



Draft Environmental Assessment

Town of Duck

Proposed Living Shoreline and NC 12 Resiliency Project

EMA-2020-BR-100-0028

Duck, Dare County, North Carolina

March 2023



FEMA

**U.S. Department of Homeland Security
Federal Emergency Management Agency Region 4
Atlanta, Georgia**

FEMA Grant Application Number: EMA-2020-BR-100-0028

This Environmental Assessment was prepared by:



Vanasse Hangen Brustlin, Inc.
351 McLaws Circle
Suite 3
Williamsburg, VA 23185
757.220.0500

Prepared for:



Town of Duck
PO Box 8369
Duck, NC 27949
252.255.1234

Date: December 2022

TABLE OF CONTENTS

TABLE OF CONTENTS..... 3

APPENDICES 5

LIST OF TABLES..... 6

LIST OF PHOTOS 7

LIST OF FIGURES 8

LIST OF ACRONYMS AND ABBREVIATIONS 9

1.0 INTRODUCTION 10

2.0 PURPOSE AND NEED..... 10

3.0 BACKGROUND 11

4.0 PROJECT LOCATION AND EXISTING FACILITY 13

5.0 ALTERNATIVES..... 14

 5.1 ALTERNATIVE 1: NO ACTION ALTERNATIVE 14

 5.2 ALTERNATIVE 2: PROPOSED ACTION 14

 5.3 ALTERNATIVE ELEMENTS ANALYZED AND DISMISSED..... 19

6.0 AFFECTED ENVIRONMENT AND POTENTIAL IMPACTS 21

 6.1 PHYSICAL RESOURCES 21

 6.1.1 *Geology, Seismicity, and Soils*.....21

 6.1.2 *Air Quality*.....22

 6.1.3 *Climate Change*.....23

 6.2 WATER RESOURCES AND WATER QUALITY 25

 6.2.1 *Coastal Zone Management Act*.....26

 6.2.2 *Floodplain Management (EO 11988)*.....27

 6.2.3 *Protection of Wetlands (EO 11990)*.....29

 6.2.4 *Coastal Barrier Resources*.....32

 6.3 BIOLOGICAL RESOURCES 32

 6.3.1 *Fish and Wildlife*.....32

 6.3.2 *Threatened and Endangered Species*.....33

 6.3.3 *Migratory Birds*.....35

 6.3.4 *Areas with Special Designation*.....38

 6.4 HAZARDOUS MATERIALS 38

 6.5 SOCIOECONOMIC RESOURCES 39

 6.5.1 *Socioeconomic Issues*39

 6.5.2 *Zoning and Land Use*.....41

6.5.3	<i>Visual Resources</i>	42
6.5.4	<i>Noise</i>	43
6.5.5	<i>Public Services and Utilities</i>	44
6.5.6	<i>Traffic and Circulation</i>	46
6.5.7	<i>Environmental Justice</i>	47
6.5.8	<i>Historic and Cultural Resources</i>	48
7.0	CUMULATIVE IMPACTS.....	52
8.0	BEST MANAGEMENT PRACTICES, MINIMIZATION, AND MITIGATION MEASURES	53
9.0	SUMMARY	57
9.1	SUMMARY OF IMPACTS.....	57
10.0	AGENCY COORDINATION AND PUBLIC INVOLVEMENT	59
10.1	AGENCY OF COORDINATION.....	59
10.2	PUBLIC NOTICE.....	60
10.3	COORDINATION AND PERMITS.....	60
11.0	LIST OF PREPARERS.....	61
12.0	REFERENCES	61

APPENDICES

APPENDIX A: Photos and Figures

APPENDIX B: Geotechnical Report

APPENDIX C: Agency Coordination Letters

APPENDIX D: FEMA 8-Step Decision Making Process Information

APPENDIX E: Memorandum on Threatened and Endangered Species

APPENDIX F: Nationwide Standard Conservation Measures

APPENDIX G: EJ Screen Report (Version 2.1)

LIST OF TABLES

TABLE 1: Summary of Temporary Impacts on Wetlands due to Revetment

TABLE 2: Summary of Permanent Impacts on Wetlands due to Revetment

TABLE 3: Migratory Birds Identified by IPaC Database

TABLE 4: Comparison of Population Demographics

TABLE 5: Summary Comparison of Potential Impacts

LIST OF PHOTOS

PHOTO 1: Aerial photograph of the project area in June 2022 illustrating the proximity of NC 12 to the Currituck Sound, looking south

PHOTO 2: Inundation of NC 12 within the project area during the 2020 winter storm

PHOTO 3: Storm damage to NC 12 within the project area from Category 1 Hurricane Irene in 2011, looking south

PHOTO 4: Storm damage to NC 12 in the project area from Category 1 Hurricane Irene in 2011, looking south. Note exposed utilities and erosion at the edge of the pavement

LIST OF FIGURES

FIGURE 1: Project Vicinity

FIGURE 2: Project Area

FIGURE 3: Existing Conditions

FIGURE 4: Proposed Action

FIGURE 5: FEMA Flood Zone Map

FIGURE 6: Wetland Existing Conditions

FIGURE 7a: Proposed Action: Impacts on Wetlands (South)

FIGURE 7b: Proposed Action: Impacts on Wetlands (North)

FIGURE 8: Historic Properties

LIST OF ACRONYMS AND ABBREVIATIONS

AASHTO	American Association of State Highway and Transportation Officials
BRIC	Building Resilient Infrastructure and Communities
APE	Area of Potential Effect
CAA	Clean Air Act
CAMA	Coastal Area Management Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
EA	Environmental Assessment
EO	Executive Order
EO 11988	Floodplain
EO 11990	Wetlands
EO 12898	Environmental Justice
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FWS	U.S. Fish and Wildlife Service
IPaC	[U.S. Fish and Wildlife Service] Information for Planning and Consultation
JPA	Joint Permit Application
NAAQS	National Ambient Air Quality Standards
NAVD88	North American Vertical Datum of 1988
NC 12	North Carolina State Route 12
NCDEQ	North Carolina Department of Environmental Quality
NCDOT	North Carolina Department of Transportation
NCDWQ	North Carolina Division of Water Quality
NEPA	National Environmental Policy Act
NHPA	National Historic Protection Act
SAV	subaquatic vegetation
Section 106	Historic Preservation Consultation
SHPO	State Historic Preservation Officer
THPO	Tribal Historic Preservation Officer
Town	Town of Duck, North Carolina
USACE	US Army Corps of Engineers

1.0 INTRODUCTION

North Carolina Department of Public Safety submitted a Building Resilient Infrastructure and Communities (BRIC) grant application to the Federal Emergency Management Agency (FEMA) on the behalf of the Town of Duck (the Town). Fiscal year 2020 funding would be provided through the BRIC grant program, as authorized under Section 203 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act). The Disaster Recovery Reform Act of 2018 amended Section 203 of the Stafford Act and established BRIC, which is funded from a six-percent set-aside of estimated disaster expenses for each major disaster, as authorized by Section 203(i). BRIC is designed to promote a national culture of preparedness and public safety through encouraging investments to protect the Nation’s communities and infrastructure and through strengthening national mitigation capabilities to foster resilience. Under BRIC, FEMA may provide technical and financial assistance to states, tribal governments and local governments to assist in the implementation of pre-disaster hazard mitigation measures that are cost effective and designed to reduce injuries, loss of life, and damage and destruction of property, including damage to critical services and facilities resulting from natural disasters.

This draft Environmental Assessment (EA) has been conducted in accordance with National Environmental Policy Act (NEPA), the President’s Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 Code of Federal Regulations [CFR] 1500-1508) and regulations adopted pursuant to the Department of Homeland Security Directive 023-01, Rev 01, and FEMA Directive 108-1. FEMA is required to consider potential environmental and cultural resource impacts before funding and approving actions and projects. FEMA will use the findings in this EA to determine if an Environmental Impact Statement is required, or if the project can be authorized under a Finding of No Significant Impact. FEMA is required to consider potential environmental impacts before funding or approving actions and projects.

In 2021, the Town applied to FEMA for a BRIC grant to improve a 1,375-linear-foot stretch of North Carolina State Route 12 (NC 12) and the adjacent Currituck Sound shoreline. The location of the project area is shown in Figures 1 and 2 in Appendix A. NC 12 is the primary arterial road connecting the length of the North Carolina Outer Banks, from Corolla in the north to Ocracoke Island in the south.

2.0 PURPOSE AND NEED

North Carolina State Route 12 is a critical lifeline connecting residents of Dare and Currituck Counties to the North Carolina mainland. It is also the main artery bringing over 600,000 tourists to these areas during the high season annually, supplying the lifeblood of the local economy, which is rooted in tourism.

The purpose of this project is to improve the resiliency of NC 12 and its associated bicyclist and pedestrian accommodations through raising the elevation of the infrastructure and improving the

adjacent shoreline conditions in the Currituck Sound. The project is needed because inundation of this infrastructure is expected to continue and worsen as relative sea level rise continues and as the adjacent shoreline continues to erode. Additionally, improvements are needed to address the safety issues that arise due to conflicts among vehicles, bicyclists, and pedestrians travelling along NC 12 through the Town.

This project would mitigate threats and loss from the following:

- Private and public property loss associated with erosion
- Damage to critical infrastructure from roadway flooding and erosion including:
 - Transportation
 - Public water
 - Electrical transmission
 - Telecommunications
- Roadway infrastructure replacement costs
- Blockage of emergency vehicles impacting response times and hospital access
- Blockage of storm evacuation route
- Disruption of safe pedestrian and bicycle travel
- Ongoing riprap maintenance and replacement

3.0 BACKGROUND

Incorporated in 2002, the Town of Duck is situated along the northern Outer Banks on a narrow strip of land on the northern end of Dare County between the Currituck Sound and the Atlantic Ocean. The only major transportation route through this area is NC 12 (also known as Duck Road in this area). The town is characterized as a coastal village with a commercial center surrounded by built-out residential neighborhoods. The town has a largely built-out physical environment with little open space available for new development. The town is home to a small year-round population of more than 500 people, but seasonal residents and tourists increase that figure to as many as 25,000 during the peak tourist season of April through October (US Census Bureau 2019 and Duck Fire 2017).

NC 12 is the only north-south roadway through the Town; all other roads extend into small neighborhoods with no interconnectivity. As such, NC 12 provides the only route for personal vehicle trips, pedestrian and bicycle access to the Town Village, emergency vehicle access, and storm evacuation. Additionally, NC 12 through the Town serves as the only connection between the mainland and the Currituck County coastline to the north. In peak season, weekly population in these areas is almost 65,000 (Currituck County 2018). An estimated 500,000 tourists visit Currituck County alone during the 10-week peak season, and the only access road is NC 12 via the Town of Duck (Currituck County 2020).

Portions of NC 12 are subject to flooding (including areas impacted by stormwater runoff and areas inundated by storm surge from Currituck Sound). Such flooding prohibits north-south traffic within the Town and blocks daily travel, emergency vehicles, the one evacuation route, and pedestrian and bicycle travel. This issue is particularly acute in areas where NC 12 runs immediately adjacent to the Currituck Sound at low elevations (see Photo 1 in Appendix A). Because of the low elevation of the roadway, its close proximity to Currituck Sound, and the loss of abutting marsh, NC 12 has become more vulnerable to closure due to flooding. This trend is expected to continue in the future as the effects of climate change and sea level rise exacerbate the risk. This segment of NC 12 was identified as the most vulnerable road segment in the Town of Duck in the 2020 vulnerability assessment study conducted by the Program for the Study of Developed Shorelines at Western Carolina University (Western Carolina University 2020).

A review of the EPA's analysis for climate change for North Carolina titled, "What Climate Change Means for North Carolina," states that the sea level rise along the coast of North Carolina is expected to likely rise anywhere from one to four feet in the next 100 years (EPA 2016). The USACE Sea Level Tracker (https://climate.sec.usace.army.mil/slr_app/) calculates relative sea level change projections using historical data from tide gauges. Projections include sea level change rates under low, intermediate, and high rates of sea level rise. According to the USACE Sea Level Tracker, and using data from the Oregon Inlet Marina, NC gauge, by 2040, sea level could rise by 0.35 feet (using the North American Vertical Datum of 1988 [NAVD88] and mean sea level) under the low scenario, by 0.55 feet under the intermediate scenario, and by 1.18 feet under the high scenario. Barrier islands, such as the one on which the project area is located, are likely to experience higher water levels and increased storm surge as the sea level rises. Coastal infrastructure may experience increased flooding during storm events due to the higher water levels and storm surge.

As a community on the Outer Banks of North Carolina, the Town of Duck is most vulnerable to flooding and wind damage from tropical storms. On average, the Outer Banks experiences at least one named or unnamed subtropical storm each year. The section of roadway within the project area has recently experienced flooding during the following storm events resulting in flood waters covering NC 12 at the project location, at times with greater than 2 feet of inundation (see Photos 2-4 in Appendix A):

- Hurricane Irene (Category 1): 08/27/2011
- Hurricane Matthew (Category 1): 10/8/2016
- Hurricane Dorian (Category 1): 9/9/2019
- Fall Storm: 10/14-16/2019
- Winter Storm: 2/7/2020

The threat to infrastructure also carries potential risk to the tourism revenue on which the region relies. In 2019, direct tourist spending in Dare County totaled \$1.27 billion, and in Currituck County totaled over \$250 million (Outer Banks of North Carolina 2021). Dare County is a leading tourism destination on North Carolina's coast, and tourism is Dare County's main industry (NC State University 2016).

The town developed a Comprehensive Pedestrian Plan and has already invested considerable amounts in new infrastructure to improve safety for travelers near the main town center including dedicated sidewalks, bike lanes, and an extended public boardwalk along the Currituck Sound shoreline that provides alternative pedestrian connectivity to business and parks. As part of the plan, improvements are now being considered for the 1,375-foot segment of NC 12 between Cook Road and Barrier Island Station where multiple issues need to be addressed. At this location, bikers, pedestrians, and motor vehicles cause transportation conflicts that jeopardize public safety where there are not sufficient dedicated lanes for bikes or sidewalks for pedestrians. Examples include pedestrians utilizing bike lanes, bikers utilizing vehicle travel lanes, and both bikers and pedestrians crossing the road at undesignated locations. The town installed a new sidewalk on the east side of the road in 2019, but pedestrians also utilize the west side of the road where no sidewalk is available.

4.0 PROJECT LOCATION AND EXISTING FACILITY

The project area is located within and adjacent to the NC 12 corridor between Cook Road and Barrier Island Station (see Figure 2 in Appendix A). NC 12 in this location is two-lane road with paved shoulders and a single sidewalk on the northbound (east) side. The western side of the roadway borders the Currituck Sound shoreline for most of the project area and is otherwise surrounded by a mix of commercial and single-family residential uses. The segment of NC 12 within the project area sits at elevations between 3.5 and 4.5 feet NAVD88. The entire segment is within the FEMA designated 100-year flood zone. The shoreline adjacent to the road includes sections of coastal wetlands, eroding areas, and riprap stabilizing the shoreline adjoining NC 12. East of the roadway, the residential lots and neighborhood streets slope upward dramatically and quickly.

The project area encompasses a 1,375-linear-foot section of NC 12 and includes paved impervious cover, vegetated uplands, stone riprap, marsh wetlands, and open water associated with the Currituck Sound. Elevations range between 7.0 at the northern end of the project area to -1.4 feet in the sound. Impervious surfaces include the NC 12 roadway and shoulders, a 5-foot-wide sidewalk on the eastern side of NC 12, and parking area entrances to several commercial sites. Vegetated upland areas comprise sections of sloping dunes with naturally occurring vines and herbs, mowed road shoulders dominated by grasses and common weedy plants, and forested areas. See Figure 3 in Appendix A for a map of the overall existing conditions of the project area.

The existing shoreline revetment is comprised of two segments that follows the longitudinal grade of the existing road pavement. The longer of the two segments begins at a small boat launch next to the Sunset Grille restaurant entrance on the north end of the project area and extends southward to Sea Colony Drive for approximately 620 linear feet. The crest of the revetment at its highest point reaches 7 feet at this northern end and declines in elevation moving further south to elevation 2.7 feet at its lowest point. The second segment begins across from Sea Colony Drive near the middle of the project area and extends about 120 linear feet to the south. This segment ranges in elevation from 2.1 to 2.5 feet. In the lower elevations, common reed grows through the stone. Material used to create the revetment measures to an equivalent North Carolina Department of Transportation (NCDOT) Class II stone (9 to 23 inches) with some broken concrete. At the northern end, larger class stone was placed at the upper crest next to the road pavement.

5.0 ALTERNATIVES

This section describes the alternatives considered during the planning process. Alternative 1: No Action and Alternative 2: Proposed Action are carried forward for detailed analysis in this EA. Other alternatives were considered but ultimately dismissed from consideration. The rationale for those dismissals is included in this section.

The following alternatives are carried forward for full analysis in this EA.

5.1 Alternative 1: No Action Alternative

Under the No Action Alternative, no improvements would be made within the project area. The roadway elevation of NC 12 through the project area would remain between 3.5 and 4.5 feet NAVD88, which would continue to be within the 100-year flood zone and subject to recurring flood risk. The shoreline would remain in its existing state with sections of riprap revetment at between 7 and 2.1 feet in elevation. The sidewalk on the east side of NC 12 would remain in its existing location and configuration. There would continue to be no sidewalk or other pedestrian accommodation on the west side of the roadway.

5.2 Alternative 2: Proposed Action

The proposed action includes roadway infrastructure improvements, pedestrian and bicycle infrastructure improvements, and a living shoreline. These elements are described in more detail below and illustrated on Figure 4 in Appendix A.

Roadway Infrastructure Improvements

Under the proposed action, 1,375 linear feet of NC 12 through the project area would be elevated above the 100-year floodplain. The proposed elevation would vary along the roadway but would generally be between 5 and 6 feet NAVD88 with a slope of approximately 0.3%. The elevated

roadway would transition to the existing grade on the north and south ends of the project area, near Barrier Island Station and Cook Drive, respectively, where the existing grade is above the base flood elevation of the 100-year floodplain. Most utility surface features within the project area would be adjusted to the new grade, such as fiber pedestals and vaults, power poles, electric vaults, and fire hydrants. Existing utilities that are located within the NC 12 right-of-way would remain in place. At the entrance to Sea Colony Drive, the existing median, including existing signage and landscaping, would be removed to tie into the new roadway elevation. It would be replaced after construction is complete. Tie-ins would require about 100 feet to meet the grade of the side roads.

GPS coordinates for the two road stretches are as follows:

Start	End
36.171206, -75.756249	36.172624, -75.756428
36.173990, -75.756491	36.174558, -75.756358

The use of a subsurface infiltration chamber is anticipated under the proposed action (as the Town has done at other locations within the NC 12 corridor); this green infrastructure provides runoff storage capacity that maximizes contact with the native sandy soils for infiltration, avoiding discharge to the sound. An infiltration chamber would be constructed on the east side of NC 12 between Barrier Island Station and Olde Duck Road. Runoff that is not captured in this chamber would sheet flow across NC 12 and into the sound.

Approximate Storm Chamber GPS boundaries are:

Corner 1	36.173981, -75.756363
Corner 2	36.174185, -75.756343
Corner 3	36.174173, -75.756248
Corner 4	36.173968, -75.756266

The roadway elevation project element would require roughly 950 cubic yards of fill, 2,030 tons of asphalt, 1,260 cubic yards of aggregate base course, and 650 linear feet of subsurface storm chamber. It also would require replacement of approximately 1,200 linear feet of existing sidewalk and infiltration trench along the east side of the roadway. The overall area of ground disturbance would be 135,000 square feet. The project is consistent with the regional Hazard Mitigation Plan recommendations for addressing roadway flooding and the Infrastructure Vulnerability Assessment.

Eastern Side Infiltration Trenches:

Start	End
36.171137, -75.756144	36.171802, -75.756383
36.171958, -75.756428	36.172669, -75.756376
36.172943, -75.756373	36.173430, -75.756408
36.173491, -75.756416	36.173796, -75.756437
36.173945, -75.756442	36.174458, -75.756324

Western Side Infiltration Trenches:

Start	End
36.171120, -75.756292	36.171257, -75.756334
36.171361, -75.756365	36.171428, -75.756391
36.171517, -75.756417	36.171767, -75.756500
36.171855, -75.756524	36.174710, -75.756397

Western Side New Sidewalks:

Start	End
36.171846, -75.756531	36.174716, -75.756395
36.174867, -75.756327	36.175232, -75.756201

Pedestrian and Bicycle Infrastructure Improvements

The proposed action would require the reconstruction of the existing sidewalk and bicycle lane on the east side of the roadway after the roadway is raised, as described above. The proposed action would also include construction of new pedestrian and bicycle facilities on the west side of the roadway. It includes extending north the recently completed sidewalk and bicycle lane in the vicinity of the Resort Realty office near Cook Road and completing the bicycle and pedestrian improvements envisioned in the Town’s Comprehensive Pedestrian Plan. Specifically, the project includes approximately 1,375 linear feet of sidewalk and bike lane along the west side of the road. The sidewalk would be separated from the bike lane and road by an approximately 2-foot-wide pervious stormwater management swale. The extended infrastructure would link to an existing crosswalk at the Sunset Grille restaurant near Barrier Island Station. In addition to improving the pedestrian and bicycle connectivity, the proposed action would also improve stormwater runoff conditions along the roadway by creating an infiltration trench between the roadway asphalt and the concrete sidewalk. The total land disturbance for the new sidewalk and accompanying stormwater infiltration trench would be 7,280 square feet.

Living Shoreline

Under the proposed action, shoreline improvements would be undertaken in the form of breakwater sills, marsh protection and restoration, and shoreline stabilization. Specifically, the proposed action includes the following:

- creation of 988 linear feet of breakwater sills
- protection of 21,234 square feet of existing marsh
- restoration of 12,168 square feet of marsh
- creation of 920 linear feet of riprap revetment

The living shoreline, which is specifically referenced in the Town’s Hazard Mitigation Plan, would help mitigate shoreline erosion, protect and restore coastal wetland habitat, and result in a green infrastructure demonstration project within the Town. The proposed revetment is necessary to prevent erosion and protect the roadway and adjacent private property. It would also help attenuate wave energy and prevent debris from accumulating in the roadway. This element would require 25,791 square feet of ground disturbance associated with installation of a revetment, installation of a sill, and backfill of sand to create marsh planting zones.

This alternative would include sills located just landward of the subaquatic vegetation at approximately 18 inches above the normal water elevation to dissipate wave energy, the placement of sand fill on the bottom to establish proper water depths of 0.0 to +0.2 feet and planting medium in the areas lacking marsh vegetation, and the installation of *Juncus roemerianus* plugs within the open water gaps to jump-start the growth of this reference marsh plant. A vertical vinyl or wooded sill with narrow footprint would be installed.

Breakwater Sill Locations:

Sill Number	GPS Points
1	36.1719243, -75.7570087 36.1719616, -75.7570338 36.1720618, -75.7569860
2	36.1720314, -75.7569600 36.1720254, -75.7569422 36.1721172, -75.7568611 36.1721816, -75.7568663
3	36.1721862, -75.7568463 36.1722210, -75.7568133

Town of Duck
Proposed Living Shoreline and NC 12 Resiliency Project
EMA-2020-BR-100-0028

4	36.1722102, -75.7568035 36.1722412, -75.7567650
5	36.1722527, -75.7567457 36.1723080, -75.7567390
6	36.1723325, -75.7567621 36.1724371, -75.7567579 36.1725076, -75.7567184 36.1725601, -75.7567137 36.1725955, -75.7567324
7	36.1725888, -75.7567546 36.1726567, -75.7567448 36.1727150, -75.7567272
8	36.1727110, -75.7566855 36.1727858, -75.7566817
9	36.1727848, -75.7567047 36.1728226, -75.7566830 36.1729504, -75.7566751 36.1730176, -75.7567102
10	36.1730288, -75.7566935 36.1731437, -75.7566552 36.1732328, -75.7566601 36.1732892, -75.7566997
11	36.1732899, -75.7567183 36.1733075, -75.7567126 36.1733529, -75.7567148 36.1734070, -75.7566991
12	36.1734213, -75.7566983 36.1734437, -75.7566884 36.1735667, -75.7567029 36.1735893, -75.7567293 36.1736222, -75.7567364

13	36.1736513, -75.7567406 36.1736861, -75.7567542 36.1738386, -75.7567173 36.1738552, -75.7567251
14	36.1738450, -75.7567484 36.1738811, -75.7567397 36.1739441, -75.7567689 36.1740820, -75.7567650
15	36.1740730, -75.7567350 36.1741159, -75.7567148 36.1741973, -75.7566393 36.1742144, -75.7566373
16	36.1742280, -75.7566493 36.1742403, -75.7566324 36.1744816, -75.7565731 36.1744883, -75.7565783

Proposed staging areas for materials and equipment include: the Duck Town Park Boardwalk gravel parking lot at (36.165441, -75.754174), paved parking at a commercial lot (36.175231, -75.755706), and a paved parking lot at the Duck Fire and Police Station (36.183033, -75.756828). The project description below is an assumed schedule of how the construction work could be completed but it will be decided by the contractor pending weather, tourist season, and other unforeseeable events.

5.3 Alternative Elements Analyzed and Dismissed

The following describes alternative elements that were considered during the planning process but were ultimately dismissed from consideration. The rationale for those dismissals is also discussed below.

Bulkhead Only

This alternative element would include removal of the existing rip rap of inadequate size and the installation of a bulkhead along the edge of the grassy road shoulder with a top elevation of 6.0 feet. No alterations would be made to the roadway. The lowest point in the road within the project

segment is 2.15 feet, which means the bulkhead would protrude higher than the roadway by 3.85 feet. The new sidewalk could be installed just landward of the bulkhead.

This alternative would resolve the issue of roadway flooding for storms smaller than the 50-year event. However, whenever flood waters crest the bulkhead, water would gather on the road with no means to flow back to the Currituck Sound once the storm has passed. The bulkhead would hold back the water on the road causing disruptions to traffic usage over an otherwise longer period. The bulkhead would also impede the flow of stormwater off of the roadway, resulting in additional flooding. In addition, studies have shown that bulkheads and seawalls support lower biodiversity and fewer organisms than rip rap or natural shorelines (Gittman et al. 2016), and over time, wave energy reflection along seawalls would also negatively affect what little marsh vegetation currently remains. Thus, the concept of a bulkhead or seawall was contrary to the goals for flood reduction and habitat enhancement, and for these reasons, the option of a bulkhead was dismissed from further consideration.

Riprap Revetment Only

One alternative element that was considered included the installation of a rip rap revetment using NCDOT Class III stone that would crest at elevation 5.6 feet. Under this alternative element, the revetment would begin at the edge of the roadway pavement, and the sidewalk would be placed on top of the revetment. This alternative element may protect the road from a complete washout and would push the revetment further landward and away from the adjacent wetlands, but water would move through the rocks and eventually reach the roadway, thereby not fully addressing the problem of roadway flooding. For this reason, this alternative element was dismissed from further consideration.

Expand Width of Existing Sidewalk

One alternative element considered would expand the width of the existing sidewalk on the eastern side of NC 12 from a 5-foot pedestrian sidewalk to an 8-foot shared use path with designated cross walks for access. However, this alternative would require that steeply sloped vegetated sand dunes be cut to make room for the path and a substantial retaining wall installed at considerable cost. This alternative would continue to rely on users on the western side to cross the road to reach the shared use path. Therefore, this alternative element was dismissed from further consideration.

Shoreline Marsh Revegetation

An alternative element for shoreline habitat enhancement that was considered included installing plants in the shoreline marsh areas absent of vegetation with no plans to manipulate the bottom elevations, wave energy, or bottom substrate. No fill material would be used to manipulate the bottom elevations that otherwise would be considered a regulatory impact. This option would pose

greatest risk in failure of plant survivorship once planted materials are left to survive in areas of high wave energy and water depths not matching nearby reference marsh elevations. For these reasons, this alternative was dismissed.

Sill Installation with Natural Sediment Deposition

Another element for shoreline habitat enhancement considered was for the installation of a sill along the landward side of the subaquatic vegetation (SAV) line to dissipate wave energy, allowing bottom sediments to accumulate over time landward of the sills and marsh vegetation to naturally recruit into the bare areas. Fill material would be limited to the space occupied by the sills. This option poses certain uncertainties that, left uncontrolled, would pose a high risk of failure. One issue includes the uneven distribution of sediments as they accumulate landward of the sills. If the target marsh ecosystem is one dominated by the same native species (namely black needle rush [*Juncus roemerianus*]) currently on site, proper elevations and water depths are needed. Survey data in the project area show elevations in the *Juncus* marsh being around +0.0 to +0.2 NAVD88, which is a narrow range. Natural sediment deposition may come in higher or lower than the target elevation resulting in either no natural recruitment of *Juncus* (no marsh establishment at all) or areas of too much sediment accumulation reaching elevations above +0.2 feet and becoming overrun with the invasive *Phragmites australis* just as the reference wetlands. For these reasons, the Town dismissed this alternative.

This alternative is the same as alternative 2 in location and general construction with the exception on the method of transporting water from the intake to a new water pump station near the Canal WTP reservoir. Instead of a tunnel under the Congaree River, this alternative would construct an aerial crossing with piers piled into the Congaree River's bedrock and a raw water pipeline over the Congaree River. Although meeting the purpose and need for providing water to the community and facilitating the licensing requirements, FEMA has practicably dismissed this alternative due to the major safety risks such a crossing would have to anyone recreationally using the river.

6.0 AFFECTED ENVIRONMENT AND POTENTIAL IMPACTS

This section includes a concise description of relevant affected environments at the project site and the impact of each alternative on that environment. Where environments are not present in the project area or where potential impacts are not of critical importance, those environments are described to the extent warranted.

6.1 PHYSICAL RESOURCES

6.1.1 Geology, Seismicity, and Soils

The Outer Banks are a series of barrier islands that form a 160-mile ridge of constantly shifting sand off the eastern coast of North Carolina. It is estimated that this ridge has existed for between

3,500 and 5,000 years, although its exact shape, size, and location shift continuously as sand is removed and deposited by weather events and natural processes.

According to the US Department of Agriculture Natural Resources Conservation Service Soil Survey maps, the predominant soil types located within the site are classified as dune land/Newhan complex and Newhan fine sand. Newhan fine sand is characterized by low runoff potential. Hydrological Soil Group A is characterized by low-medium runoff potential due to high infiltration rates. According to the Geotechnical Report dated December 2, 2020, by GET Solutions, Inc., the existing subsurface consists of sandy topsoil and poorly graded fine to medium sand. See Appendix B for a copy of the Geotechnical Report. The initial groundwater level was observed between elevations of 1.0 and 1.5 feet. Groundwater elevations vary with environmental variations and seasonal conditions. Field-measured infiltration rates were 5.5 inches per hour and 7.9 inches per hour; the infiltration rates were taken at 2.0 feet and 2.5 feet below existing grade.

Alternative 1: No Action

The no-action alternative maintains the status quo of geology, seismicity, and soils from existing conditions. No impacts to these resources are anticipated because there would be no ground disturbance or changes within the project area.

Alternative 2: Proposed Action

Under the proposed action, there would be no change in geology or existing soil composition. Ground disturbance would be required for construction of the living shoreline, new sidewalk, and for elevating the roadway. Typical earth-moving equipment would be used to dig, grade, trench, and shape the soils during construction activities. As a requirement of the proposed action, a state-approved sediment and erosion control plan would be developed, and erosion and sediment control measures such as silt fence would be used during construction activities. Equipment staging and material laydown areas will utilize existing paved and gravel parking areas. Immediately following construction activities, disturbed areas outside of the roadway would be seeded with a native seed mixture to control erosion. Because these measures would be implemented, any impacts on geology, seismicity, and soils would be negligible to minor.

6.1.2 Air Quality

The Clean Air Act (CAA) requires the U.S. Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment; the CAA established two types of national air quality standards; primary standards set limits to protect public health, including the health of “sensitive” populations such as asthmatics, children, and the elderly; secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation and buildings; current criteria pollutants are: Carbon Monoxide (CO), Nitrogen Dioxide (NO₂),

Ozone (O₃), Lead (Pb), Particulate Matter (PM₁₀), and Sulfur Dioxide (SO₂). If the air quality in a geographic area meets or exceeds the NAAQS, it is called an attainment area. The project is located in the Town of Duck, Dare County, North Carolina, which is in attainment status for all criteria pollutants.

Alternative 1: No Action

The no action alternative maintains the status quo of air quality from existing conditions. No impacts to air quality are anticipated because there would be no changes within the project area.

Alternative 2: Proposed Action

Implementation of the project under the proposed action will follow all local permitting requirements for stationary sources, such as generators, as needed. Temporary impacts to air quality may exist during construction of the proposed project, as temporary increases in vehicle emissions and particulate matter are expected to occur. To reduce the temporary impacts to air quality, the Town of Duck would be required to water down construction areas when necessary to limit dust and particulates. It is anticipated that traditional types of commercial construction equipment would be used, such as earthmoving equipment, small to medium size cranes, scaffolding, and storage containers. Emissions from fuel-burning internal combustion engines (e.g., heavy equipment and earth moving machinery) could temporarily increase the levels of some pollutants, including CO, Volatile Organic Compounds (VOCs), NO₂, O₃, and Particulate Matter. To reduce the emission of criteria pollutants, fuel-burning equipment running times would be kept to a minimum during construction. These temporary impacts would only last the duration of construction. This project is not anticipated to generate sufficient emissions during either construction or operation to have a substantial long-term negative impact on air quality.

6.1.3 Climate Change

CEQ guidance for NEPA analysis directs Federal agencies to consider the extent to which a proposed action and its reasonable alternatives would contribute to climate change, through greenhouse gas (GHG) emissions, and take into account the ways in which a changing climate may impact the proposed action and any alternative actions, change the action's environmental effects over the lifetime of those effects, and alter the overall environmental implications of such actions. GHGs are emitted by both natural processes and human activities, and their accumulation in the atmosphere regulates temperature. GHGs include water vapor, carbon dioxide, methane, nitrous oxides, and other compounds.

A review of the EPA's analysis for climate change for North Carolina titled, "What Climate Change Means for North Carolina," states that the sea level rise along the coast of North Carolina is expected to likely rise anywhere from one to four feet in the next 100 years (EPA 2016). The USACE Sea Level Tracker (https://climate.sec.usace.army.mil/slr_app/) calculates relative sea

level change projections using historical data from tide gauges. Projections include sea level change rates under low, intermediate, and high rates of sea level rise. According to the USACE Sea Level Tracker, and using data from the Duck, NC tide gauge (#8651370), by 2040, sea level could rise by 0.3 feet (NAVD 88 and MSL) under the low scenario, by 0.5 feet under the intermediate scenario, and by 1.1 feet under the high scenario (USACE 2022). Barrier islands, such as the one on which the project area is located, are likely to experience higher water levels and increased storm surge as the sea level rises. Coastal buildings and infrastructure may experience increased flooding during storm events due to the higher water levels and storm surge.

Alternative 1: No Action

Effects of climate change, such as increased storm events and sea level rise, will likely be more dramatic on the barrier island of the Outer Banks than inland portions of the State. Rising sea levels may increase storm surge during hurricanes and other weather events. The no-action alternative would not result in any increase in GHG emissions and would not increase the effects of climate change or sea level rise in the project area. However, under the no-action alternative, the current risk factors affecting the project area, including erosion and damage during severe weather events, would continue or worsen. NC 12 would remain vulnerable to continued erosion and overwash and would be at a higher risk for future roadway damage. With relative sea-level expected to rise anywhere from one to four feet in the next 100 years (EPA 2016), it is likely that storm and extreme high tide events under the no-action alternative would produce more severe overwash and erosion in the future. It is expected that emergency closures of NC 12 would continue to occur and possibly increase after storm and extreme high tide events. Therefore, the no-action alternative would result in a continuation of (and perhaps increased intensity of) existing adverse impacts on the project area related to climate change.

Alternative 2: Proposed Action

Implementation of the proposed action would result in a temporary increase in GHG emissions during construction activities, but it would not contribute to an increase in GHG in the long term. The proposed action would result in improved resiliency of the project area from flooding and overwash resulting from storm and extreme high tide events.

Because NC 12 would be less vulnerable to severe damage from such events, NCDOT would be better able to clear the road of debris and reopen the road more quickly when compared to the existing conditions. This would allow for faster response of emergency supplies and personnel to areas in need after a major storm or extreme high tide event. Because NC 12 is the only north-south road through the Town, reduced closures after storm events may improve overall access for residents and visitors. Although closures of NC 12 due to storm events are not likely to be eliminated, access to destinations, grocery stores, and other services accessed via NC 12 may be maintained or restored more quickly after storm events, which would be a beneficial impact for

residents and visitors of the Town. Overall, the proposed action would result in beneficial impacts by improving the resiliency of NC 12 from the effects of climate change.

6.2 WATER RESOURCES AND WATER QUALITY

The United States Army Corps of Engineers (USACE) is responsible for permitting and enforcement functions dealing with building in US waters and discharging dredged or fill material into US waters. The Rivers and Harbors Act of 1899 authorize USACE regulations for building or working in navigable waters of the United States. These regulations often go hand in hand with Section 404 of the Clean Waters Act (CWA), which establishes the USACE permit program for discharging dredged or fill material. The regulations are often used together because building in navigable waters of the United States also constitutes discharging dredged or fill material into water of the United States. In addition to regulating construction or work being done in navigable waters of the United States, USACE regulates discharging into wetlands through the "Section 404" permit program.

Under Section 401 of the CWA, a Federal agency may not issue a permit or license to conduct any activity that may result in any discharge into waters of the United States unless a Section 401 water quality certification is issued, verifying compliance with State or delegated tribe water quality requirements, or certification is waived. States and authorized tribes where the discharge would originate are generally responsible for issuing water quality certifications under Section 401 of the CWA. Permitting/compliance or conditions under both Section 404 and 401 would be required if any impact to jurisdictional waters of the United States (temporary or permanent) occur as part of a project.

A Joint Permit Application (JPA) for both CAMA and Section 404 was submitted to NCDEQ for review on March 30, 2022. The NCDEQ has provided initial comments on the JPA on April 13, 2022, and the Town responded on August 3, 2022. Coordination and planning with NCDEQ is ongoing.

The waters of Currituck Sound are classified by the North Carolina Division of Water Quality (NCDWQ) as SC (tidal salt waters protected for secondary recreation). The NCDWQ identifies best usages of Class SC as “fishing, boating, and other activities involving minimal skin contact; fish and noncommercial shellfish consumption; aquatic life propagation and survival; and wildlife.” (NCDEQ 2019). The Currituck Sound drains to the Albemarle Sound and ultimately into the Atlantic Ocean. The Currituck Sound and Albemarle Sound do not have a Total Maximum Daily Load as authorized under the Clean Water Act.

6.2.1 Coastal Zone Management Act

The Coastal Zone Management Act (CZMA) provides for the management of the nation’s coastal resources. The CZMA defines the coastal zones where development must be managed to protect areas of natural resources unique to coastal regions. States are required to define the area that will comprise coastal zone and develop management plans that will protect these unique resources through enforceable policies of state coastal zone management (CZM) programs. In North Carolina, this program is called the Coastal Area Management Act (CAMA) and is carried out by the North Carolina Department of Environmental Quality (NCDEQ) Division of Coastal Management. As defined in the Act, the coastal zone includes coastal waters extending to the outer limit of state submerged land title and ownership, adjacent shorelines, and land extending inward to the extent necessary to control shorelines. Federal as well as local actions must be determined to be consistent with the CZM plans and policies before they can proceed.

A Joint Permit Application (JPA) for both CAMA and Section 404 was submitted to NCDEQ for review on March 31, 2022. The NCDEQ has provided initial comments on the JPA on April 13, 2022, and the Town responded on August 3, 2022. See Appendix C for coordination letters. During the coordination for the JPA, the Town identified that portion of the proposed sidewalk would be within the established 30-foot CAMA buffer. The land where the new sidewalk is proposed is highly disturbed, consisting of stone revetment and grassy road shoulder with buried riprap and underground utilities. These disturbances have rendered the site vulnerable to events such as flooding and erosion as well as having reduced storm water management capacity. The proposed sidewalk on the site would add to the existing impervious surfaces within the project area, the current riprap and grassy areas constitute unnatural features having no buffering qualities; as such, the addition of the sidewalk would not result in any additional impacts within the 30-foot CAMA buffer.

Alternative 1: No Action

The no action alternative maintains the status quo of water quality from existing conditions, and stormwater is not currently treated by a stormwater management facility. No impacts to the nearby Currituck Sound or to water quality are anticipated because there would be no ground disturbance or changes within the project area.

Alternative 2: Proposed Action

The proposed action would incorporate stormwater management features that would improve water quality and benefit wetland vegetation. The proposed action would slightly increase the impervious footprint of the project area and would create slight increases in runoff and pollutant loading. Stormwater would infiltrate into the sandy soils, and larger storms events would drain across NC 12 and into the Currituck Sound. The proximity of this project to the Currituck Sound

is less than 575 feet; therefore, the project will comply with Coastal Community Zone requirements. This project will also comply with High Density regulations, which include project areas with greater than 12% impervious cover. No new pipe connections will be permitted to the Currituck Sound, which is Class SA Waters. Infiltration is the best stormwater solution for the project given the sandy soils.

The proposed stormwater chamber on the east side of the roadway would collect upslope drainage from the adjacent residential neighborhood and provide additional stormwater quantity and quality control, above the minimum requirements. The chamber would also aid with flood control during storm surge, when the Currituck Sound raises and crosses NC 12. The proposed action would reduce runoff and volume of stormwater by approximately 10% compared with existing conditions.

Under the proposed action, ground disturbance during construction activity has the potential to release loose sediment into nearby waters, particularly during rain and storm events; however, these adverse impacts on water quality would be temporary and minor in nature. To minimize these impacts, dust and erosion control will be considered an integral part of all design. All structural and vegetative erosion and sediment control practices will be constructed and maintained according to minimum standards and specifications of the North Carolina Erosion and Sediment Control Planning and Design Manual, 2013. The following erosion and sedimentation controls would likely be employed during the earthwork and construction phases of the project: silt fence, inlet protection, and temporary and permanent seeding measures. These measures and practices would mitigate potential impacts of dust and erosion on water quality during construction.

6.2.2 Floodplain Management (EO 11988)

The intent of Executive Order (EO) 11988, “Floodplain Management” is to require federal agencies to avoid, to the extent possible, short and long-term adverse impacts associated with the occupancy of and modifications to floodplains. For regulatory floodways (a type of Zone AE) and coastal high hazard areas (Zone V or VE); fill is not allowed, and new construction or substantial improvement requires the structure or facility to be functionally dependent functionally dependent or facilitate open space use. Per 44 C.F.R. § 9.6(b), FEMA uses an 8-step decision making process for actions within a floodplain. The Town completed the 8-step decision making process as part of the BRIC grant application in 2020. See Appendix D for the 8-Step Decision Making Information form. By its very nature, the NEPA compliance process involves the same basic decision process to meet objectives found in the 8-step decision-making process. The 8-step decision making process has been applied through implementation of the NEPA process followed as part of this EA.

The proposed roadway improvements are in Flood Zone AE (areas within the 100-year floodplain) and Flood Zone X (Areas within the 0.2% annual chance floodplain) as indicated on the Flood Insurance Rate Map for the Town of Duck, North Carolina having community panel number 3720985900K, dated June 19, 2020 (FEMA 2020) (see Figure 5 in Appendix A). The project area is not within a regulatory floodway or a coastal high hazard area. The 100-year flood elevation on the FEMA Flood Map is elevation 5 along the sound and elevation 4 along Duck Road based on NAVD-88. The flood zone associated with the Currituck Sound occurs along the entirety of the more than 30 miles of shoreline abutting Bodie Island. This flood zone is an ever-changing system affected by natural forces such as sea level rise, routine coastal forces from winds, and dramatic impacts from hurricanes.

The nature of flooding within the project area is inundation from the sound during storm events due to heavy rain and/or high winds. Additionally, stormwater sheet flows across NC 12 directly into Currituck Sound throughout much of the project area; periods of heavy rain result in flooding of NC 12 within the project area due to this stormwater runoff. The local floodplain administrator from the Town of Duck has been involved in the planning, design, and analysis of this project. They have provided comments on the analysis of the potential impacts on floodplain management and have approved of the proposed action.

Alternative 1: No Action

Under the no-action alternative, there would be no buildings, structures, or fill added to the floodplain; therefore, there would be no changes or impacts on the floodplain.

Alternative 2: Proposed Action

Under the proposed action, the sidewalk and roadway improvements would require fill to be placed in the floodplain to raise the roadbed above the 100-year flood elevation. This would result in a small loss of flood storage where the existing road is regularly flooded from storm surges. The storm chamber would provide additional subsurface stormwater storage within the floodplain while also facilitating infiltration into the sandy soil; stormwater would not be redirected onto other properties. This storm chamber would benefit all nearby property owners by reducing the potential for stormwater ponding along the road and on adjacent private properties. This would not impact the overall flow of the water from east to west. While the infrastructure improvements would result in some reduction of flood storage capacity, the extent of flood storage loss by raising the roadbed an average of 2 feet for 1,375 linear feet would be undetectable given the expanse and volume of the Currituck Sound. The project does not include the construction of any buildings in the flood zone. The living shoreline component of the project will improve flood zone functions of the shoreline by providing additional marsh habitat for flood protection where none currently exists.

Although the proposed project area is located within a 100-year flood zone, no occupied structures such as buildings or bridges would be built within the flood zone that could jeopardize public safety in the event of a major flood.

6.2.3 Protection of Wetlands (EO 11990)

Executive Order 11990, “Protection of Wetlands,” requires federal agencies to take action to minimize the destruction or modification of wetlands, by considering both direct and indirect impacts to wetlands that may result from federally funded actions. Application of the 8-step decision making process is required to ensure that federally funded projects are consistent with EO 11990 objectives. The Town completed the 8-step decision making process as part of the BRIC grant application in 2020. See Appendix D for the 8-Step Decision Making Information form. By its very nature, the NEPA compliance process involves the same basic decision process to meet the objectives found in the 8-step decision making process. The 8-step decision making process has been applied through implementation of the NEPA process followed as part of this EA.

Activities disturbing jurisdictional wetlands require a permit from the USACE. Two types of authorization are available from the USACE for activities regulated under Section 404 of the CWA: general permits, which are issued for a specific category of similar activities and include nationwide permits defined in 33 CFR Part 30 and individual permits issued after individual review of the project, project alternative and proposed mitigation.

Wetlands within the project area include a small area of scrub-shrub totaling 1,319 square feet in the southern end of the corridor and patches of herbaceous marsh covering approximately two-thirds of the shoreline totaling 22,767 square feet. Scrub-shrub vegetation includes wax myrtle (*Morella cerifera*), willow (*Salix caroliniana*), salt bush (*Baccharis halimifolia*), and marsh elder (*Iva frutescens*) mixed with the invasive common reed (*Phragmites australis*). Approximately 53 percent of the emergent marsh is dominated by reed grass (11,933 square feet) and 47 percent is occupied by black needle rush (*Juncus roemerianus*) (10,835 square feet). See Figure 6 in Appendix A for the existing conditions of wetlands within the project area vicinity.

The normal water level of the Currituck Sound is 0.7 feet NAVD88. The near-shore open water habitat of the Sound maintains a bottom elevation around -0.8 to -1.4 feet, which equates to water depths ranging between 1.5 to 2 feet. The bottom substrate is primarily sand and silt. Areas occupied by subaquatic vegetation occur approximately 20 to 30 feet from the shoreline on the northern end and run along the waterward edge of the marsh vegetation in the middle and southern end of the project site. The two dominant species of subaquatic vegetation are widgeon grass (*Ruppia maritima*) and eelgrass (*Vallisnaria americana*) with the average percent coverage at around 70 percent.

The riparian zone of the Currituck Sound extending inland by 75 feet is considered an Area of Environmental Concern. This area encompasses the existing revetment, road pavement, the sidewalk on the eastern side of NC 12, and areas of upland vegetation on the east side of the sidewalk. The total area of impervious surface under existing conditions totals 55,190 square feet, including the revetment.

Alternative 1: No Action

There would be no changes to or construction activities within jurisdictional wetlands under the no-action alternative; therefore, there would be no impacts on wetlands.

Alternative 2: Proposed Action

Under the proposed action, the improved revetment will encroach slightly into the edge of the wetlands resulting in temporary and permanent impacts. Temporary impacts are associated with those areas below the ordinary high-water line that will be excavated for the revetment toe and backfilled with sand. Areas currently occupied by scrub-shrub habitat will be restored to scrub-shrub vegetation, and areas currently occupied by *Phragmites australis* will be re-planted with scrub-shrub habitat. One small patch of black needle rush of 42 square feet will be excavated for the revetment toe, but this will be restored back to black needle rush once the revetment installation is completed. See Tables 1 and 2 below for a summary of temporary and permanent wetlands impacts resulting from the revetment. See Figures 7a and 7b in Appendix A for graphics depicting the wetland impacts.

Table 1. Summary of Temporary Impacts on Wetlands due to Revetment

Wetland Classification and Code	Action	Area of Impacts (SF)
Estuarine, Intertidal, Emergent (E2EM)	<i>Phragmites australis</i> to be excavated for new revetment toe, backfilled with sand and re-planted with wetland shrubs	361
Estuarine, Intertidal, Unconsolidated Shore, Sand (E2US2)	Unvegetated sand bottom to be excavated for the revetment toe and restored back to a sand bottom	65
Estuarine, Intertidal, Unconsolidated Shore, Sand (E2US2)	Unvegetated sand bottom to be excavated for the revetment toe, backfilled with sand, and planted with <i>Juncus roemerianus</i>	552
Estuarine, Intertidal, Rocky Shore, Rubble (E2RS2)	Portion of old revetment to be removed and converted to <i>Juncus roemerianus</i> marsh	3,789

Table 2. Summary of Permanent Impacts on Wetlands due to Revetment

Wetland Classification and Code	Action	Area of Impacts (SF)
Estuarine, Intertidal, Rocky Shore, Rubble (E2RS2)	Existing wetland revetment converted to upland revetment.	582
Estuarine, Intertidal, Emergent (E2EM)	Conversion of <i>Phragmites australis</i> to upland revetment	342
Estuarine, Intertidal, Unconsolidated Shore, Sand (E2US2)	Sand Bottom to be filled for revetment	181

Work to construct the living shoreline will involve the installation of 16 wooden and vinyl vertical sills (each less than 100 feet long) and the restoration of estuarine marsh. Each sill will occupy approximately 0.5 square feet of estuarine bottom per each 6 linear feet. Short sections of sills will unavoidably require bisecting the landward edge of submerged aquatic vegetation for 155 linear feet due to the configuration of the submerged aquatic vegetation in relation to marsh vegetation. The living shoreline would include an expansion of the marsh habitat by removing the existing revetment and backfilling areas of the old revetment and open water areas with clean sand on the landward side of the sills to an elevation matching the existing patches of black needle rush (approximately +0.2 feet NAVD88) and planting these areas with plugs of black needle rush at 1 by 1-foot spacing. The living shoreline will establish 12,536 square feet of new marsh habitat.

The proposed breakwater sills and marsh restoration areas would be designed and sited to avoid impacts to submerged aquatic vegetation. There would be a beneficial impact on wetlands as a result of the living shoreline marsh restoration totaling 12,536 square feet. This aspect of the project would serve to self-mitigate impacts to vegetated marsh caused by the improved revetment. While fill within existing wetlands would be required for construction of the living shoreline, the impact of converting the existing sand bottom to a vegetated marsh habitat would provide a net functional benefit and would provide the best chance of marsh establishment and minimize the competitive pressure of *Phragmites australis* from becoming the dominant plant.

Once the road improvements, new sidewalk, and new revetment are completed, the total area of impervious surface within the Area of Environmental Concern will be slightly smaller than the existing at 53,504 square feet, resulting in a decrease of 1,686 square feet.

6.2.4 Coastal Barrier Resources

The Coastal Barrier Resources System (CBRS) is a system of protected coastal areas that includes ocean-front land, the Great Lakes and Other Protected Areas. Coastal barriers serve as important buffers between coastal storms and inland areas, often protecting properties on land from serious flood damage. Also, coastal barriers provide a protective habitat for aquatic plants and animals. The Coastal Barrier Resources Act (CBRA) of 1982 restricted development on the CBRS in an effort to protect the barrier system and prevent future flood damage. The project area is not within or adjacent to any identified CBRS Units (USFWS 2019); therefore, there would be no impact on Coastal Barrier Resources as a result of either the no-action alternative or the proposed action.

6.3 BIOLOGICAL RESOURCES

6.3.1 Fish and Wildlife

Vegetated upland areas comprise sections of sloping dunes with naturally occurring vines and herbs, mowed road shoulders dominated by grasses and common weedy plants, and forested areas. Common upland vegetation in the area includes live oak (*Quercus virginiana*), black cherry (*Prunus serotina*), loblolly pine (*Pinus taeda*), eastern red cedar (*Juniperus virginiana*), wax myrtle (*Morella cerifera*), yaupon holly (*Ilex vomitoria*), trumpet creeper (*Campsis radicans*), American beautyberry (*Phytolacca americana*), common broomsedge (*Andropogon virginicus*), Virginia creeper (*Parthenocissus quinquefolia*), American beach grass (*Ammophila breviligulata*), Asiatic dayflower (*Commelina communis*), cutleaf evening primrose (*Oenothera laciniata*), Chinese yam (*Dioscorea oppositifolia*), salt bush (*Baccharis halimifolia*), and greenbriar (*Smilax bona-nox*).

Wildlife in this environment includes songbirds, such as northern cardinal (*Cardinalis cardinalis*), eastern towhee (*Pipilo erythrophthalmus*), northern mockingbird (*Mimus polyglottos*), white-eyed vireo (*Vireo griseus*), and Carolina wren (*Thryothorus ludovicianus*); raccoon (*Procyon lotor*); eastern glass lizard (*Ophisaurus ventralis*); and gray fox (*Urocyon cinereoargenteus*).

There are a number of aquatic species common to the area that occur within the Currituck Sound, such as large-mouth bass (*Micropterus salmoides*), common sunfish (*Lepomis* spp.), and blue crabs (*Callinectes sapidus*).

Alternative 1: No Action

The no-action alternative would not involve any changes to the existing terrestrial or aquatic habitats within the project area; therefore, there would be no impact to these resources.

Alternative 2: Proposed Action

Impacts to upland vegetation under the proposed action would occur along a narrow strip of land on the east side of the roadway to accommodate the elevated roadway improvement. This area is occupied by live oaks with wax myrtle and greenbriar. Although some upland vegetation would be removed under the proposed action, these species are common to the region and their removal would not threaten the continued existence of the species.

Terrestrial wildlife would be disturbed during construction activities and would likely avoid the area due to the presence of construction equipment, materials, and activities. These impacts are expected to last the duration of construction. However, the species found in this habitat are common to the region and are well-adapted to the presence of human development. Therefore, no long-term impacts on wildlife species are anticipated from the proposed action.

Aquatic species within the Currituck Sound may avoid the project area during construction and may be displaced either temporarily (during construction) or long-term (until suitable habitat is re-established); however, there is plentiful habitat available within the Currituck Sound, and species would likely return to the area once construction is complete. Therefore, no long-term impacts on aquatic resources are anticipated from the proposed action.

6.3.2 Threatened and Endangered Species

The Endangered Species Act (ESA) of 1973 establishes a federal program to conserve, protect and restore threatened and endangered plants and animals and their habitats. ESA specifically charges federal agencies with the responsibility of using their authority to conserve threatened and endangered species. All federal agencies must ensure any action they authorize, fund or carry out is not likely to jeopardize the continued existence of an endangered or threatened species or result in the destruction of critical habitat for these species.

A desktop review of the Information for Planning and Consultation (IPaC) portal managed by the US Fish and Wildlife Service (FWS) indicates the following listed species as potentially occurring in Dare County:

- Animals
 - Northern long-eared bat (*Myotis septentrionalis*)
 - West Indian manatee (*Trichechus manatus*)
 - Eastern black rail (*Laterallus jamaicensis*)
 - Piping plover (*Charadrius melodus*)
 - Red knot (*Calidris canutus rufa*)
 - Red-cockaded woodpecker (*Picoides borealis*)
 - Roseate tern (*Sterna dougallii*)
 - Green sea turtle (*Chelonia mydas*)

- Hawksbill sea turtle (*Eretmochelys imbricata*)
- Kemp's Ridley sea turtle (*Lepidochelys kempii*)
- Leatherback sea turtle (*Dermochelys coriacea*)
- Loggerhead sea turtle (*Caretta caretta*)
- Plants
 - Seabeach amaranth (*Amaranthus pumilus*)

Following this desktop review, the site was visited in July 2019 and June 2022 by professional biologists and botanists to assess and document the conditions of the project area. The results and recommendations of those site visits were documented in a memorandum dated July 5, 2022, and is available in Appendix E.

As documented in the memorandum, professional wildlife biologist and botanists determined that no habitat is present for the following species on the IPaC list: Northern long-eared bat, piping plover, red know, red-cockaded woodpecker, roseate tern, and the seabeach amaranth. Therefore, it was determined that there was no potential for impacts on these species.

Based on the results of the IPaC review and the site visits, it was determined that the following species have the potential to occur within the project area:

- West Indian manatee
- Eastern black rail
- Sea turtles, including:
 - Green sea turtle
 - Hawksbill sea turtle
 - Kemp's Ridley sea turtle
 - Leatherback sea turtle
 - Loggerhead sea turtle

Alternative 1: No Action

The no-action alternative would not involve any changes to the existing habitats within the project area; therefore, there would be no impact to any threatened or endangered species.

Alternative 2: Proposed Action

Implementation of the proposed action has the potential to impact threatened and endangered species that occur within the project area; however, project design and location of construction activities would minimize or avoid those potential impacts. Impacts for each species occurring within the project area are discussed below. The impact analyses are based on an on-site analysis of habitats present within and adjacent to the construction limits and the behavior, range, and habitat requirements of each species.

West Indian manatee

The west Indian manatee occurs in tropical and subtropical warm waters where it feeds on subaquatic vegetation within estuaries, lagoons, canals, and freshwater rivers. Very rarely will manatees trek north along the eastern seaboard into the temperate zone as far north as North Carolina where food supplies are limited and waters are colder. While the project area maintains warm water temperatures during the summer months with a supply of subaquatic vegetation as a food source, immediate work area maintains a water depth of 1.5 to 3 feet, which is too shallow for manatee access. Construction activities would limit the use of heavy equipment to land or on temporary mats along the shoreline rather than barges or boats. This would remove the risk of injury to a manatee from boat collisions. Therefore, the project is determined to have no effect on the species.

Eastern black rail

The eastern black rail ranges from the mid-west to northeast and along the eastern and gulf coast states. This species utilizes freshwater and brackish marshes having dense, tall vegetation with a canopy sufficient to walk under. Home territories are around 1 to 3 acres in size. Though the project area contains marsh vegetation, it is not sufficient to provide habitat for the species. The project area contains small patches of marsh vegetation (namely *Juncus roemerianus*) that does not provide sufficient height coverage that this bird prefers. The narrow band of *Phragmites australis* found closer to the shoreline of the project area does not provide sufficient size to meet the home range requirements for the species. Therefore, the project is expected to have no effect on the eastern black rail.

Sea turtles

Sea turtle species with the potential to occur within the project area include green sea turtle, hawksbill sea turtle, Kemp's Ridley sea turtle, leatherback sea turtle, and loggerhead sea turtle. Sea turtles live most of their adult lifespan in oceans, with individuals occasionally entering tidal rivers and estuaries. Beaches along the Atlantic Ocean and Gulf of Mexico are the preferred nesting areas. The project site is situated on the bank of the Currituck Sound where no beach exists. While turtles may be within the Currituck Sound, the shallow waters of the project site are not likely a location where sea turtles would venture. Temporary construction noise will be relatively minimal for installation of the sills and revetment, and sea turtles will have vast areas of the Sound to travel away from the construction area. Therefore, the project will have no effect on these species.

6.3.3 Migratory Birds

The Migratory Bird Treaty Act of 1918 (MBTA) protects migratory birds, their parts, nests, and eggs from take, including killing, capture, transport, sale, and several other actions that are detrimental to the species, except when authorized by the U.S. Fish and Wildlife Service (USFWS) (U.S. Code 1989). The MBTA provides protections for a variety of bird species native to the U.S. that are not necessarily listed as threatened or endangered and therefore not protected by the ESA.

The Bald and Golden Eagle Protection Act of 1940 specifically protects eagles from take or disturbance, requiring a 660-foot buffer zone between any development or construction and an active eagle nest during the nesting season (U.S. Code 2004).

In compliance with the MBTA and the Bald and Golden Eagle Protection Act, searches were conducted using the IPaC database and The Cornell Lab of Ornithology eBird database (eBird). The IPaC database identifies birds of particular concern that may be present in the search area, including species listed under the USFWS Birds of Conservation Concern and species that require special attention in the project location. The eBird database compiles data submitted by citizen scientists of varying skill levels informally observing, identifying, and recording birds at a particular “hotspot.” Hotspots are geographical locations, including parks, golf courses, and cemeteries, from which users may submit eBird checklists containing species data.

The IPaC database identified 15 species of concern with the potential to occur in the project area. These species are listed in Table 3 below, along with their breeding season, where applicable. Only 10 of the birds listed breed in the area, mostly during the spring and summer.

Table 3. Migratory Birds Identified by IPaC Database

Common Name	Scientific Name	Breeding Season
American oystercatcher	<i>Haematopus palliatus</i>	April 15 – August 31
Bald eagle	<i>Haliaeetus leucocephalus</i>	September 1 – July 31
Black skimmer	<i>Rynchops niger</i>	May 20 – September 15
Clapper rail	<i>Rallus crepitans</i>	April 10 – October 31
Dunlin	<i>Calidris alpina arcticola</i>	Breeds elsewhere
Least tern	<i>Sterna antillarum</i>	April 20 – September 10
Prairie warbler	<i>Dendroica discolor</i>	May 1 – July 31
Prothonotary warbler	<i>Protonotaria citrea</i>	April 1 – July 31
Red-throated loon	<i>Gavia stellata</i>	Breeds elsewhere
Ruddy turnstone	<i>Arenaria interpres morinella</i>	Breeds elsewhere
Seaside sparrow	<i>Ammodramus maritimus</i>	May 10 – August 20
Semipalmated sandpiper	<i>Calidris pusilla</i>	Breeds elsewhere
Whimbrel	<i>Numenius phaeopus</i>	Breeds elsewhere
Willet	<i>Tringa semipalmata</i>	April 20 – August 5
Wilson’s plover	<i>Charadrius wilsonia</i>	April 1 – August 20

The nearest eBird hotspot to the project area is the Duck Park Boardwalk. This hotspot is located approximately 0.7 miles to the south of the proposed project area. A total of 1,650 complete checklists have been submitted by eBird users from this location. Across all checklists submitted from this hotspot, 240 distinct species have been recorded. This includes waterfowl, raptors, and a large number of songbirds, also called passerines.

Many of the passerines identified in these searches prefer forested habitat or manmade yards. Others, including the waterfowl and shorebirds identified, require dunes, beaches, or marshland. The project area does not possess any suitable breeding habitat for the bird species identified, as it lies along a short stretch of shoreline that is occupied by a roadway and revetment.

Alternative 1: No Action

The no-action alternative would not involve any changes to the existing habitats within the project area; therefore, there would be no impact to any migratory bird species.

Alternative 2: Proposed Action

The barrier islands of the Outer Banks provide important habitats for nesting, migrating, and overwintering birds of all kinds. The project area consists of an existing paved road and sidewalk abutting a shoreline with a stone revetment. Waterward of the revetment are small patches of marsh vegetation. The project will not directly affect existing habitats available for migratory bird usage because none exists within the project area boundaries. The proposed shoreline work using sills is expected to protect the existing marsh from further erosion and loss, which would result in an indirect benefit on habitat for migratory birds. In addition, the project includes artificially increasing the reach of marsh and shrub habitats via a living shoreline design that will add to the shoreline habitat available for migratory birds.

Construction would take place over several months in the winter. As such, construction activities may cause some temporary disturbance of birds using the area to forage but would avoid breeding periods. Some species identified by eBird, such as house sparrow (*Passer domesticus*), laughing gull (*Leucophaeus atricilla*), and Canada goose (*Branta canadensis*) are well-adapted to human presence and may forage along roads and similar structures. However, these species are highly mobile and are thus unlikely to be impacted by project activities. Any other applicable nationwide conservation measures for migratory birds established by the FWS would be included in construction specifications. Examples of relevant conservation measures include (but are not limited to) the following:

- Educate all employees, contractors, and/or site visitors of relevant rules and regulations that protect wildlife.
- Provide enclosed solid waste receptacles at all project areas. Non-hazardous solid waste (trash) would be collected and deposited in the on-site receptacles. Solid waste would be collected and disposed of by a local waste disposal contractor.
- Minimize project creep by clearly delineating and maintaining project boundaries (including staging areas).

- Implement standard soil erosion and dust control measures. For example: establish vegetation cover to stabilize soil; use erosion blankets to prevent soil loss; and water bare soil to prevent wind erosion and dust issue.
- Schedule all vegetation removal, trimming, and grading of vegetated areas outside of the peak bird breeding season to the maximum extent practicable.
- When project activities cannot occur outside the bird nesting season, conduct surveys prior to scheduled activity to determine if active nests are present within the area of impact and buffer any nesting locations found during surveys.
- Prepare a vegetation maintenance plan that outlines vegetation maintenance activities and schedules so that direct bird impacts do not occur
- For temporary and permanent habitat restoration/enhancement, use only native and local (when possible) seed and plant stock.

See Appendix F for a complete list of the nationwide conservation measures. Because conservation measures would be in place, construction activities would not result in adverse impacts on migratory birds.

6.3.4 Areas with Special Designation

Areas with special designation include conservation areas, wildlife refuges, parklands, and/or other ecologically critical or threatened areas. There are no areas with special designation within the vicinity of the project area; therefore, there would be no impact on areas with special designation as a result of either the no-action alternative or the proposed action.

6.4 HAZARDOUS MATERIALS

Two of the main Federal laws that address hazardous and toxic materials issues are the Comprehensive Environmental Response Compensation and Liability Act of 1980 (CERCLA; 42 U.S.C. §9601 et seq.) and the Resource Conservation and Recovery Act of 1976 (RCRA; 42 U.S.C. §6901 et seq.). CERCLA, commonly known as Superfund, has the major objectives to identify hazardous and toxic material sites, determine liability, and oversee the cleanup. The Resource Conservation and Recovery Act (RCRA) is the public law that creates the framework for the proper management of hazardous and non-hazardous solid waste. The law describes the waste management program mandated by Congress that gave EPA authority to develop the RCRA program. Within North Carolina, the NCDEQ has authorization from EPA to administer and enforce that state's hazardous waste management rules. The state's more stringent rules apply to hazardous waste generators; transporters; owners and operators of hazardous waste treatment, storage, and disposal facilities; and handlers of used oil. The state's rules for handlers of universal wastes parallel the federal requirements.

A search of available environmental records was conducted utilizing the EPA Envirofacts and NEPAassist databases. These websites provide points of access to EPA data about environmental activities that may affect air, water, and land anywhere in the United States. Based on the search results of the databases, there are no EPA regulated facilities within the project area, and there were no reports or indicators of hazardous and/or toxic chemicals identified within the project area (EPA 2021 and 2022). One hazardous waste generator facility was identified approximately 0.8 mile from the southern point of the project area, and about 0.3 mile from the proposed staging area. According to the NEPAassist database, the site is a very small quantity generator located at 1171 Duck Road (EPA 2022).

Alternative 1: No Action

There would be no change to the existing conditions of hazardous materials as a result of the no-action alternative; therefore, there would be no impacts related to hazardous materials.

Alternative 2: Proposed Action

Under the proposed action, construction activities would occur within 1-mile of an identified EPA hazardous materials site; however, the identified site is that of a small generator, and because of its distance from the project area, it would not be directly affected by implementation of the proposed action or construction activities. The identified generator site would continue to have no impact on the project area. Additionally, demolition debris and unusable fill generated during construction activities will be properly disposed at a NCDEQ landfill or permitted site if not salvageable.

6.5 SOCIOECONOMIC RESOURCES

6.5.1 Socioeconomic Issues

Dare County, including the Town of Duck, has an economic base that relies largely on tourism and recreation. Commercial activity contributes to local socioeconomic resources in the form of tourism and associated tourist recreation, surfing, home construction, fishing, landscaping, and other general residential and commercial services. Visitor spending in Dare County amounted to \$1.27 billion in the 2019/2020 fiscal year, resulting in \$116.5 million in state and local tax revenues (Outer Banks of North Carolina 2021).

There are 2,958 total housing units in the Town of Duck including 288 occupied units and 2,670 vacant (vacation) units. The town is also home to a growing retirement population, attracted to the area by the mild climate and beautiful natural surroundings. The median age of the town population is 62.8 years, while the median age of North Carolina and the United States overall is 38.7 years and 38.5 years, respectively (US Census Bureau 2010 and 2019).

From 2010 to 2019, the year-round population of Duck grew at a rate of about 58 percent; in 2010 the population was 369 and in 2019 the population was 583 (US Census Bureau 2010 and 2019). Of the year-round population, the median household income in 2019 was \$87,500 and 3.8 percent of the population had an income below the poverty level. Approximately 2.2 percent of the population identifies as Black or African American, American Indian and Alaska Native, Asian, Native Hawaiian or Pacific Islander, or Hispanic or Latino (US Census Bureau 2019). Table 4 below compares the population demographics of Duck to the State of North Carolina and the United States overall.

Table 4. Comparison of Population Demographics

Demographic Category	Town of Duck	North Carolina	United States
Median Household Income (dollars)	\$87,500	\$54,602	\$65,712
Population Below Poverty Level (%)	3.8%	14.7%	12.3%
Median Age (years)	62.8	38.7	38.5
Population (persons)	583	10,264,876	328,239,523
White (not Hispanic or Latino) (%)	97.8%	63.1%	60.0%
Black or African American (%)	0.0%	21.4%	12.8%
American Indian or Alaska Native (%)	0.0%	1.2%	0.9%
Asian (%)	0.3%	2.9%	5.7%
Native Hawaiian or Other Pacific Islander (%)	0.0%	0.1%	0.2%
Hispanic or Latino (%)	1.2%	9.4%	18.4%
Two or More Races (%)	0.7%	2.7%	3.4%

Source: US Census Bureau 2010 and 2019

The total population of Dare County was 36,222 in 2019, a 6.8% increase over the 2010 population of 33,920 (US Census Bureau 2019). The tax base in Dare County also grew by 26% in 2020 (County of Dare North Carolina 2020). Dare County collects a 6% Occupancy Tax, which is collected when visitors rent short-term lodging such as room rentals, lodging, and campsite rentals. It also collects a 1% tax on food and beverages served. Revenue from the Occupancy and Food and Beverage Tax is used toward emergency services; tourist-related services including tourism promotion and refuse and solid waste disposal; and beach nourishment. In 2019, the Town of Duck accounted for 14% of the occupancy and meals tax collections within Dare County (County of Dare North Carolina 2020).

Alternative 1: No Action

Under the proposed action, there would be an overall benefit to socioeconomic resources within the Town and the adjacent Currituck County to the north. The improvements made to the roadway infrastructure as well as the living shoreline would result in NC 12 flooding less frequently, and therefore, reducing the frequency and duration of road closures within the project area. This would result in less frequent disruption of access to homes, businesses, and tourist destinations in the Town and in Currituck County to the north. In turn, the proposed action would result in less economic disruption due to flooding of NC 12 within the project area because there would be more reliable access to tourist destinations and businesses after storm events. There would also be a benefit on local jobs (and recruitment potential) in these areas through improved reliability of access for consumers and employees.

Alternative 2: Proposed Action

Under the proposed action, there would be an overall benefit to socioeconomic resources within the Town and the adjacent Currituck County to the north. The improvements made to the roadway infrastructure as well as the living shoreline would result in NC 12 flooding less frequently, and therefore, reducing the frequency and duration of road closures within the project area. This would result in less frequent disruption of access to homes, businesses, and tourist destinations in the Town and in Currituck County to the north. In turn, the proposed action would result in less economic disruption due to flooding of NC 12 within the project area because there would be more reliable access to tourist destinations and businesses after storm events. There would also be a benefit on local jobs (and recruitment potential) in these areas through improved reliability of access for consumers and employees.

6.5.2 Zoning and Land Use

Duck Village, located to the south of the project area, consists of a Town Park, Town Hall, and businesses comprised of retail, restaurants, and tourist-oriented shops. The remainder of the Town's land uses are dominated by single-family residential neighborhoods, with a few multi-family residential structures, small pockets of commercial uses, and a primary resort destination (the Sanderling Resort). The Town operates its own police, fire, and ocean rescue services from a public safety building north of the project area.

Zoning

Zoning within the project area consists primarily of single-family residential with small areas of commercial areas on the north and south ends of the project area. There would be no alteration to existing zoning within or adjacent to the project area; therefore, neither the no-action alternative

nor the proposed action would result in impacts on zoning. Both the no-action alternative and the proposed action are consistent with existing zoning within the project area.

Prime Farmland

The Farmland Protection Policy Act was enacted in 1981 (P.L. 98-98) to minimize the unnecessary conversion of farmland to nonagricultural uses as a result of federal actions. In addition, the Act seeks to assure that federal programs are administered in a manner that will be compatible with state and local policies and programs that have been developed to protect farmland. The policy of the Natural Resources Conservation Service is to protect significant agricultural lands from conversions that are irreversible and result in the loss of an essential food and environmental resource. The Service has developed criteria for assessing the effects of federal actions on converting farmland to other uses, including a Farmland Conversion Impact Rating form AD-1066 that documents a site-scoring evaluation process to assess its potential agricultural value. There are no Prime or Unique Farmlands within the project area or its vicinity; therefore, there would be no impacts on Prime or Unique Farmlands under any alternative.

6.5.3 Visual Resources

Assuring aesthetically pleasing surroundings for all Americans is one of the goals identified in Section 101 of NEPA, and visual impacts are included among environmental effects evaluated by federal agencies prior to making decisions.

The nearby ocean, waterways, coastal marshes, beaches, and dunes in Duck contribute to unique aesthetics common to coastal North Carolina communities. Currently, the existing aesthetic character of the project area consists of a 2-lane road with sidewalks edged by coastal marsh and the Currituck Sound as well as low-density residential and commercial properties. The low-density properties have a coastal suburban aesthetic and are generally 1 to 4 stories in height. There are generally unobstructed views of the Currituck Sound from the project area, though some small pockets of low vegetation exist at the southern end of the project area. The adjacent residential properties on the east side of the roadway are partially obscured from view from the project area by vegetation. Views looking north and south along the project area are limited due to the gentle curves of the roadway and canopy trees on the east side.

Alternative 1: No Action

There would be no change in visual resources or the aesthetic character of the project area under the no-action alternative; therefore, there would be no impacts on visual resources.

Alternative 2: Proposed Action

Under the proposed action, there would be no change to the overall aesthetic character of the project area. Elevating the road 5 to 6 feet would not noticeably alter the views from the project area, and it would not obstruct any views of the Currituck Sound from adjacent properties. The shoreline improvements, including the living shoreline, would be consistent with the aesthetic character of the project area. The proposed sills would only be about 18 inches above the normal water elevation, which would not obstruct views of the Currituck Sound. The marsh vegetation that would be installed to create the living shoreline would visually screen the sills from the roadway once fully established, which would limit the visual disruption from the scenic views of the Sound. The new bicycle and pedestrian infrastructure improvements would be consistent with the existing roadway and the Town's Comprehensive Pedestrian Plan and would not alter the character of the project area. Overall, the project area would retain its coastal North Carolina aesthetic and views of the Currituck Sound. Temporary impacts on visual resources would occur during construction activities when equipment and materials would be located within the project area and would disrupt the appearance and visual character of the project area. After construction, any areas disturbed would be returned to the aesthetic condition that existed prior to implementation of the proposed action. Therefore, there would be no long-term impacts on visual resources.

6.5.4 Noise

The Noise Control Act was enacted in 1972 (P.L. 92-574). Inadequately controlled noise presents a growing danger to the health and welfare of the nation's population. The major sources of noise include transportation vehicles and equipment, machinery, appliances, and other products in commerce, climate, or recreation. Sounds that disrupt normal activities or otherwise diminish the quality of the environment are designated as noise. Noise can be stationary or transient, intermittent, or continuous. Within the project area, noise primarily comes from traffic along NC-12 as well as commercial use of the land to the east of NC-12 near Cook Road and near Barrier Island Station.

Alternative 1: No Action

There would be no changes to the noise level within the project area under the no-action alternative; therefore, there would be no impacts on noise.

Alternative 2: Proposed Action

The proposed action would result in a temporary increase in noise levels during construction activities. It is anticipated that traditional types of commercial construction equipment would be used such as earthmoving equipment, small to medium size cranes, and storage containers.

However, construction activities would be limited to Monday through Saturday from 7 am to 6 pm, which is in compliance with the Duck, North Carolina Code of Ordinances, Title IX, Chapter 91, Section 91.36(I). Equipment and machinery utilized at the site would be required to meet all State and Federal noise regulations and all have sound control devices no less effective than those provided on the original equipment (i.e., mufflers or other noise abatement devices that come standard with the equipment from the factory). Impacts related to noise would be temporary in nature and would revert to existing conditions following completion of the construction activity. The proposed action is not expected to substantially increase use of the project area; therefore, no long-term impacts on noise within the project area would occur.

6.5.5 Public Services and Utilities

NC 12 is a two-lane road running north-south through the Town of Duck and is critical for the Town and communities to the north because it is the primary access route for supplies, emergency management services, service personnel, visitors, and government business. This roadway provides access to food, water, transportation, and shelter for local communities and visitors. NC 12 provides emergency access to hospitals south of the project area, as well as access for local fire and police and other first responders. The Town's Public Safety Building, which includes the Duck Fire Department, and the Duck Police Department is located off of NC 12 north of the project area, as are the following Currituck County facilities:

- Corolla Fire & Rescue
- Corolla Fire Station 61
- Currituck County Sheriff's Office
- Carova Beach Volunteer Fire Department

There are no hospitals or medical facilities north of the project area; therefore, NC 12 through the project area is the most critical transportation corridor in Duck.

Additionally, other critical infrastructure and public utilities (e.g., public water, electricity, and telecommunications) lies within the road right-of-way and are threatened by roadway erosion and washout. There is an existing 8-inch water main located in the northbound lane of NC 12. Several franchise utility lines are located within the right-of-way of NC 12, including electric, telephone, cable, and fiber optic services. There is no sanitary sewer infrastructure because all the developments are on septic drain fields.

Alternative 1: No Action

Under the no-action alternative, the high vulnerability of NC 12 within the project area to flooding, erosions, and washout would continue to result in adverse impacts on public services and utilities for the entire town, as well as communities to the north. During future flood events that force the closure of NC 12 through the project area, residents and visitors in the Town would be cut off from

access to medical services, evacuation routes, and other necessities, as they are under existing conditions. During times that NC 12 is flooded (or closed in the case of erosion and washout) within the project area, all emergency management services to the north would be cut off from access to hospitals and other emergency services; there are no hospitals or medical centers north of the project area. Additionally, other critical infrastructure (e.g., public water, electricity, and telecommunications) would remain in its existing location and within the road right-of-way and would continue to be threatened by roadway erosion and washout.

Under the no-action alternative, the current risk factors affecting the Town and communities to the north, including erosion and damage during severe weather events, would continue or worsen. NC 12 would remain vulnerable to continued flooding, erosion, and overwash and would continue to be at a higher risk for future roadway damage. Given current conditions and anticipated future relative sea-level rise, there is an increased risk for NC 12 to be closed due to storm damage and remain closed until repairs to the roadway and utilities are completed. Because this is the only north-south connection through the Town and to points north, as well as the major artery through the local communities, closures of NC 12 would cut off residents and visitors from important public services and supplies such as hospitals and medical centers.

Alternative 2: Proposed Action

Under the proposed action, there would be an improved reliability of transportation circulation along NC 12 through the project area because there would be a reduction in the frequency of flood events, and thus a reduction in the frequency of road closures. A reduction in closures would allow access to emergency medical services, hospitals, grocery stores, and other public services accessed via NC 12 to be maintained or restored more quickly after storm events. The proposed action would ensure a more reliable route for emergency management services, including police and fire response services, over the existing conditions or alternative 1. Because NC 12 would be less vulnerable to severe damage from such events, NCDOT would be better able to clear the road of debris and reopen the road more quickly when compared to alternative 1. This would allow for faster response of emergency supplies and personnel to areas in need north of the project area after a major storm event.

Because the roadway would be less vulnerable to damage due to storm events, existing utilities within the right-of-way (e.g., public water, electricity, and telecommunications) would be better protected and less vulnerable to exposure caused by erosion during storm events. This would result in more reliable public utilities and services because there would be less frequent disruptions caused by major flood events.

6.5.6 Traffic and Circulation

As discussed above, NC 12 is the only north-south circulation pattern through the town of Duck and to/from Currituck County to the north. All traffic traveling from the mainland of North Carolina to destinations in the Town or Currituck County pass through the project area along NC 12. According to the Town of Duck Police Department traffic count records, roughly 65,000 vehicles traveled through the Town along NC 12 each week during the 2021 peak season (June through August) (Town of Duck Police Department). When the peak season traffic is averaged with the low season, NCDOT estimates that the annual average daily traffic count through the project area is 6,900 vehicles per day (NCDOT 2019).

Five local roads connected to NC 12 within the project area on the east side of the road. These roads are cul-de-sacs that lead into residential neighborhoods in an east-west orientation. There are no parking areas on NC 12, though adjacent businesses on the west side of the road have parking lots with access directly from NC 12.

A pedestrian sidewalk currently exists on the east side of the road, providing pedestrian access through the project area and connecting local neighborhoods with local businesses. Similarly, bicycle lanes are striped on the road shoulders, providing similar access and connectivity to cyclists.

Alternative 1: No Action

Under the no-action alternative, traffic circulation and access would continue to be temporarily cut off or limited during and/or after flood events. These disruptions would also occur to the existing bicycle lanes and the existing sidewalk on the east side of NC 12. If flooding occurs in the vicinity of the businesses on the west side of NC 12, access into their parking lots may be cut off or limited as well. The duration of these closures and disruptions to access would depend on the intensity of the flood event and related damage to the road infrastructure.

Alternative 2: Proposed Action

Under the proposed action, the reliability of NC 12 to remain open during and after storm events would increase due to the reduced flood risk. This would be a long-term beneficial impact on traffic circulation and storm evacuation through the project area as well as to and from destinations north. Access to the parking areas of local businesses on the west side of NC 12 through the project area would also more reliably remain open during and after storm events, resulting in a beneficial impact.

Pedestrian circulation and access would be improved via the proposed sidewalk on the west side of the road, connecting to an existing sidewalk on the north end of the project area. This would provide a more comfortable walking experience for those walking along the west side of NC 12.

Similarly, the proposed bicycle facilities would improve the bicycle connectivity through the project area and in turn, the broader region.

The proposed action would not directly result in a change in vehicular traffic volume through the project area or along NC 12 overall. The proposed sidewalk and improved bicycle facilities may result in more people walking or biking through the project area due to the more comfortable setting for these modes of transportation, but it is not anticipated to be a discernible increase.

There would be some disruption to traffic patterns during construction, including temporary lane closures for a duration of about four to six months; however, at least one lane of NC 12 would remain open throughout the construction period. All work would take place outside of hurricane season to ensure that both lanes would be available if evacuation is required. The community would be notified in advance of all road closures and a schedule of construction work would be available. The existing bicycle lane and sidewalk would be closed during construction, which would restrict pedestrian access through the project area and would require cyclists to share the roadway with vehicular traffic. Construction may also disrupt access to business and local roads connecting to NC 12, but access would not be completely cut off during construction. These closures and disruptions would be temporary and would be restored after construction activities are completed. Roadway elevation work, including the installation of a storm chamber, is anticipated to occur before construction of the living shoreline.

Roadway improvements, bicycle lanes, and the sidewalk would be designed in accordance with applicable design criteria, including the NCDOT *Roadway Design Manual*, the US DOT Federal Highway Administration *Manual on Uniform Traffic Control Devices for Streets and Highways*, the American Association of State Highway and Transportation Officials (AASHTO) *Guide for the Development of Bicycle Facilities*, and the AASHTO *Guide for the Planning, Design, and Operation of Pedestrian Facilities*. Construction related to the proposed action would also abide by Occupational Safety and Health Administration (OSHA) regulations, as well as state and local ordinances and regulations, related to creating a safe construction zone for the public.

6.5.7 Environmental Justice

On February 11, 1994, President Clinton signed EO 12898, entitled "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations." The EO directs federal agencies to focus attention on human health and environmental conditions in minority and/or low-income communities. Its goals are to achieve environmental justice, fostering non-discrimination in federal programs that substantially affect human health or the environment and to give minority or low-income communities greater opportunities for public participation in and access to public information on matter relating to human health and the environment. The EO also directs federal agencies to identify and address, as appropriate, disproportionately high and adverse

human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States.

FEMA uses the best available data, including Census Block Group and EPA's Environmental Justice Screening and Mapping Tool (EJSCREEN) Version 2.1 to identify populations at risk for potential environmental justice concerns. Where there is a potential for disproportionately high or adverse effects based on the Proposed Action Alternative, FEMA consults with EPA and incorporates recommendations for mitigating those effects. An EJ Screen Report (Appendix G) was formulated from the EJSCREEN Version 2.1 and a census block group due to the estimated population size of 1,500 people within the study area, a census block group evaluation was used as the project area was centered within the census block. This is the smallest geographic unit for which the U.S. Census Bureau publishes data between the decennial censuses. According to the Census Bureau, "a block group should contain either at least 600 people or at least 240 housing units at minimum, and 3,000 people or 1,200 housing units at maximum." A block group in a dense urban area may span a few city blocks; one in a rural area may span many square miles. EPA's EJSCREEN tool utilizes block group data (U.S. Census Bureau (federalregister.gov), 2018). FEMA reviewed the report's table on page 3 of 3 and compared the selected variables with the value(s) in the block group to the state (NC) average. Results of the comparison indicates that no minority or low-income populations were identified through the EJSCREEN report for the area around proposed project area.

Additionally, the Town of Duck informed FEMA that no impacts related to environmental justice would occur as a result of the proposed action for the following reasons:

- The planning team solicited public participation as part of the planning process and gave equal consideration to all input from persons regardless of age, race, income status, or other socioeconomic or demographic factors.
- Implementation of the proposed action would not result in any identifiable adverse human health effects. Therefore, there would be no direct or indirect adverse impacts on any minority or low-income population.
- The impacts associated with implementation of the proposed action would not disproportionately affect any minority or low-income population or community.
- Implementation of the proposed action would not result in any identified effects that would be specific to any minority or low-income community.

6.5.8 Historic and Cultural Resources

Cultural resources include historic architectural properties (including buildings, structures, and objects), prehistoric and historic archaeological sites, historic districts, designed landscapes, and traditional cultural properties. The primary federal statutes that apply to cultural resources are the National Environmental Policy Act (NEPA) and Section 106 of the National Historic Preservation

Act of 1966 (NHPA), as amended. The NHPA created the National Register of Historic Places (NRHP) and criteria to determine if cultural resources are eligible for listing in the NRHP. The NHPA defines historic properties as any prehistoric or historic district, site, building, structure, or object that is listed in, or eligible for listing in, the NRHP (36 CFR 800.16). When NRHP-eligible properties are present, federal agencies must assess the effect of the undertaking on them and consider ways to avoid, minimize, or mitigate potential adverse effects.

As defined in 36 CFR § 800.16(d), the Area of Potential Effect (APE), “is the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if such properties exist.” In addition to identifying historic properties that may exist in the proposed project’s APE, federal agencies must also determine, in consultation with the appropriate State Historic Preservation Officer (SHPO) and interested Tribal Historic Preservation Officers (THPO), what effect, if any, the action will have on historic properties.

FEMA evaluated potential resources in the Area of Potential Effects (APE) utilizing the National Park Service (NPS) National Register of Historic Places (NRHP) GIS resource, the North Carolina HPOWEB site, and previous cultural resource investigations. FEMA obtained information regarding previously recorded archaeological sites within 0.5 miles of the APE from the NC Office of State Archaeology (OSA).

Archaeological Resources and Historic Properties

The project area is located in the coastal community of Duck in the Outer Banks of North Carolina. This portion of the barrier islands was largely undeveloped until the 1970s, although NC Highway 12 was constructed prior to 1940. The project area is comprised of Newhan fine sand (NeC) with 0 to 10 percent slopes and Dune land-Newhan complex (DwE) with 2 to 40 percent slopes. It is not considered prime farmland. (USDA NRCS 2022). The project site consists of land that has been previously disturbed for the construction of the existing roadway over numerous building campaigns (NC HWY 12), sidewalk, parking lots/driveways, and existing riprap. Around 2003, the existing revetment of broken concrete along the shoreline was installed. The APE for archaeological resources is defined on the basis of construction plans and encompasses the limits of the proposed project, permanent and temporary easements, and the footprint for the proposed construction of the stormwater drainage system, elevation of the existing roadway, and living shoreline construction. Because of this previous ground disturbance, the existence of intact, substantial archaeological resources occurring within the project area is unlikely. No archaeological sites were identified within the APE.

There were two previously recorded archaeological sites within a one-mile radius of the APE. Duck Dunes (31Dr3), located 0.35 miles NE of the APE. Duck Dunes is a site that was identified as a circular depression with sherds, bottle fragments, iron nails and points. The survey form indicated that the location was on a dune and likely had 19th Century dwellings situated in the

area. The report indicated possible Native American occupation of the site but did not indicate whether any artifacts were discovered during the investigation. OSA has not reviewed this site for eligibility for listing in the NRHP. However, due to the distance from the APE, the site will not be impacted by the proposed work.

The second site (31Dr55) was identified as a previously demolished structure dating to the 19th Century which had been constructed on a wooded dune. Only a scatter of bricks and concrete slab remained of the dwelling when the site was recorded in 1976. Artifacts located at the site included pearlware, porcelain, whiteware, stoneware, brick and mortar fragments, nails, glass bottles, windowpanes as well as oyster shell and mammal bones. This property was previously deemed not eligible by the North Carolina Office of State Archaeology. According to aerial maps, this site has since been developed with modern dwellings.

For above ground resources, the APE included identification of historic properties located adjacent to the construction of a stormwater chamber, proposed elevation of the roadway, and living shoreline construction in Duck, North Carolina. The review found there are no properties listed in or eligible for listing in the National Register of Historic Places or National Historic Landmarks, no known historic structures, historic cemeteries, or historic bridges within the proposed project area. Duck, NC was largely undeveloped until the mid- to late-twentieth century. Aerial imagery indicates that modern development did not begin to occur in the area until the 1970s. Development patterns appear to be sparse until the 1980s. While most of the development immediately adjacent to the project is less than 45-year in age, one resource at 101 Dune Road (circa 1974) was identified in the viewshed. Due to loss of material integrity, the property was determined not eligible for listing in the NRHP were identified within the viewshed of the project area.

Alternative 1: No Action

There would be no changes to any historic property as a result of the no-action alternative; therefore, there would be no impacts on these resources. There would be no ground disturbance under the no-action alternative; therefore, there would be no impact to archeological or historic properties.

Alternative 2: Proposed Action

Under the proposed action, there would be no historic properties affected. The project footprint would not directly impact any nearby buildings or structures. Additionally, the raised road would not obstruct or diminish existing views from any adjacent properties toward the Currituck Sound. The proposed action would not result in changes to historic circulation patterns, land use, or setting of the project area. No impacts on archaeological resources are anticipated as a result of the proposed action because the occurrence of these resources within the project area is unlikely. In accordance with Section 106 of the NHPA, and the implementing regulations, 36 CFR Part 800, FEMA consulted with the North Carolina Department of Natural and Cultural Resources (SHPO)

and federally recognized Tribes with an ancestral interest in the project area the Catawba Indian Nation, Seminole Nation of Oklahoma and the Shawnee Tribe on September 12, 2022, with a finding of No Historic Properties Affected for this undertaking in accordance with 36 CFR § 800.4(d)(1). FEMA specified the following conditions to be placed on the project for the treatment of fortuitous finds or unexpected discoveries during ground disturbing activities within the project area:

If in the unlikely occurrence that any unknown archaeological resources are uncovered during ground-disturbing activities, all work in the immediate vicinity of the discovery would be halted until the resources are identified, documented, and an appropriate mitigation strategy developed, if necessary, in accordance with pertinent laws and regulations, including Section 106 of the National Historic Preservation Act. FEMA specified the following conditions to be placed on the project for the treatment of fortuitous finds or unexpected discoveries during ground disturbing activities within the project area:

- If human remains or intact archaeological features or deposits (e.g. arrowheads, pottery, glass, metal, etc.) are uncovered, work in the vicinity of the discovery will stop immediately and all reasonable measures to avoid or minimize harm to the finds will be taken. The subrecipient will ensure that archaeological discoveries are secured in place, that access to the sensitive area is restricted, and that all reasonable measures are taken to avoid further disturbance of the discoveries. The subrecipient's contractor will provide immediate notice of such discoveries to the applicant. The subrecipient shall contact the North Carolina State Archaeologist and FEMA within 24 hours of the discovery. Work in the vicinity of the discovery may not resume until FEMA has completed consultation with SHPO, Tribes, and other consulting parties as necessary. In the event that unmarked human remains are encountered during permitted activities, all work shall stop immediately, and the proper authorities notified in accordance with North Carolina North Carolina Statutes, Section 70-29.
- Any changes to the approved scope of work will require submission to, and evaluation and approval by, the State and FEMA, prior to initiation of any work, for compliance with Section 106.
- Prior to conducting repairs, applicant must identify the source and location of fill material and provide this information to NCEM and FEMA. If the borrow pit is privately owned, or is located on previously undisturbed land, or if the fill is obtained by the horizontal expansion of a pre-existing borrow pit, FEMA Section 106 consultation will be required. Failure to comply with this condition may jeopardize FEMA funding; verification of compliance, review and follow-up consultation by FEMA-EHP will be required at project closeout.

FEMA received responses from the Catawba Indian Nation on October 13, 2022, and SHPO on October 14, 2022 concurring with FEMA’s finding of No Historic Properties Affected. The SHPO further noted that: “based on our knowledge of the area, it is unlikely that any archaeological resources that may be eligible for inclusion in the National Register of Historic Places will be affected by the project. We (NC SHPO), therefore, recommend that no archaeological investigation be conducted in connection with this project.”. Therefore, under the Proposed Action Alternative no impacts to historic properties to historic properties or archaeological resources would occur.

7.0 CUMULATIVE IMPACTS

According to NEPA, cumulative impacts are defined as “the impact on the environment which results from the incremental impact of the action when added to other past, present, or reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions” (40 CFR 1508.7). Cumulative impacts were evaluated based on general descriptions of past, present, and reasonably foreseeable projects in the vicinity of the project area. Their impacts were considered for both proposed action and the no-action alternative.

Past, Present, and Reasonably Foreseeable Projects

Two projects were identified that may contribute to cumulative impacts of the project. These include the installation of living shoreline in Duck Town Park and the extension of the northern end of the town boardwalk. These projects are summarized below.

Duck Town Park is located along NC 12 in the heart of Duck Village (roughly a half-mile south of the project area for the Living Shoreline and NC 12 Resiliency project). The living shoreline project at Duck Town Park involves the installation of breakwater sills and a riprap revetment, the protection of existing marsh, and the restoration of marshland. These improvements would protect coastal habitat and mitigate shoreline erosion, both of which threaten the adjacent roadway and private property. Project activities related to the living shoreline are anticipated to begin during late 2022.

The northern extension of the Town’s boardwalk involves the lengthening of the existing boardwalk to reach a northern terminus at the Resort Realty property, which is located at the southern extent of the project area for the Living Shoreline and NC 12 Resiliency project. For the boardwalk project, the proposed boardwalk extension would connect to the existing Duck Village sidewalk and public amenities and link the Resort Realty site with nearby commercial areas. Additionally, the boardwalk project would provide an opportunity to highlight the proposed living shoreline, which would be installed at nearby Duck Park. The boardwalk extension is anticipated to begin in 2024.

Alternative 1: No Action

The no-action alternative would not result in any impacts on resources that would be affected by the past, present, and reasonably foreseeable projects discussed above; therefore, the no-action alternative would not contribute to the cumulative impact of those projects.

Alternative 2: Proposed Action

Both the Duck Town Park living shoreline project and the proposed action would contribute to the overall resiliency of NC 12 and allow the Town of Duck to better adapt to and recover from the effects of climate change and sea level rise. The two projects would protect separate but nearby areas of NC 12, which would cumulatively protect a larger portion of the roadway than either would independently. Overall, the proposed action would contribute a beneficial increment to the cumulative impact related to improving resiliency of the Town and of NC 12.

The extension of the Town Boardwalk would improve pedestrian connections to and between recreational and commercial areas of the Town. The proposed action would contribute to these connections by providing additional pedestrian and bicycle facilities from the Town Boardwalk to points north. When considered together, these two projects would improve the overall pedestrian connectivity throughout the Town, which would be consistent with the Town’s Comprehensive Pedestrian Plan and would further the goals to create a pedestrian-focused Town. Overall, the proposed action would contribute a beneficial increment to the cumulative impact related to improved pedestrian and bicycle connectivity throughout the Town.

8.0 BEST MANAGEMENT PRACTICES, MINIMIZATION, AND MITIGATION MEASURES

This chapter summarizes the best management practices that would be utilized during project implementation as well as measures to avoid, minimize, and mitigate adverse impacts on resources within the project area.

General Measures

The following general best management practices and measures to avoid, minimize, and mitigate impacts would be implemented:

- The applicant is responsible for obtaining and complying with all required local, State and Federal permits and approvals.
- If deviations from the proposed scope of work result in substantial design changes, the need for additional ground disturbance, additional removal of vegetation, or any other unanticipated changes to the physical environment, the Town of Duck must contact FEMA so that the revised project scope can be evaluated for compliance with NEPA and other applicable environmental laws.

Physical Resources

The following measures would be implemented to avoid, minimize, and mitigate impacts on physical resources within the project area:

- As a requirement of the proposed action, a state-approved sediment and erosion control plan would be developed, and erosion and sediment control measures such as silt fence would be used during construction activities. Immediately following construction activities, disturbed areas outside of the roadway would be seeded with a native seed mixture to control erosion.
- To mitigate potential impacts of dust and erosion on water quality during construction, all structural and vegetative erosion and sediment control practices will be constructed and maintained according to minimum standards and specifications of the North Carolina Erosion and Sediment Control Planning and Design Manual, 2013. The following erosion and sedimentation controls would likely be employed during the earthwork and construction phases of the project: silt fence, inlet protection, and temporary and permanent seeding measures.
- To reduce the degree of impacts to wetland habitats, the proposed revetment would be placed as close to the new sidewalk as possible. Additionally, the toe of the revetment, which would extend into the estuarine system, would be buried, and backfilled with sand just below normal water elevation. This backfilled area would be planted with wetland vegetation to further minimize the loss of aquatic habitat.
- To avoid impacts to subaquatic vegetation (SAV), wetland scientists conducted a survey of the area to determine the presence and type of SAV within and surrounding the project area. The rock sill required for the living shoreline would be strategically placed between existing SAV and marsh vegetation, along the landward edge of the SAV. This would prevent any impacts to SAV.
- To offset the anticipated impacts on jurisdictional systems, the restoration of 12,536 square feet of estuarine marsh habitat is proposed. This would occur through the removal of an existing stone revetment, backfilling of the area, and planting with appropriate vegetation. Further, 1,280 square feet of uplands would be converted into marshland.
- To reduce the temporary impacts to air quality during construction activities, the applicant would be required to water down construction areas when necessary to limit dust and particulates. To reduce the emission of criteria pollutants, fuel-burning equipment running times would be kept to a minimum during construction.

Biological Resources

The following measures would be implemented to avoid, minimize, and mitigate impacts on biological resources within the project area:

- Educate all employees, contractors, and/or site visitors of relevant rules and regulations that protect wildlife.
- Provide enclosed solid waste receptacles at all project areas. Non-hazardous solid waste (trash) would be collected and deposited in the on-site receptacles. Solid waste would be collected and disposed of by a local waste disposal contractor.
- Minimize project creep by clearly delineating and maintaining project boundaries (including staging areas).
- Implement standard soil erosion and dust control measures. For example: establish vegetation cover to stabilize soil; use erosion blankets to prevent soil loss; and water bare soil to prevent wind erosion and dust issue.
- Schedule all vegetation removal, trimming, and grading of vegetated areas outside of the peak bird breeding season to the maximum extent practicable.
- When project activities cannot occur outside the bird nesting season, conduct surveys prior to scheduled activity to determine if active nests are present within the area of impact and buffer any nesting locations found during surveys.
- For temporary and permanent habitat restoration/enhancement, use only native and local (when possible) seed and plant stock.
- To avoid the potential for boat collisions with aquatic wildlife, construction activities would limit the use of heavy equipment on land or on temporary mats along the shoreline rather than on barges or boats.

Hazardous Materials

The following measures would be implemented to avoid, minimize, and mitigate impacts related to hazardous materials within the project area:

- Demolition debris and unusable fill will be properly disposed at a NCDEQ landfill or permitted site if not salvageable.

Socioeconomic Resources

The following measures would be implemented to avoid, minimize, and mitigate impacts related to socioeconomic resources within the project area:

- To minimize disturbance related to noise, construction activities would be limited to Monday through Saturday from 7 am to 6 pm, which is in compliance with the Duck, North Carolina Code of Ordinances, Title IX, Chapter 91, Section 91.36(I).
- To minimize disruption to traffic patterns during construction, at least one lane of NC 12 would remain open throughout the construction period. All work would take place outside of hurricane season to ensure that both lanes would be available in the event that evacuation

is required. Access to businesses and local roads would be maintained throughout construction.

- Roadway improvements, bicycle lanes, and the sidewalk would be designed in accordance with applicable design criteria, including the NCDOT Roadway Design Manual, the US DOT Federal Highway Administration Manual on Uniform Traffic Control Devices for Streets and Highways, the AASHTO Guide for the Development of Bicycle Facilities, and the AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities.
- Construction related to the proposed action would also abide by OSHA regulations, as well as state and local ordinances and regulations, related to creating a safe construction zone for the public.

Historic and Cultural Resources

The following measures would be implemented to avoid, minimize, and mitigate impacts on historic and cultural resources within the project area:

- If human remains or intact archaeological features or deposits (e.g. arrowheads, pottery, glass, metal, etc.) are uncovered, work in the vicinity of the discovery will stop immediately and all reasonable measures to avoid or minimize harm to the finds will be taken. The subrecipient will ensure that archaeological discoveries are secured in place, that access to the sensitive area is restricted, and that all reasonable measures are taken to avoid further disturbance of the discoveries. The subrecipient's contractor will provide immediate notice of such discoveries to the applicant. The subrecipient shall contact the North Carolina State Archaeologist and FEMA within 24 hours of the discovery. Work in the vicinity of the discovery may not resume until FEMA has completed consultation with SHPO, Tribes, and other consulting parties as necessary. In the event that unmarked human remains are encountered during permitted activities, all work shall stop immediately, and the proper authorities notified in accordance with North Carolina North Carolina Statutes, Section 70-29.
- Any changes to the approved scope of work will require submission to, and evaluation and approval by, the State and FEMA, prior to initiation of any work, for compliance with Section 106.
- Prior to conducting repairs, applicant must identify the source and location of fill material and provide this information to NCEM and FEMA. If the borrow pit is privately owned, or is located on previously undisturbed land, or if the fill is obtained by the horizontal expansion of a pre-existing borrow pit, FEMA Section 106 consultation will be required. Failure to comply with this condition may jeopardize FEMA funding; verification of compliance, review, and follow-up consultation by FEMA-EHP will be required at project closeout.

9.0 SUMMARY

This chapter provides a summary of the proposed alternative, the other alternatives evaluated in the document, the resource topics, and the impacts of each alternative on the resource topic.

Alternative 1: No Action

Under the no-action alternative, there would be no changes implemented within the project area. The roadway of NC 12 would remain at its current elevation, there would be no additional bicycle or pedestrian infrastructure along the roadway, and there would be no changes to the shoreline.

Alternative 2: Proposed Action

Under the proposed action, NC 12 through the project area would be elevated above the base flood elevation of the 100-year floodplain, as would the pedestrian sidewalks on the east side of the roadway. A new sidewalk would be constructed on the west side of the roadway, separated from the road by a pervious stormwater swale. A bicycle lane would be construction on the west side of the roadway. Additionally, a living shoreline would be constructed on the shoreline of the Currituck Sound consisting of breakwater sills, marsh protection and restoration, and riprap revetment.

9.1 SUMMARY OF IMPACTS

Table 5 below provides a summary and comparison of impacts to the physical and natural environment for the alternatives considered. Cells shaded red indicate an alternative would result in a continued risk of impacts due to road closures caused by flood events. Cells shaded green indicate that an alternative would result in a net benefit to a resource. Cells without shading indicate that an alternative would have no impact on a resource, or that impacts would only be temporary during construction activities.

Table 5. Summary Comparison of Potential Impacts

Resource Topic	Impacts of Alternative 1: No Action	Impacts of Alternative 2: Proposed Action
Geology Seismicity, and Soils	No impacts	Measures would be implemented during construction to minimize or avoid any temporary impacts; no long-term impacts would occur.
Water Resources and Water Quality	No impacts	Improved stormwater management features would slightly improve water quality. Measures would be implemented during construction to minimize or avoid temporary impacts.

Resource Topic	Impacts of Alternative 1: No Action	Impacts of Alternative 2: Proposed Action
Floodplain Management (EO 11988)	No impacts	Small loss of flood storage due to road improvements; overall improved floodplain functions due to living shoreline and storm chamber.
Protection of Wetlands (EO11990)	No impacts	Net functional benefit on wetlands and wetland habitat.
Air Quality (CAA)	No impacts	Measures would be implemented during construction to minimize or avoid any temporary impacts; no long-term impacts would occur.
Climate Change	Continued risk of flooding and overwash during storm and extreme high tide events.	Improved resiliency of NC 12 from effects of climate change such as storm events and sea level rise.
Coastal Barrier Resources	No impacts	No impacts
Terrestrial and Aquatic Environment	No impacts	Construction activities may temporarily displace species, but no long-term impacts would occur.
Threatened and Endangered Species	No impacts	No impacts but measures would be implemented during construction to minimize or avoid any temporary impacts; no long-term impacts would occur.
Migratory Birds	No impacts	Increased available habitat for migratory birds from creation of living shoreline and protection of existing marsh. Measures would be implemented during construction to minimize or avoid any temporary impacts.
Areas with Special Designation	No impacts	No impacts
Hazardous Materials	No impacts	Demolition debris and unusable fill generated during construction activities will be properly disposed of if not salvageable.
Socioeconomic Issues	Continued risk of economic disruption when NC 12 is closed due to flooding.	Less intense economic disruption due to less frequent road closures.
Zoning and Land Use	No impacts	No impacts
Prime Farmland	No impacts	No impacts

Resource Topic	Impacts of Alternative 1: No Action	Impacts of Alternative 2: Proposed Action
Visual Resources	No impacts	Temporary impacts would occur during construction when equipment and materials are within the project area; no long-term impacts would occur.
Noise	No impacts	Noise levels would temporarily increase during construction activities, but measures would be in place to minimize impacts; no long-term impacts would occur.
Public Services and Utilities	Continued risk of cutting off access to hospitals and EMS services when NC 12 is closed due to flood; continued risk of damage to utility lines.	More reliable utilities and public services access due to less frequent road closures and damage caused by flood events.
Traffic and Circulation	Continued risk of temporary closures of NC 12 during and after flood events.	More reliable roadway access of NC 12 due to less frequent flooding of road. Temporary road closures during construction would occur.
Environmental Justice	No impacts	No impacts
Historic Properties	No impacts	No impacts
Archaeological Resources	No impacts	No impacts but measures are in place if inadvertent discoveries are made.

10.0 AGENCY COORDINATION AND PUBLIC INVOLVEMENT

10.1 AGENCY OF COORDINATION

The following agencies were contacted during the preparation of this EA:

- NC Department of Environmental Protection (DEP), 401 Water Quality Section
- NC DEP, Coastal Management
- NC DEP, Division of Environmental Assistance and Customer Service
- NC Department of Transportation
- NC Wildlife Resources Commission
- US Army Corps of Engineers
- North Carolina Department of Natural and Cultural Resources, State Historic Preservation Office
- Catawba Indian Nation

- Seminole Nation of Oklahoma
- Shawnee Tribe

10.2 PUBLIC NOTICE

Over the last two years, the Town has provided many opportunities for public involvement in the planning for this project. There have been presentations about the project at Town Council retreats, grant funding discussions at Town Council meetings, as well as community meetings with individual property owners and neighborhood association meetings. Additionally, public involvement for pedestrian improvements throughout the Town, including for this project, has been ongoing for the last five years.

The public will be notified of the availability of this EA for review and comment by posting of the public notice on FEMA's website and the Town of Duck's website, and a hard copy of the EA will be made available at the Duck Town Hall. The public comment period ends after 30 days from date of posting.

10.3 COORDINATION AND PERMITS

The following permits are anticipated for this project:

- Individual Permit from the US Army Corps of Engineers
- Major Permit from the North Carolina Department of Environmental Quality, Division of Coastal Management
- Encroachment Agreement from North Carolina Department of Transportation

The Town of Duck has held numerous public meetings to discuss the resiliency project and BRIC funding application prior to the adoption of a resolution in support of the project. The project has also been discussed in a public forum at Town Council retreats. Town staff has met individually and provided detailed information to the neighborhood associations and property owners adjoining the project area, as well as other stakeholders. In addition, the Town will be submitting wetland permit applications to the US Army Corps of Engineers and the North Carolina Department of Environmental Quality, Division of Coastal Management. Once the wetland permit application is submitted, a public notice will be published advertising the application and requesting public input.

An official with the Town of Duck and staff with VHB conducted a permit pre-application meeting with regulatory agencies on March 11, 2020, to discuss the living shoreline and sidewalk components of the project. Present at this meeting were representatives from the following agencies:

- NC Wildlife Resources Commission
- US Army Corps of Engineers
- NC Department of Environmental Protection (DEP), Coastal Management
- NC DEP, 401 Water Quality Section
- NC DEP, Division of Environmental Assistance and Customer Service

During the meeting, the agencies were informed that the road experiences flooding two to three times a year, and the Town was especially concerned about public safety since NC 12 is the only means of egress in an emergency. The purpose of the meeting was to hear comments and concerns about the project that could be addressed in a permit application package. A concept plan was presented showing a sill, marsh restoration, revetment, and sidewalk.

Agency staff generally agreed to the concept of a new sidewalk for pedestrian safety. The concept design and benefits of the shoreline work were discussed, with the agencies providing guidance on size and dimensions of the revetment and sill, as well as control of the invasive *Phragmites australis*. The agencies encouraged the Town to provide a strong purpose and need justifying the impacts, as well as a discussion about alternative concepts, in the application package. The Town has taken these comments under full consideration and intend to incorporate these comments into the permit application process.

11.0 LIST OF PREPARERS

Name	Organization	Title
Chris DeWitt	VHB	Project Manager
Tracy Littell	VHB	Environmental Planner
Erin Leatherbee	VHB	Environmental Planner
Margaret Beavers	VHB	GIS Specialist
Joe Heard	Town of Duck	Director of Community Development
Stephanie Everfield	Region 4 FEMA	Regional Environmental Officer
Dr. Angelika Phillips	Region 4 FEMA	Supervisory Environmental Protection Specialist
Dustin Ducote	Region 4 FEMA	Environmental Protection Specialist
Cary Helmuth	Region 4 FEMA	Environmental Protection Specialist
Dr. Leslie Johansen	Region 4 FEMA	Historic Preservation Lead
Cynthia Elmore	Region 4 FEMA	Historic Preservation Specialist
Deana Rausch	Region 4 FEMA	Historic Preservation Specialist

12.0 REFERENCES

Block Groups for the 2020 Census-Proposed Criteria, 83 Fed. Reg. 6937 (February 15, 2018) Available at <https://www.federalregister.gov/documents/2018/02/15/2018-02624/block-groups-for-the-2020-census-proposed-criteria>.

County of Dare, North Carolina. 2019. *Annual Budget Fiscal Year 2020*. May 2019.

_____. 2020. *2020 County-wide Property Revaluation: Results of Dare County's Revaluation effective January 1, 2020*. Available online at <https://www.darenc.com/departments/tax-department/2020-revaluation>. Accessed July 28, 2020.

Currituck County. 2018. *Destination Research Study*. Available at https://www.visitcurrituck.com/wp-content/uploads/2019/02/Destination_Research-Study_2019-Currituck.pdf. Accessed July 28, 2021.

_____. 2020. *Currituck Travel & Tourism Strategy & Marketing Plan 2020-2021*. Currituck County Department of Travel & Tourism. Available online at https://www.visitcurrituck.com/wp-content/uploads/2020/08/2020_2021-tourism-strategic-plan.pdf, accessed June 25, 2021.

Duck Fire Department. 2017. "We Are Duck Fire." Available online at <https://www.duckfire.org/about>, accessed June 24, 2021.

Environmental Protection Agency (EPA). 2016. "What Climate Change Means for North Carolina." Available online at <https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-nc.pdf>, accessed July 27, 2021.

_____. 2021. Envirofacts. Available at <https://enviro.epa.gov/>. Accessed July 27, 2021.

_____. 2022. NEPAassist. Available at <https://www.epa.gov/nepa/nepassist>. Accessed August 3, 2022.

Federal Emergency Management Agency (FEMA). 2020. National Flood Insurance Program, Flood Insurance Rate Map 3720985900K, Map revised June 19, 2020.

Gittman, R.K., S.B. Scyphers, C. S. Smith, I. P. Neylan, and J. H. Grabowski. 2016. "Ecological Consequences of Shoreline Hardening: A Meta-Analysis." *BioScience*, Vol. 66 No. 9, pp. 763-773.

Nationwide Environmental Title Research, LLC (NETR). 2021. Historic Aerials Viewer. Available at <https://www.historicaerials.com/viewer>. Accessed July 21, 2021.

North Carolina Department of Transportation. 2019. NCDOT Annual Average Daily Traffic (AADT) Mapping Application. Available online at <https://ncdot.maps.arcgis.com/apps/webappviewer/index.html?id=5f6fe58c1d90482ab9107ccc03026280>, accessed August 3, 2021.

North Carolina State Historic Preservation Office. HPOWEB 2.0 Webmap. Available at <https://nc.maps.arcgis.com/apps/webappviewer/index.html?id=79ea671ebdcc45639f0860257d5f5ed7>. Accessed July 21, 2021.

North Carolina State University. 2016. *Dare County 2020 Economic Development & Diversification Strategic Plan*. Prepared for Dare County Board of Commissioners.

Outer Banks of North Carolina. 2021. *Your Guide to Dare County Tourism*. Available online at <https://www.outerbanks.org/partners/did-you-know-dare-county-tourism/>, accessed July 28, 2021.

Town of Duck, North Carolina. 2020. *Draft Comprehensive and CAMA Land Use Plan*. Draft dated July 9, 2020. Available at <https://www.townofduck.com/wp-content/uploads/Duck-LUP-Draft-2020-07-09-Low-Res.pdf>. Accessed July 21, 2021.

Town of Duck Police Department. 2021. Traffic Counts, June 2021–August 2021. Available online at <https://www.townofduck.com/police-department/>, accessed September 13, 2021.

US Army Corps of Engineers. 2022. Sea Level Tracker. Available online at https://climate.sec.usace.army.mil/slr_app/, accessed August 3, 2022.

US Census Bureau. 2010. 2010 Census. Available online at <https://data.census.gov/cedsci/table?q=2010%20census%20Duck,%20NC&tid=DECENNIALSF12010.H10>, accessed July 21, 2021.

_____. 2019. American Community Survey 5-Year Estimates. Available online at <https://data.census.gov/cedsci/table?q=2019%20Duck,%20NC&tid=ACSST5Y2019.S0601>, accessed July 21, 2021.

US Fish and Wildlife Service. 2019. Coastal Barrier Resources System Mapper. Available online at <https://fwsprimary.wim.usgs.gov/CBRSMapper-v2/>, accessed July 14, 2022.

Western Carolina University. 2020. *Coastal Hazards Infrastructure Vulnerability Assessment, Duck, North Carolina*. Prepared by the Program for the Study of Developed Shorelines. February 2020.

**Appendices are available for review upon request to
FEMA-R4EHP@fema.dhs.gov**