- **Town of Southern Shores – Canal Maintenance:** This project would provide funding for “snag-and-pull” projects to clear canals of debris thus allowing passage and stormwater to better flow through the channels and reduce flooding effects in adjacent areas.
- **This is a town-wide project, so no project area map has been included.**

Infrastructure Action 13: Town of Southern Shores – Canal Maintenance

County: Dare

Priority Grouping: High Priority

Priority Ranking: 10

Project Timeframe: One year

Location: Town of Southern Shores

Project Summary: Funding for “snag-and-pull” projects to clear canals of debris thus allowing passage and stormwater to better flow through the channels and reduce flooding effects in adjacent areas

Question	Response	Disposition
Articulate how this project addresses an unmet need that has been created by damage from Hurricane Matthew.	Lack of implementation resulted in slower recovery from Hurricane Matthew.	N/A
Consistent with existing plans (describe points of intersection/departure)	Southern Shores Land Use Plan and Albemarle Regional Hazard Mitigation Plan	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.	Allowing for passage of canals stormwater flow reduces flood impacts.	Agree
For how long will this solution be effective?	Less than 10 years	Agree
How effective is the risk reduction?	<50 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?	No Impact	Agree
What impacts to the environment of the county will result from this project?	None	N/A
What is the capability of the local government to administer this project?	High	Agree
What is the financial range of this project?	\$51K - \$100K	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?	Local	Agree

- **Town of Kitty Hawk – Outfalls and Pumping Stations:** Increase number of outfalls/pumping stations throughout the county where "bowl" trapped rain water collects. Additionally, provide pumps to keep in the area, rather than having to go to Virginia to get them prior to storms.
- **This is a town-wide project, so no project area map has been included.**

Infrastructure Action 10: Town of Kitty Hawk – Outfalls and Pumping Stations

County: Dare

Priority Grouping: High Priority

Priority Ranking: 11

Project Timeframe: 1-3+ years

Location: Kitty Hawk Beach (US 158 corridor and areas east of US 158)

Project Summary: Increase number of outfalls/pumping stations throughout the county where "bowl" trapped rain water collects. Additionally, provide funding to purchase pumps to keep in the area, rather than having to go to Virginia to get them prior to storms.

Question	Response	Disposition
Articulate how this project addresses an unmet need that has been created by damage from Hurricane Matthew.	Lack of project caused damage during Hurricane Matthew	N/A
Consistent with existing plans (describe points of intersection/departure)	Albemarle Regional Hazard Mitigation Plan and Kitty Hawk Land Use Plan	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.	This bowl and highway has flooded numerous times from deluge rainfall similar to that experienced during Matthew. The result is infrastructure damage closed highway to all traffic including emergency response	Agree
For how long will this solution be effective?	Between 31 and 50 years	Agree
How effective is the risk reduction?	<50 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?	Less than 25%	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?	None	N/A
What is the capability of the local government to administer this project?	High	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?	Less than 25%	Agree
Who will administer this project?	Local	Agree

- **Town of Kill Devil Hills – Memorial Boulevard Trunk Line:** This project would extend the major improvements made in 2015 to Memorial Boulevard north of Ocean Bay Boulevard, southward to its terminus at Carolyn Drive. This system provides both conveyances, ultimately to Kitty Hawk Bay as opposed to the Atlantic Ocean with its higher tides, and groundwater management.

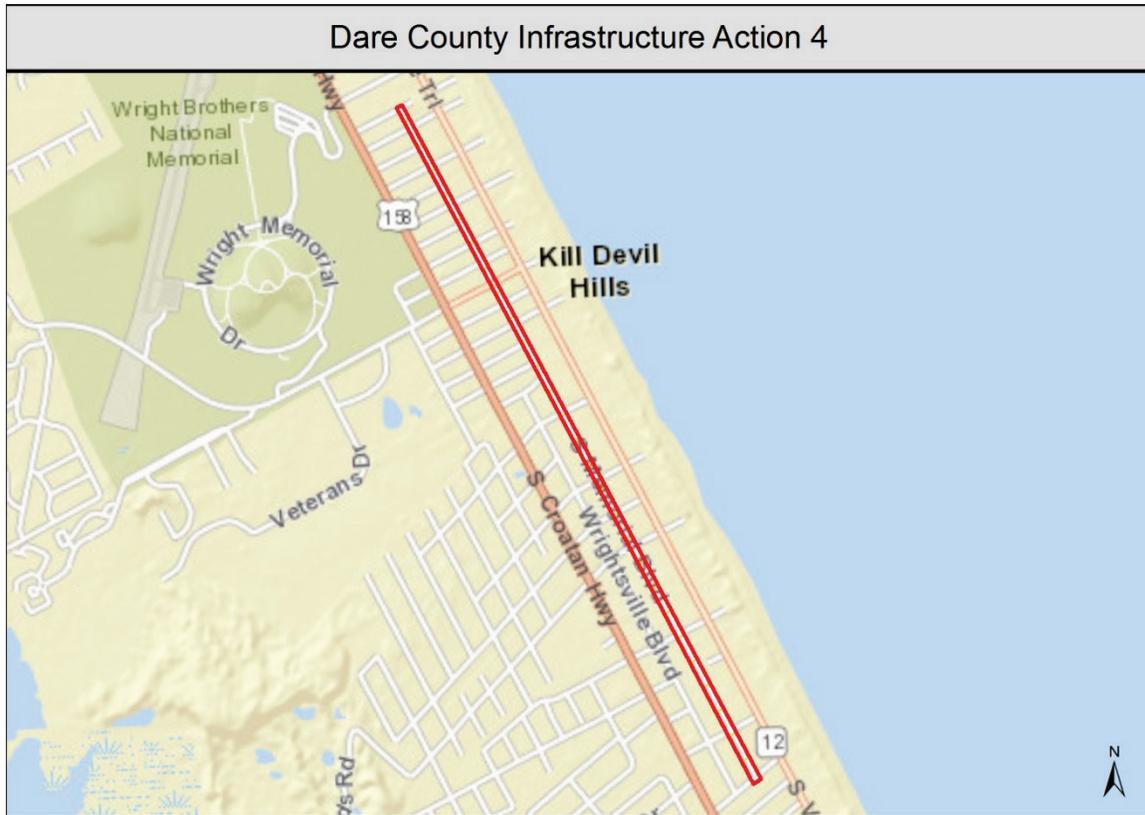


Figure 15. Infrastructure Action 4: Memorial Boulevard Trunk Line

Infrastructure Action 4: Memorial Boulevard Trunk Line

County: Dare

Priority Grouping: High Priority

Priority Ranking: 12

Project Timeframe: 1-2 Years

Location: Town of Kill Devil Hills - Memorial Boulevard north of Ocean Bay Boulevard southward to its terminus at Carolyn Drive

Project Summary: Memorial Boulevard Trunk Line: This project would extend the major improvements made in 2015 to the Memorial Boulevard north of Ocean Bay Boulevard, southward to its terminus at Carolyn Drive. This system provides both conveyances, ultimately to Kitty Hawk Bay as opposed to the Atlantic Ocean with its higher tides, and groundwater management. The northern section, north of Meadowlark Street, is 48” HDPE. South of Meadowlark to about Martin Street will be 42”, with the southernmost section being a new 30” system, including infiltration, with the existing twin 18” system remaining in place.

Question	Response	Disposition
Articulate how this project addresses an unmet need that has been created by damage from Hurricane Matthew.	Short-term flooding in the Memorial Blvd. area impacted area businesses in the days after the hurricane. As an extension of a successful project this effort would increase capacity of stormwater system to reduce the number of impacted days and damaged caused from short-term damage.	N/A
Consistent with existing plans (describe points of intersection/departure)	Albemarle Regional Hazard Mitigation Plan and Kill Devil Hills Storm Water Management Plan	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.	Improvements to the stormwater system would increase capacity and conveyance which would reduce short-term flooding impacts.	Agree
For how long will this solution be effective?	Between 31 and 50 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?	No Impact	Agree
What impacts to the environment of the county will result from this project?	None known	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?	Local	Agree

- **Town of Nags Head – Comprehensive Stormwater Plan:** This project would develop long range plan for progressively improving the Town’s stormwater drainage infrastructure. This plan includes documentation of the type, size, and location of existing drainage features within the Town, including rights-of-ways and outfalls. Additionally, the plan should document existing nuisance and problem areas that experience frequent flooding.
- **This is a town-wide project, so no project area map has been included.**

Infrastructure Action 14: Town of Nags Head – Comprehensive Stormwater Plan

County: Dare

Priority Grouping: High Priority

Priority Ranking: 13

Project Timeframe: 1-2 years

Location: Town of Nags Head

Project Summary: Develop long range plan for progressively improving the Town’s stormwater drainage infrastructure. This plan includes documentation of the type, size, and location of existing drainage features within the Town, including rights-of-ways and outfalls.

Question	Response	Disposition
Articulate how this project addresses an unmet need that has been created by damage from Hurricane Matthew.	Property and roads have been flooded during hurricanes, nor’ easters and heavy rainfall events including Hurricane Matthew.	N/A
Consistent with existing plans (describe points of intersection/departure)	Town of Nags Head Comprehensive Plan Albemarle Regional Hazard Mitigation Plan NCDENR Ocean Outfall Master Plan Town of Nags Head Stormwater Management Plan (2006)	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.	This project will identify inadequate or substandard infrastructure and areas that experience frequent or repetitive flooding that causes damage to homes property and impassable roads	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?	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?	No Impact	Agree
What impacts to the environment of the county will result from this project?	None	N/A
What is the capability of the local government to administer this project?	High	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?	Local	Agree

- **Town of Kitty Hawk – Rabbit Hollow Housing Stormwater Management:** Implement a previously engineered project to better manage stormwater runoff affecting housing in the Rabbit Hollow cul-de-sac area of the Town.

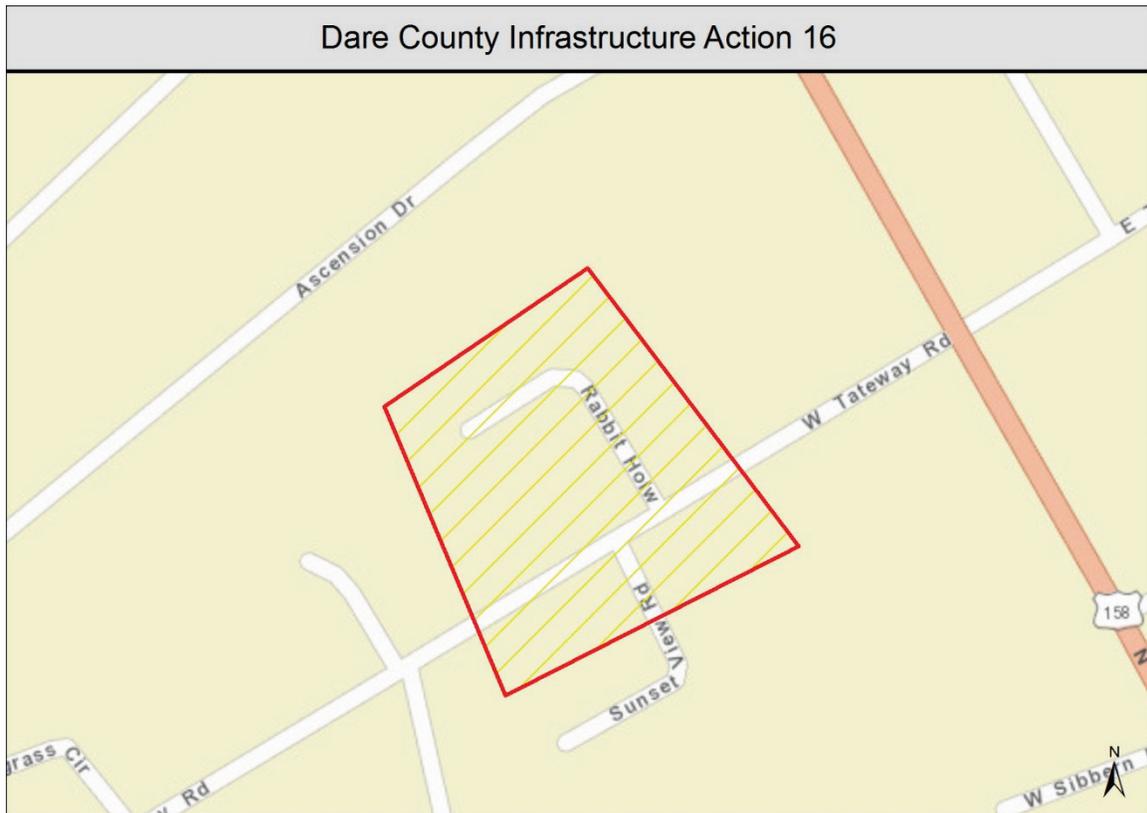


Figure 16. Infrastructure Action 16: Kitty Hawk – Rabbit Hollow Housing Stormwater Management

Infrastructure Action 16: Town of Kitty Hawk – Rabbit Hollow Housing Stormwater Management

County: Dare

Priority Grouping: High Priority

Priority Ranking: 14

Project Timeframe: 2-3 years

Location: Town of Kitty Hawk - Rabbit Hollow cul-de-sac

Project Summary: Previously engineered project to better manage stormwater runoff affecting housing in the Rabbit Hollow cul-de-sac.

Question	Response	Disposition
Articulate how this project addresses an unmet need that has been created by damage from Hurricane Matthew.	Affected properties is located outside Special Flood Hazard Area (SFHA) and not eligible for federal funding;	N/A
Consistent with existing plans (describe points of intersection/departure)	Yes Albemarle Regional Hazard Mitigation Plan Dare County Land Use Plan and Kitty Hawk Land Use Plan	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.	Would prevent flooding and protect private properties fewer damaged homes and displacement possibilities	Agree
For how long will this solution be effective?	More than 50 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?	No	Agree
Is this project consistent with Federal Laws	Yes	Agree
To what degree does this project adversely impact local floodplain/coastal zone management?	Less than 25%	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?	No Impact	Agree
What impacts to the environment of the county will result from this project?	None to very limited	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?	Local	Agree

- **Groundwater Management Systems:** Improvements to groundwater management system to increase conveyance of stormwater to outfalls during rain events throughout Kill Devil Hills.
 - Roadside infiltration areas adjacent to sock drain systems included in the design of new groundwater management systems and added to existing systems.
 - Install 12-inch or 15-inch HDPE perforated, smooth wall pipe wrapped in filter fabric (“sock drain”) in all existing Kill Devil Hills maintained streets below elevation of 15 feet, resulting in 2.5 feet to 3 feet of “dry” sand which can accept about 12 inches of rain volume.
- **This is a town-wide project, so no project area map has been included.**

Infrastructure Action 6-A: Groundwater Management Systems

County: Dare

Priority Grouping: High Priority

Priority Ranking: 15

Project Timeframe: 1-3 Years

Location: Town of Kill Devil Hills

Project Summary: Install 12” or 15” HDPE perforated, smooth wall pipe wrapped in filter fabric (“sock drain”) in all existing KDH-maintained streets below elevation 15. Approximately 200,000 lf. Connect each subsystem to an existing drainage system with an outfall desirably 3’ deep or more and lay sock drain nearly flat, so that groundwater rising above the invert of the sock drain infiltrates and is conveyed away. Resulting 2.5’ to 3’ of “dry” sand can accept about 12” of rain volume, allowing for portion conveyed to outfall during rain event.

Question	Response	Disposition
Articulate how this project addresses an unmet need that has been created by damage from Hurricane Matthew.	Constant issues during storm events movement of storm water quick and efficiently	N/A
Consistent with existing plans (describe points of intersection/departure)	Albemarle Regional Hazard Mitigation Plan and Kill Devil Hills Storm Water Management Plan	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.	Project will reduce flooding protecting infrastructure within drainage area	Agree
For how long will this solution be effective?	Between 31 and 50 years	Agree
How effective is the risk reduction?	<50 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?	No Impact	Agree
What impacts to the environment of the county will result from this project?	None.	N/A
What is the capability of the local government to administer this project?	High	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?	Local	Agree

Infrastructure Action 6-B: Groundwater Management Systems

County: Dare

Priority Grouping: High Priority

Priority Ranking: 17

Project Timeframe: 1-3 Years

Location: Town of Kill Devil Hills

Project Summary: Even with groundwater managed down to 3'± below the surface, some short-duration flooding will occur when high-volume rain events (10" in 24 hours) include shorter bursts of very high intensity rain. For example, the 10", 24 hour rain, a 100-year event, may include the 100-year, 2-hour event, which can deliver 5", or 2.5 inches per hour for 2 hours. Depending on ground cover conditions, these intense bursts of rain cannot infiltrate into the open pores of sandy soil as fast as they fall. The result is short-duration flooding, perhaps 6" to 12" deep, depending on topography and percentage of impervious cover. To mitigate this, roadside infiltration areas can be provided adjacent to or above sock drain systems such as the above. These can be included in the design of new groundwater management systems and added to existing systems.

Question	Response	Disposition
Articulate how this project addresses an unmet need that has been created by damage from Hurricane Matthew.	Lack of project caused damage during Hurricane Matthew.	N/A
Consistent with existing plans (describe points of intersection/departure)	Albemarle Regional Hazard Mitigation Plan and Town of Kill Devil Hills Storm Water Management Plan	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.	Project will reduce flooding protecting infrastructure and housing.	Agree
For how long will this solution be effective?	Between 31 and 50 years	Agree
How effective is the risk reduction?	<50 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?	Unknown	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?	None	N/A
What is the capability of the local government to administer this project?	High	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?	Local	Agree

- **Town of Nags Head – “Gallery Row” Watershed Stormwater Management:** This project would consist of the implementation of a comprehensive groundwater management system to lower groundwater elevations and provide interstitial storage in surrounding sandy soils to reduce peak stormwater flows and increase available basin-wide storage. This will reduce the burden on the existing underutilized stormwater infrastructure, can mitigate stormwater runoff quality and flood impacts to low-lying businesses and residences.

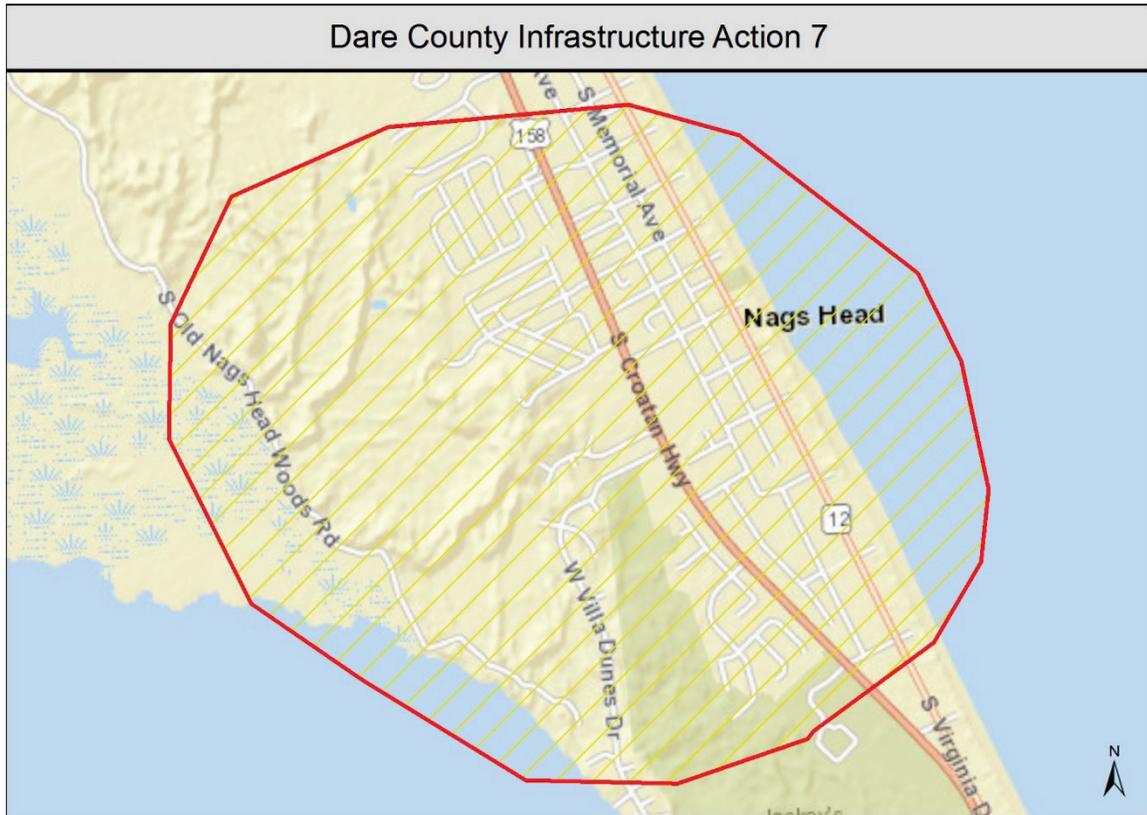


Figure 17. Infrastructure Action 7

Infrastructure Action 7: Town of Nags Head “Gallery Row” Watershed Stormwater Management

County: Dare

Priority Grouping: High Priority

Priority Ranking: 16

Project Timeframe: 3+ years

Location: Town of Nags Head, Gallery Row watershed, between MP 9.5 and MP 12

Project Summary: Implementation of a comprehensive groundwater management system to lower groundwater elevations and provide interstitial storage in surrounding sandy soils to reduce peak stormwater flows and increase available basin-wide storage. This will reduce the burden on the existing underutilized stormwater infrastructure, can mitigate stormwater runoff quality and flood impacts to low-lying businesses and residences.

Question	Response	Disposition
Articulate how this project addresses an unmet need that has been created by damage from Hurricane Matthew.	Undersized stormwater infrastructure currently inadequate to handle peak flows resulting in upstream flooding	N/A
Consistent with existing plans (describe points of intersection/departure)	Albemarle Regional Hazard Mitigation Plan and NCDEQ Ocean Outfall study	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.	Mitigate stormwater runoff quality and flood impacts to low-lying businesses and residences.	Agree
For how long will this solution be effective?	Between 31 and 50 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?	Minimal to low 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?	None	N/A
What is the capability of the local government to administer this project?	High	Agree
	High	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?	Local	Agree
	Local	Agree

- **Park Service Ocean Outfall:** The “park service” ocean outfall, that serves the southern section of Nags Head oceanfront and west side neighborhoods, was damaged during Hurricane Mathew. The water-facing sections of this structure were damaged during the storm event and are in need of replacement.
- **This is a town-wide project, so no project area map has been included.**

Infrastructure Action 8: Park Service Ocean Outfall

County: Dare

Priority Grouping: High Priority

Priority Ranking: 18

Project Timeframe: 1-2 years

Location: South Nags Head, MP 19 - MP 21.5

Project Summary: Park Service Ocean Outfall: The “park service” ocean outfall, which serves the southern section of Nags Head oceanfront and west side neighborhoods, was damaged during Hurricane Mathew. The outfall provides this area as a mechanism for drainage relief via an ocean outfall discharge. The waterward sections of this structure were damaged during the storm event and are in need of replacement.

Question	Response	Disposition
Articulate how this project addresses an unmet need that has been created by damage from Hurricane Matthew.	Sustained physical damage from Hurricane Matthew	N/A
Consistent with existing plans (describe points of intersection/departure)	Albemarle Regional Hazard Mitigation Plan Town of Nags Head Land Use Plan. NCDENR Ocean Outfall Master Plan	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.	None	Agree
For how long will this solution be effective?	Between 31 and 50 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)?	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?	Low to moderate 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?		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?	Medium	Agree
What is the technical feasibility of this project?	Higher than 75%	Agree
Who will administer this project?	Local	Agree
	Local	Agree

- **Upgrade Major Outfall Systems:** The project includes upgrading piping, widening ditches, cleaning ditches and canals, and repairing/replacing culverts throughout Dare County. Locations and projects include:
 - North Carolina Department of Transportation (NCDOT) outfalls under US 158
 - West Landing Drive
 - West First Street
 - NCDOT Canal (S01 Watershed Backbone)
 - Upgrade S015 system, in front of Dare Center, then beside and behind Town of Kill Devil Hills Fire Station
 - Replace all 36” Corrugated Metal Pipe (CMP) in Raymond Avenue with 48” High Density Polyethylene (HDPE) or Polyethylene Pipe (PP) for S10 system in Kill Devil Hills
 - Upgrade open-channel sections of Raymond and Bickett ditches to US 158
 - Replace 48” CMP under US 158 with 60” RCP in Kill Devil Hills
 - Clean and regrade Bickett ditch downstream of 158 to Bay Drive in Kill Devil Hills
 - Add single 48” HDPE or PP alongside existing twin 36” HDPE in Bickett right of way between Columbia Avenue and Lee Avenue in Kill Devil Hills.
- **This is a county-wide project, so no project area map has been included.**

Infrastructure Action 5-A: Upgrade Major Outfall Systems

County: Dare

Priority Grouping: High Priority

Priority Ranking: 19

Project Timeframe: 1 year (high priority) – 3 years

Location: Towns of Kill Devil Hills, Hatteras Village and Town of Nags Head

Project Summary: Upgrade NCDOT outfalls under US 158, West Landing Drive, and West First Street, and NCDOT Canal (S01 Watershed Backbone). The project includes upgrading piping, widening ditches, cleaning ditches and canals, and repairing/replacing culverts.

Question	Response	Disposition
Articulate how this project addresses an unmet need that has been created by damage from Hurricane Matthew.	Lack of actions proposed in the project caused damage during Hurricane Mathew	N/A
Consistent with existing plans (describe points of intersection/departure)	Albemarle Region Hazard Mitigation Plan	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.	May result in less flooding faster recovery and quicker return to normal business for impacted businesses in the areas.	Agree
For how long will this solution be effective?	Between 31 and 50 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?	No Impact	Agree
What impacts to the environment of the county will result from this project?	None known	N/A
What is the capability of the local government to administer this project?	High	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

Infrastructure Action 5-B: Upgrade Major Outfall Systems

County: Dare

Priority Grouping: High Priority

Priority Ranking: 21

Project Timeframe: 1-3 years

Location: Town of Kill Devil Hills

Project Summary: Upgrade S015 system, in front of Dare Center, then beside and behind Fire Station. Replace existing 48” round and equivalent arch CMP with single 48” HDPE or PP in front of Dare to confluence with 48” lake outfall under US 158, then twin 48” HDPE or PP to West First Street.

Question	Response	Disposition
Articulate how this project addresses an unmet need that has been created by damage from Hurricane Matthew.	Lack of project caused damage during Hurricane Matthew.	N/A
Consistent with existing plans (describe points of intersection/departure)	Albemarle Regional Hazard Mitigation Plan and Town of Kill Devil Hills Land Use Plan	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.	Project will provide stormwater management to move more water reduce flooding and protect infrastructure.	Agree
For how long will this solution be effective?	Between 31 and 50 years	Agree
How effective is the risk reduction?	<50 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?	Unknown	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?	None	N/A
What is the capability of the local government to administer this project?	High	Agree
What is the financial range of this project?	\$501K - \$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?	Local	Agree

- **Town of Nags Head – Stormwater and Nuisance Flooding:** The following projects have been identified as minimal steps needed to remedy impacts from flooding experienced within the Town of Nags Head during Hurricane Matthew:
 - Increase the capacity of the Gallery Row Ocean Outfall Pipe. The “Gallery Row” watershed is served by a single outlet via a 30-inch diameter dual pipe configuration. Increase to an estimated 72-inch diameter dual pipe configuration.
 - Develop connectivity of the watersheds served by outfalls to equalize drainage flow between outfalls. The land area served by each outfall is disproportionate.
 - Increase the capacity and develop a deep water extension of Gallery Row Ocean Outfall Pipe. Increase to an estimated 72-inch diameter dual pipe configuration and extend 2,000 feet into ocean to mitigate recreational water quality impacts.
 - Increase the capacity of the internal watershed storm infrastructure.
 - Secure funding for a comprehensive drainage infrastructure maintenance program.
 - Install stormwater surface water pump stations to manage peak stormwater flows. Implementation of a groundwater lowering system to manage pre- and post-storm groundwater levels for increased storm system capacity.
 - Implementation of a comprehensive residential on-site stormwater management program.
 - Develop and implement treatment solutions for the end of pipes at outfall locations.
 - Cooperation and coordination with NCDOT and other state agencies for implementation of stormwater maintenance and improvements.
- **This is a town-wide project, so no project area map has been included.**

Infrastructure Action 15: Town of Nags Head – Stormwater and Nuisance Flooding

County: Dare

Priority Grouping: High Priority

Priority Ranking: 22

Project Timeframe: Implementation projects from the Stormwater Plan will be incorporated and programmed into the Town's CIP as soon as the comprehensive plan is finished.

Location: Town of Nags Head

Project Summary: Residential and commercial development have been repeatedly impacted by varying levels of flooding resulting from undersized and insufficient drainage infrastructure resulting in flood damage.

Question	Response	Disposition
Articulate how this project addresses an unmet need that has been created by damage from Hurricane Matthew.	This project will implement projects identified in the comprehensive stormwater plan to alleviate frequent or repetitive flooding.	N/A
Consistent with existing plans (describe points of intersection/departure)	Town of Nags Head Comprehensive Plan Albemarle Regional Hazard Mitigation Plan Town of Nags Head Stormwater Management Plan (2006) NCDENR Ocean Outfall Master Plan	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.	This project will implement projects that will reduce future occurrences of flooding and prevent impacts to local businesses.	Agree
For how long will this solution be effective?	Between 31 and 50 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?	No Impact	Agree
What impacts to the environment of the county will result from this project?	None	N/A
What is the capability of the local government to administer this project?	High	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?	Local	Agree

- **Town of Nags Head – Comprehensive Dune Management Plan Implementation:** Project would consist of the development and implementation of a comprehensive dune management plan to establish a contiguous dune complex providing an equal level of storm protection throughout the Town.
- **This is a town-wide project, so no project area map has been included.**

Infrastructure Action 17: Town of Nags Head – Comprehensive Dune Management Plan Implementation

County: Dare

Priority Grouping: High Priority

Priority Ranking: 26

Project Timeframe: 3+ years

Location: Town of Nags Head’s oceanfront shoreline

Project Summary: The implementation of a comprehensive dune management plan to establish a contiguous dune complex providing an equal level of storm protection throughout the Town.

Question	Response	Disposition
Articulate how this project addresses an unmet need that has been created by damage from Hurricane Matthew.	1.43 million cubic yards of engineered beach volume was lost during Hurricane Matthew out of a recent renourishment project that provided 4.6 million cubic yards of sand in 2011 at a cost of \$36M by the Town of Nags Head.	N/A
Consistent with existing plans (describe points of intersection/departure)	Albemarle Regional Hazard Mitigation Plan Dare County Land Use Plan and Town of Nags Head Comprehensive Plan NC Beach and Inlet Management Plan	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.	Having a continuous dune would help protect the Town from storm surge and wave action therefore reducing impacts to housing and businesses.	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)?	>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?	Less than 25%	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?	Dune engineering can assist in habitat restoration.	N/A
What is the capability of the local government to administer this project?	High	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?	Local	Agree

- **Town of Nags Head – Stormwater Pump Stations:** Implementation of a network of stormwater pump stations to manage peak stormwater flows throughout the Town.
- **This is a town-wide project, so no project area map has been included.**

Infrastructure Action 9: Town of Nags Head - Stormwater Pump Stations

County: Dare

Priority Grouping: High Priority

Priority Ranking: 27

Project Timeframe: 1-3 Years

Location: Town of Nags Head

Project Summary: The implementation of a network of stormwater pump stations to manage peak stormwater flows

Question	Response	Disposition
Articulate how this project addresses an unmet need that has been created by damage from Hurricane Matthew.	Damage to residential structures and businesses occurred from flooding during Hurricane Matthew.	N/A
Consistent with existing plans (describe points of intersection/departure)	Albemarle Regional Hazard Mitigation Plan Ocean Outfall Master Plan Town of Nags Head Stormwater Management Plan (2006)	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.	Reduce storm-term flooding to residential areas and businesses.	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)?	>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?	No Impact	Agree
What impacts to the environment of the county will result from this project?	None	N/A
What is the capability of the local government to administer this project?	High	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?	Local	Agree

- **Town of Nags Head – Decentralized Wastewater Management:** Update the Decentralized Wastewater Management Plan to evaluate the overall effectiveness of the Septic Health Program and protect water quality.
- **This is a town-wide project, so no project area map has been included.**

Infrastructure Action 12: Town of Nags Head – Decentralized Wastewater Management

County: Dare

Priority Grouping: High Priority

Priority Ranking: 28

Project Timeframe: 1 year

Location: Town of Nags Head - Areas of the Town served by septic systems.

Project Summary: Update the Decentralized Wastewater Management Plan to evaluate the overall effectiveness of the Septic Health Program and protect water quality.

Question	Response	Disposition
Articulate how this project addresses an unmet need that has been created by damage from Hurricane Matthew.	Flooded septic systems create water quality issues that impact the economic viability and sustainability of the Town's tourism industry.	N/A
Consistent with existing plans (describe points of intersection/departure)	Albemarle Regional Hazard Mitigation Plan Town of Nags Head Comprehensive Plan and Decentralized Wastewater Management Plan.	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.	Approximately 80% of the Town is served by onsite wastewater systems. Flooded septic systems create water quality issues that impact the economic viability and sustainability of the Town's tourism industry.	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)?	>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?	Enhance protection of water quality.	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?	Medium	Agree
What is the technical feasibility of this project?	Higher than 75%	Agree
Who will administer this project?	Local	Agree

High Priority Environmental Strategies

Pillar	Action Name	Priority	Overall Ranking
Environment	Environment Action 2: Town of Duck Wetland Restoration	High	9
Environment	Environment Action 3: Town of Nags Head – Coastal Resiliency Outreach	High	24
Environment	Environment Action 1: Estuarine Shoreline Management Plan and Implementation	High	25

Table9. Dare High Priority Environmental Summary

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

- Town of Duck – Wetland Restoration:** Wetland restoration and management to minimize damage from flooding and wave action. Construction of this project will involve re-establishment and stabilization of the shoreline, the addition of fill, and planting of native marsh grasses along approximately 400 linear feet of soundfront shoreline.

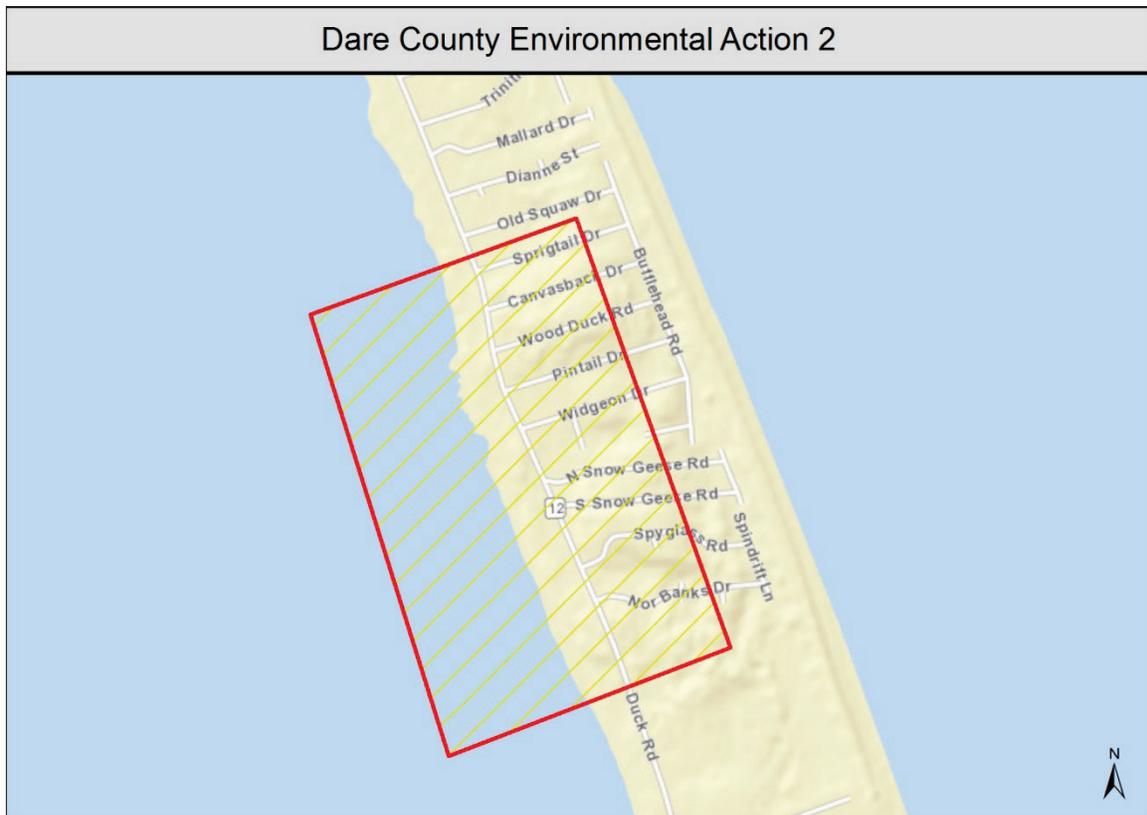


Figure 18. Environment Action 2: Town of Duck – Wetland Restoration

Environment Action 2: Town of Duck Wetland Restoration

County: Dare

Priority Grouping: High Priority

Priority Ranking: 9

Project Timeframe: 1 year

Location: Town of Duck near Currituck Sound/Town-owned property at 1200 Duck Road

Project Summary: Construction of this project will involve re-establishment and stabilization of the shoreline, the addition of fill, and planting of native marsh grasses along with approximately 400 linear feet of soundfront shoreline. This project would enhance protection from flooding for over \$4 million in public investment, including the Town administration building, Town meeting hall, and public entertainment facilities hosting events that draw over 30,000 visitors a year to the Town of Duck.

Question	Response	Disposition
Articulate how this project addresses an unmet need that has been created by damage from Hurricane Matthew.	Hurricane Matthew exacerbated a recent trend of soundfront shoreline erosion along the Town of Duck property. The shoreline is now in need of stabilization to prevent further erosion.	N/A
Consistent with existing plans (describe points of intersection/departure)	Albemarle Regional Hazard Mitigation Plan Town of Duck Land Use Plan	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.	This project would enhance protection from flooding for the Town administration building, meeting hall and public entertainment facilities.	Agree
For how long will this solution be effective?	Between 31 and 50 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)?	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?	No Impact	Agree
What impacts to the environment of the county will result from this project?	The shoreline is now in need of stabilization to prevent further erosion.	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?	Local	Agree

- **Town of Nags Head – Coastal Resiliency Outreach:** Develop a comprehensive educational outreach program to inform the public and increase awareness on hazards, how to develop and retrofit their properties against hazards, and individual tasks that can help them better prepare and respond to hazards. This should also include targeted educational strategies for repetitive loss properties.
- **This is a town-wide project, so no project area map has been included.**

Environment Action 3: Town of Nags Head – Coastal Resiliency Outreach

County: Dare

Priority Grouping: High Priority

Priority Ranking: 24

Project Timeframe: 3+ years

Location: Town of Nags Head

Project Summary: Develop a comprehensive educational outreach program to inform the public and increase awareness on hazards, how to develop and retrofit their properties against hazards, and individual tasks that can help them better prepare and respond to hazards. This should also include targeted educational strategies for repetitive loss properties.

Question	Response	Disposition
Articulate how this project addresses an unmet need that has been created by damage from Hurricane Matthew.	If property owners better understood risk and best management practices they would be able to make better decisions in their development practices towards storm preparation and recovery.	N/A
Consistent with existing plans (describe points of intersection/departure)	Town of Nags Head Comprehensive Plan Albemarle Regional Hazard Mitigation Plan Town of Nags Head Stormwater Management Plan (2006) NC Beach Inlet and Management Plan	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.	None	Agree
For how long will this solution be effective?	Less than 10 years	Agree
How effective is the risk reduction?	<50 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?	Low to moderate 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?	None	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?	Medium	Agree
What is the technical feasibility of this project?	Higher than 75%	Agree
Who will administer this project?	Local	Agree

- **Town of Nags Head – Estuarine Shoreline Management Plan and Implementation:** Develop an estuarine shoreline management plan that establishes policies, procedures, and overall management strategy for the town’s estuarine shoreline. This plan will work to develop specific projects and strategies to prevent estuarine flooding in the future. The plan should research, identify and map marsh loss, “soft” stabilization methods that are appropriate for Nags Head’s estuarine shoreline, potential opportunities for land acquisition, and potentially restorable wetlands.
- **This is a town-wide project, so no project area map has been included.**

Environment Action 1: Estuarine Shoreline Management Plan and Implementation

County: Dare

Priority Grouping: High Priority

Priority Ranking: 25

Project Timeframe: 2-3 years

Location: Town of Nags Head

Project Summary: Develop an estuarine shoreline management plan that establishes policies, procedures, and overall management strategy for the town’s estuarine shoreline. This plan will work to develop specific projects and strategies that will develop project and strategies to prevent estuarine flooding in the future.

Question	Response	Disposition
Articulate how this project addresses an unmet need that has been created by damage from Hurricane Matthew.	Properties along the sound experienced flooding due to surge.	N/A
Consistent with existing plans (describe points of intersection/departure)	Town of Nags Head Comprehensive Plan and Albemarle Regional Hazard Mitigation Plan	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.	Project would stabilize the estuarine shoreline potentially reducing the impacts of flooding. A living shoreline could boost tourism in the area.	N/A
For how long will this solution be effective?	Between 31 and 50 years	N/A
How effective is the risk reduction?	50-100 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?	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?	No Impact	N/A
What impacts to the environment of the county will result from this project?	Project calls for the protection and potential restoration of shoreline.	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?	\$251K - \$500K	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?	Local	N/A

Summary

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.