

National Park Service  
U.S. Department of the Interior



Cape Hatteras National Seashore  
North Carolina

## NC 12 Improvements Environmental Assessment

March 2010





**ENVIRONMENTAL ASSESSMENT for the NC 12 IMPROVEMENTS  
at  
CAPE HATTERAS NATIONAL SEASHORE  
North Carolina**

**SUMMARY**

In the Outer Banks of North Carolina, NC 12 is the only north-south route connecting Bodie Island, Hatteras Island, and Ocracoke Island. The North Carolina Department of Transportation (NCDOT) maintains most of NC 12; however, the National Park Service (NPS) maintains NC 12 from Whalebone Junction (the intersection with US-64/US-264 and mile 0.0) south to mile 5.28. The pavement within this 5.28 mile section of NC 12 has deteriorated, as evidenced by the fatigue cracking and potholes. Also, bicyclists currently use the road, and typically ride in the two-foot shoulders alongside vehicles traveling at high speeds. The NPS, in cooperation with the Federal Highway Administration, proposes to improve NC 12. This Environmental Assessment (EA) examines the No Action Alternative (Alternative A) and two action alternatives (Alternative B and Alternative C). Alternative B would improve NC 12 by resurfacing the travel lanes and replacing the culverts. Alternative C would improve NC 12 by expanding the asphalt paved shoulders in addition to the implementation of the actions in Alternative B. Alternative C is the Preferred Alternative. Implementation of the Preferred Alternative would result in negligible to moderate, adverse impacts to some resources in the short- and long-term.

**PUBLIC COMMENT**

This EA will be on public review from March 10, 2010 through April 8, 2010. During this 30-day period, hardcopies of the EA will be available for review at the Bodie Island Visitor and the Manteo Branch of the Dare County Library located at 700 North Highway, Highway 64 and Burnside Road, Manteo, NC. An electronic version of this document can be found on the NPS's Planning Environment and Public Comment (PEPC) website at <http://parkplanning.nps.gov/caha>. This site provides access to current plans, environmental impact analyses, and related documents on public review. An electronic version may also be found at the Federal Highway Administration, Eastern Federal Lands Highway Division's website at <http://efl.fhwa.dot.gov/planning/nepa.htm>.

If you wish to comment on the EA, you may submit comments through the PEPC website or mail comments to the name and address below. Please note that the names and addresses of people who comment become part of public record. If you wish us to withhold your name and/or address, you must state this prominently at the beginning of your comment. We will make all submissions from organizations, businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, available for public inspection in their entirety.

Superintendent  
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## **CHAPTER 1: PURPOSE AND NEED**

### **INTRODUCTION**

This Environmental Assessment (EA) presents alternatives for improvements to Highway NC 12 on Bodie Island within the Cape Hatteras National Seashore. It discloses the potential impacts of the implementation of those alternatives. In this EA, Chapter 1 presents the purpose and need for the action, discusses the location and background of the project, identifies related plans and planning, and provides information regarding the scoping completed as a part of the project development process. Chapter 2 presents the alternatives proposed to meet the purpose and need of the action, and discusses alternatives that were dismissed from further consideration. Chapter 3 provides information regarding the resources present in the study area that would be impacted by the proposed action, and also discloses the impacts of each alternative to the resources. Chapter 4 documents the public involvement process throughout this project and includes the official list of recipients of the EA. Chapter 5 presents the list of references.

The preparation of an EA by a Federal agency taking an action, and the contents of an EA are the result of legislation and implementing regulations issued to date. In 1969, the United States Congress passed the National Environmental Policy Act (NEPA) (42 U.S.C. 4321 et seq.) to establish a national policy,

“...which will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation; ...”

NEPA also established the Council on Environmental Quality (CEQ) as an agency of the Executive Office of the President. In enacting NEPA, Congress recognized that nearly all Federal activities affect the environment in some way. Section 102 of NEPA mandates that before Federal agencies make decisions, they must consider the effects of their actions on the quality of the human and natural environment. NEPA assigns CEQ the task of ensuring that Federal agencies meet their obligations under the Act.

The CEQ regulations (40 CFR 1500-1508) describe the means for Federal agencies to develop the Environmental Impact Statements (EIS's) mandated by NEPA in Section 102. The CEQ regulations developed the EA to be used when there is not enough information to decide whether a proposed action may have significant impacts. If an EA concludes that a Federal action will result in significant impacts, the Agency is required to prepare an EIS or alter the action proposed. Otherwise, the Agency is directed to issue a Finding of No Significant Impact (FONSI).

Section 1508.09 of the CEQ regulations states that the purposes of an EA are to:

1. Briefly provide sufficient evidence and analysis for determining whether to prepare an EIS or a FONSI.
2. Aid an Agency's compliance with the Act when no environmental impact statement is necessary.

3. Facilitate preparation of a statement when one is necessary.

Preparation of an EA is also used to aid in an Agency's compliance with Section 102(2)E of NEPA, which requires an Agency to "study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources."

This EA was prepared to meet the NEPA requirements of both the National Park Service (NPS) and Federal Highway Administration (FHWA). The National Park Service is an agency within the Department of Interior. The Department of the Interior issued its NEPA regulations as Part 516 of its Departmental Manual (516 DM), last revised in March 2004. The NPS has issued several NEPA handbooks. In January 2001, the NPS released the Director's Order #12: Conservation Planning, Environmental Impact Analysis, and Decision Making. The FHWA's NEPA regulations are codified at 23 CFR Part 771. FHWA Tech Advisory T6640.8A was issued in 1987 to provide guidance on environmental documents.

## PURPOSE AND NEED

In cooperation with the FHWA, the NPS proposes to improve the northern 5.28 miles of NC 12 on Bodie Island within the Cape Hatteras National Seashore (hereafter referred to as "the Seashore"). The need for the proposed project is comprised of two components: the degradation of the existing NC 12 and the accommodation of multi-modal use of NC 12. NC 12 is the only north-south route connecting Bodie Island, Hatteras Island, and Ocracoke Island. NC 12 is the evacuation route for the Outer Banks villages of (from the Village of Ocracoke northward, in order): Ocracoke, Hatteras, Frisco, Buxton, Avon, Salvo, Waves, Rodanthe, and South Nags Head. Therefore, NC 12 is a vital transportation link. The NPS maintains NC 12 from Whalebone Junction (the intersection with US-64/US-264) south to mile 5.28, the intersection with the Coquina Beach Ranger Station Access Road. The Coquina Beach Ranger Station Access Road previously provided access to the Coquina Beach Ranger Station, housed in the 1925 United States Coast Guard Station building. However, these structures were recently moved to a new location. For the purposes of this EA, the Whalebone Junction intersection with NC 12 will be referred to as the northern terminus, and mile 5.28 will be referred to as the southern terminus.

The existing pavement of NC 12 has degraded. This degradation is evident from the visible fatigue cracking, rutting, settling, and potholes, particularly in the southbound lane (Figure 1). The Whalebone Junction parking area and vehicle pullouts are also experiencing similar pavement degradation, such as cracking (USDOT 2009). The Whalebone Junction Information Station serves as a visitor contact station, and welcomes visitors to the Seashore. Vehicle pullouts are located along NC 12, and serve as trailheads to the hunting blind trails and access to a wildlife viewing scenic overlook. Gravel has previously been placed at the pullouts beyond the paved area to offer additional parking area for motorists and reduce the rutting of the surrounding vegetated areas (Figure 2). Motorists continue to park on the vegetated areas, rather than the paved and graveled surfaces. To better inform the public of parking availability and reduce impacts to surrounding vegetated areas, pull-off areas need to be better delineated.

In addition to the pavement degradation, there are also four corrugated metal pipe culverts in three locations (one location has two culverts side by side) that have also degraded. These culverts are rusted, and holes through the culvert are visible. One of these culverts is also shorter than the vegetated road shoulders and requires plastic delineators to warn motorists and Seashore

employees mowing the vegetated areas.



Figure 1. Fatigue cracking is apparent in the southbound lane of NC 12



Figure 2. At this pull-off there is an additional gravel area, and rutting in the vegetated area.

NC 12 is a two-lane road with 11-foot paved lanes and two-foot paved shoulders (Figure 3). The posted speed limit is 55 mph. Bicyclists currently use the road, and travel in the two-foot shoulders alongside vehicles traveling at high speeds. The close proximity of cyclists causes a

potential for conflicts with vehicles. Widened paved roadway shoulders are available along other portions of NC 12 both north and south of the project area. South Old Oregon Inlet Road (also known as SR 1243 and Beach Road), running parallel to NC 12 through the Nags Head residential area, has a paved side multi-use path with numerous intersection and driveway crossings. This paved side path presently better serves children and basic bicyclists but is not considered ideal for experienced riders due to the frequent driveway crossings, many of which have limited sight distance. The North Carolina Department of Transportation (NCDOT) Division One has constructed and plans to construct widened paved shoulders, four feet total on each side of the road, to accommodate bicycle use (Figure 4). The widened shoulders are planned to extend for 42 continuous miles, with the exception of this 5.28 mile segment, which is not under the jurisdiction of NCDOT.

**The purpose of this project is to improve the safety of motorists, cyclists and pedestrians using NC Route 12, improve visitor experience, improve visitor access, and support alternate modes of transportation in the Seashore.**

### Objectives

The objectives that must be met in order for this project to be considered a success are:

- Maintenance of NC 12 as safe public access;
- Reduction of potential conflicts between vehicles, pedestrians, and bicyclists using NC 12;
- Improvement of visitor access along Bodie Island; and
- Minimization of impacts to natural, cultural, and scenic and aesthetic resources.



Figure 3. The existing stretch of NC 12 running through Cape Hatteras National Seashore has two-foot paved shoulders.



Figure 4. NC 12 through the Pea Island National Wildlife Refuge has widened shoulders.

### Project Site Description

The Seashore is located in Dare and Hyde Counties, along the Outer Banks of North Carolina and extends for over 70 miles on Bodie, Hatteras and Ocracoke Islands (NPS 2008c). The islands constitute a narrow barrier island chain which is typically less than one-mile wide, bordered by the Pamlico-Albemarle Sound and Roanoke Sound to the west and by the Atlantic Ocean to the east (Figure 5). For the purposes of this EA, the “project area” includes the road prism of NC 12 from the northern terminus to the southern terminus (Figure 6).



Figure 5. Cape Hatteras National Seashore (NPS 2006)



Figure 6. Project area (NC OneMap 2009)

## **Project Background**

In 1962, a road linking the southern and central Outer Banks communities was paved and designated as NC 12. Fill dirt was obtained to construct the roadbed by creating ponds along NC 12 (NCDENR 1987). The project was originally proposed to mill and overlay NC 12's existing pavement and replace deteriorated corrugated metal pipe culverts that have reached the end of their useful life.

The NPS investigated the feasibility of making this 5.28-mile segment of NC 12 more accommodating to bicyclists and cooperated with the FHWA to complete a Safety Study (FHWA 2008c). The purpose of the Safety Study was also to provide a recommendation to improve vehicle and bicycle safety with the appropriate bicycle facility design. The study was completed January 2008 and included recommended bicycle accommodation design standards. The study stated that based on the available existing roadside shoulder area, traffic data, present bicycle use, referenced design standards, and the recently completed and proposed NC DOT improvement projects to widen paved shoulders along NC12, it is recommended to provide five-foot paved shoulders on each side of the road (USDOT 2008c).

NCDOT has constructed wide paved shoulders or a side path extending along NC 12 from Corolla to the intersection with US 64. The side path continues along US 158, however, there are no bike facilities until approximately one mile south of the Bonner Bridge over the Oregon Inlet. At approximately one mile south of the bridge, wide paved shoulders extend to Hatteras, and to the northern village limits of Ocracoke. The NCDOT plans to construct the remaining section of wide paved shoulders on NC 12 from the southern terminus of this project to one mile south of the Bonner Bridge, and would also like to incorporate wider shoulders on the new proposed bridge spanning the Oregon Inlet (NCDOT 2008a).

## **Related Plans and Previous Planning Efforts**

As one of North Carolina's twenty coastal counties, Dare County has been developing land use plans since 1976 in accordance with the Coastal Area Management Act (CAMA) and Coastal Zone Management Act. In addition to complying with the CAMA regulation, the *Dare County Land Use Plan* is a tool for use by local officials and citizens as a guide to the future development of unincorporated Dare County. Traffic and transportation is an issue of great concern to the residents of Dare County. The proposed project is consistent with Dare County's transportation policies. Dare County also supports the development and construction of sidewalks, bike paths, greenways, and other walking/jogging trails to provide a safe setting for these types of outdoor recreation and as alternative transportation routes. The proposed project is also consistent with Dare County's Bikeways/Walkways/Greenways policies (Dare County 2003).

In 1984, the *General Management Plan / Development Concept Plan / Environmental Assessment for the Cape Hatteras National Seashore (GMP)* was issued. The overall planning objective for the Seashore is to preserve the cultural resources and the flora, fauna, and natural physiographic condition, while providing for appropriate recreational use and public access to the oceanside and soundside shores in a manner that will minimize visitor use conflict, enhance visitor safety, and preserve Seashore resources. The GMP presented alternatives regarding the development of bicycle trails in the Seashore. The proposed project is consistent with the GMP (NPS 1984).

In 1990, North Carolina declared the Outer Banks corridor a State Scenic Byway. The Outer Banks Scenic Byway begins in Dare County, North Carolina, at Whalebone Junction, the intersection of NC 12 and U.S. 158 and the entrance to the Seashore. The byway's route follows NC 12 down the Seashore's Bodie Island and across Oregon Inlet, onto Hatteras Island and into the Pea Island National Wildlife Refuge. The *Corridor Management Plan for the Outer Banks Scenic Byway* explores the "six intrinsic qualities" of the byway – scenic, natural, cultural, historic, archaeological and recreational. The plan details a number of enhancements that will improve the recreational experience, especially improved bicycle and pedestrian facilities. The plan states that there is a need for safe, enjoyable bicycle and pedestrian facilities. This proposed project is consistent with this plan. (OBSBAC 2008)

In 1996, the NC DOT Office of Bicycle and Pedestrian Transportation developed *Bicycling and Walking in North Carolina: A Long Range Transportation Plan*, which provides a comprehensive framework for improving bicycle and pedestrian transportation over the next 20 years. One of the focus areas is to develop continuous corridors for safe bicycle travel in areas of high demand for bicycle transportation, particularly in the coastal areas (NCDOT 1996). The project area is located within a bicycle corridor, and the proposed project is consistent with this plan.

## **Scoping**

The CEQ guidelines (1978) for implementing the National Environmental Policy Act and the NPS' National Environmental Policy Act guidelines contained in Director's Order # 12: *Conservation Planning, Environmental Impact Analysis and Decision Making Handbook* (NPS 2001a) provide the framework for scoping. Scoping is an early and open process to: determine important issues, eliminate issues that are not important or relevant, identify relationships to other planning efforts or documents, define a time schedule or document preparation and decision-making, and define purpose and need, agency objectives and constraints, and the range of alternatives. For further scoping and public participation information, see Chapter 4: Public Involvement and Coordination and Appendix A: Agency Coordination Letters.

### Public Scoping

Information about the proposed project was made available to the public on the NPS's Planning, Environment, and Public Comment website during the public scoping comment period, from February 3, 2009 through March 4, 2009. Flyers providing details of the proposed project and contact information for comments was sent to a mailing list comprised of Federal, State, and local agencies, elected officials, organizations, and advocacy groups. Public notices were run in the Virginian-Pilot and the Coastland Times on February 1, 2009 announcing the public scoping comment period. Comments were generally in support of the proposed project. Concerns were raised regarding impacts to natural resources and impacts to traffic operations as a result of detours and lane/road closures.

### Agency Scoping

Scoping letters were also sent to the North Carolina State Clearinghouse to solicit comments regarding the proposed action on January 26, 2009. Comments were received from the North Carolina Department of Environment and Natural Resources Division of Coastal Management, the Division of Water Quality, the Division of Marine Fisheries, and the NC Wildlife Resources Commission. These comments provided recommendations for analysis to be provided in the EA,

design recommendations, and identified permits that may be necessary. Early Coordination Letters were sent to the U.S. Fish and Wildlife Service and the NC Department of Environment and Natural Resources Natural Heritage Program in order to gather input regarding federally-, state-, and locally-listed species of concern that may be present in the study area. Copies of the agency responses are located in Appendix A: Agency Coordination Letters.

## ISSUES AND IMPACT TOPICS

Issues as discussed in NEPA describe the relationships between the action being proposed and the environmental (natural, cultural and socioeconomic) resources. Issues describe an association or a link between the action and the resource. Issues are not the same as impacts, which include the intensity or results of those relationships. Internal and external scoping (defining the range of potential issues) was conducted for this EA to identify what relationships exist between the proposed action and environmental resources. Issues identified through the scoping process were:

- Concerns that closure of NC 12 would route traffic through South Nags Head on South Old Oregon Inlet Road. The additional traffic through this low speed zone (25 mph to 35 mph) residential area would make access to the beach difficult. Closure of NC 12 would not allow for an alternate route in case of any incidents on South Old Oregon Inlet Road.
- Concerns that additional asphalt would create additional impervious surface, and would therefore increase stormwater runoff.
- Concerns that construction activities and pavement of vegetated areas may impact wildlife, particularly waterfowl using the Bodie Island Roadside Ponds and Marshes Significant Natural Heritage Area.
- Suggestions that widened shoulders or a bike/pedestrian path should extend to visitor destination locations such as the Bodie Island Lighthouse and Coquina Beach access roads, and also extend to the Oregon Inlet Bridge and two miles south of the bridge to connect to existing NCDOT's bike shoulders.

## Derivation of Impact Topics

Specific impact topics were developed to address potential natural, cultural, and social impacts that might result from the proposed construction work. These topics were derived from the issues identified above and address Federal laws, regulations and orders, Seashore management documents, and Seashore knowledge of limited or easily impacted resources. Issues are not the same as impacts, which include the intensity or results of those relationships. Each impact topic relates to a specific aspect of the Seashore and its surrounding community, which are essential to protect.

## **Impact Topics Included in This Document**

### Floodplains

Executive Order 11988, “Floodplain Management,” and NPS Director’s Order #77-2: Floodplain Management require an examination of impacts to floodplains and potential risk involved in placing facilities within floodplains. The entire project area is located on Bodie Island, a coastal barrier island, bounded to the east by the Atlantic Ocean and to the west by the Pamlico Sound. According to FEMA Flood Insurance Rate Maps, the project area is located within the 100-year flood zone, in zone AE (FEMA 2009). A Statement of Findings for Floodplains was prepared and is included in this EA as Appendix C. The project area is also located within North Carolina’s coastal area. The proposed project should be consistent to the maximum extent practicable with the enforceable policies of North Carolina’s approved coastal management program per the Federal Coastal Zone Management Act of 1972, as amended. A Federal Consistency Determination was prepared and is included in this EA as Appendix B. The proposed action would include the placement of fill material to construct the widened shoulders and extend culverts. Therefore, this impact topic was retained for further analysis in this EA.

### Wetlands

Executive Order 11990, “Protection of Wetlands,” and NPS Director’s Order #77-1: Wetland Protection defines the NPS goal to maintain and preserve wetland areas. Wetlands are abundant on Bodie Island. The study area along NC 12 includes the mowed grass upland shoulder and transitions to a larger estuarine wetland system. The majority of the wetlands located in the study area are in the transition area, and are classified as estuarine intertidal scrub-shrub broad leaved deciduous. Wetlands/Waters of the U.S. are also present at the channels associated with the culverts. The proposed action would include the extension of culverts and placement of fill material in wetlands. Therefore, this impact topic was retained for further analysis in this EA.

### Surface Water and Groundwater Quality

The 2006 NPS Management Policies (NPS 2006a), NPS Director’s Order #77: Natural Resources Management, along with the Clean Water Act and other Federal, State, and local regulations, provide general direction for the protection of surface and groundwaters. The Atlantic Ocean bounds Bodie Island to the east, while the Pamlico-Albemarle Sound bounds the Island to the west. The pollution of surface waters and groundwaters by both point and nonpoint sources can impair the natural functioning of aquatic and terrestrial ecosystems and diminish the utility of Seashore waters for visitor use and enjoyment. Previous research and studies of surface water quality at the culverts on Bodie Island have indicated that there are elevated levels of nutrient and microbial pathogens in the surface water connecting to South Nags Head. Pollutants associated with roads and vehicles can also be found in the surface waters in the project area. The NPS Management Policies 2006 state that the Service will determine the quality of park surface and groundwater resources and avoid, whenever possible, the pollution of park waters by human activities occurring within and outside the parks. The proposed action would increase impervious surface and ground disturbance during construction. Therefore, this impact topic was retained for further analysis in this EA.

### Stormwater Management

Stormwater is comprised of two components, quality and quantity. Stormwater quality will be addressed in the Surface Water and Groundwater Quality impact topic. Stormwater quantity refers to the volume of water that runs off of impervious surfaces. Impervious surfaces, such as asphalt roads and parking areas, do not allow precipitation to percolate. The rainfall collects and flows along the impervious surface. Pollutants from vehicles such as oil and emissions are concentrated in the stormwater. There are currently no stormwater management features along NC 12 in the project area. Stormwater flows as sheet flow from NC 12 across the mowed grass road shoulders into the wetlands adjacent to the road prism. This non-point pollution is regulated by Section 402 of the Clean Water Act. North Carolina's amended Coastal Stormwater Rule (effective October 1, 2008) applies when a project adds greater than 10,000 square feet of built-upon area (which includes impervious asphalt road surfaces). The proposed project would add approximately two acres (87,000 square feet) of new impervious surface. Therefore, the provisions of the amended Coastal Stormwater Rule apply to the project, and a Coastal Stormwater Permit is likely required. The additional pavement for the widened shoulders would increase the amount of impervious surface, which concentrates pollutants and increases stormwater runoff. The proposed action would include the construction of permanent stormwater best management practices. Therefore, this impact topic was retained for further analysis in this EA.

### Wildlife and Wildlife Habitat

The NPS policy is to protect the natural abundance and diversity of all naturally occurring communities. The 2006 NPS Management Policies (NPS 2006a), NPS DO #77: Natural Resources Management, and other NPS and Seashore policies provide general direction for the protection of wildlife and wildlife habitat. Wildlife and wildlife habitat at the Seashore encompasses an abundance of species. The project area includes terrestrial and aquatic habitat. The proposed action would alter habitat and displace wildlife species that are commonly encountered in the vicinity of the project area. Therefore, this impact topic was retained for further analysis in this EA.

### Vegetation

The NPS policy is to protect the natural abundance and diversity of all naturally occurring communities. The 2006 NPS Management Policies (NPS 2006a), NPS DO #77: Natural Resources Management, and other NPS and Seashore policies, provides general direction for the protection of vegetation. The proposed action would permanently remove vegetation to construct the widened shoulders. Therefore, this impact topic was retained for further analysis in this EA.

### Visitor Use and Experience of the Seashore

Enjoyment of park resources and values by the people of the United States is part of the fundamental purpose of all parks (NPS 2006a). The NPS strives to provide opportunities for forms of enjoyment that are uniquely suited and appropriate to the natural and cultural resources found in parks. Visitor orientation and hospitality are visitor experience goals outlined in the Long Range Interpretive Plan (LRIP) (NPS 2007). The Whalebone Junction Information Station serves as the initial contact for visitors entering the Seashore, and also includes restroom

facilities. This Information Station is staffed with volunteers and/or employees. Closures of the Whalebone Junction Information Station during construction would impact visitor access to the Seashore. Lane closures would be necessary to mill and repave the road, which could lengthen driving time. Enjoyment of recreational activities that are compatible with the protection of Seashore resources is also stated as a LRIP goal. Access to the beach, bicycling, waterfowl hunting may be impacted as a result of lane closures and construction activities. The proposed action would include the construction of widened shoulders to better accommodate cyclists and pedestrians. Resurfacing of the road would provide for a safer and more comfortable vehicle ride on a National and North Carolina Scenic Byway. The installation of bollards and resurfacing of the pull-offs would repair and formalize designated areas for parking and access to the wildlife viewing platform and hunting blinds. Improvements would minimize the need for road maintenance in the near future and the emergency repair of culvert failures would be avoided. Therefore, this impact topic was retained for further analysis in this EA.

### Seashore Operations

The 5.28 mile-segment of NC 12, including pull-offs and the Whalebone Junction parking area, are currently maintained by the NPS. Maintenance of these areas includes pavement repairs such as crack sealing and pothole patching, mowing of the vegetated shoulders and recovery area, and re-striping of the pavement markings. The removal of existing pavement and placement of new pavement would impact Seashore operations, as road conditions would be improved and maintenance needs would decrease. The addition of three feet of pavement to widen the shoulders of the road may also impact the maintenance required for the road. The construction of vegetated swales would change the conditions and topography of the recovery area, which may impact mowing. The replacement of existing signs would also impact Seashore operations. The proposed action would alter the maintenance of the road surface and vegetation management adjacent to the road. Therefore, this impact topic was retained for further analysis in this EA.

### Traffic Operations

NC 12 is the primary transportation route on the Outer Banks, connecting the town of Kitty Hawk for 90 miles south to the village of Ocracoke. The Average Daily Traffic for NC 12 is 4,500 vehicles per day (NCDOT 1996); however, the Average Daily Traffic during the peak season is 7,450 vehicles per day (FHWA 2008). Pavement improvements and culvert replacement would require partial closures of NC 12. These closures would alternate traffic on a single lane of the road. Coordination with NCDOT regarding the re-routing of traffic would also be necessary. The proposed action would change the traffic patterns of NC 12 during construction. Therefore, this impact topic was retained for further analysis in this EA.

### Health and Safety

The NPS Management Policies 2006 state that while recognizing that there are limitations on its capability to totally eliminate all hazards, the NPS and its concessionaires, contractors, and cooperators will seek to provide a safe and healthful environment for visitors and employees. The existing road has deteriorated, creating an uneven driving surface. The culvert located at mile 3.13 is too short, and poses a risk to motorists and Seashore staff mowing the grass area adjacent to the road. No crashes involving bicycles or pedestrians have been noted in crash reports. However, bicyclists currently use the road, and travel in the two-foot shoulders

alongside vehicles traveling at high speeds. The close proximity of cyclists causes a potential for conflicts with vehicles. The proposed action would alter the use of NC 12 by motorists and bicyclists. Therefore, this impact topic was retained for further analysis in this EA.

### Gateway Communities

Gateway communities are cities or towns located in close proximity to national parks, and serve as a portal to these Federal lands. They contain amenities that are often not available in the national parks, such as food, lodging, and transportation. The southern end of the Town of Nags Head is located adjacent to the northern end of the Seashore. South Nags Head is accessible from the west via intersections at Whalebone Junction or South Old Oregon Inlet Road. Motorists may also choose to follow South Old Oregon Inlet Road from Whalebone Junction to the southern intersection of NC 12 with South Old Oregon Inlet Road during traffic delays due to lane closures during construction. South Nags Head contains multiple businesses, including restaurants, and residences that would experience a temporary change in traffic volume during these times. NC 12 also services as the only road connecting towns south of Nags Head, such as Avon, Buxton, Hatteras, and Ocracoke. The proposed action would alter the accessibility of amenities adjacent to the Seashore. Therefore, this impact topic was retained for further analysis in this EA.

### **Impact Topics Dismissed From Further Consideration**

The following impact topics were initially considered but were dismissed from further analysis because the resource is not present in the project site or because the proposed action would have no impact, have a negligible impact, or have a minor impact. A brief rationale for the dismissal of each impact topic is provided below.

### Historic Structures, Districts, and Landmarks

A historic structure is defined by the NPS as “a constructed work, usually immovable by nature or design, consciously created to serve some human act” (DO #28, 113). For a structure, building to be listed on or eligible for listing on the National Register, it must possess historic integrity of those features necessary to convey its significance, particularly with respect to location, setting, design, feeling, association, workmanship, and materials. A historic district is located within the project area. The Bodie Island Baseline, U.S. Coast Survey, 1848 are the only remaining completed set of coastal survey baseline markers left in the United States. This 6.75-mile historic district has been nominated as a National Historic Landmark, and is under review by the North Carolina State Historic Preservation Office (NC-SHPO). The proposed action would have no impact to the proposed National Historic Landmark. The proposed action was reviewed by the Seashore’s National Historic Preservation Act Specialist. It was determined that the project would have no adverse effects to cultural resources. The NC-SHPO reviewed the proposed action and determined that there are no historic properties that are likely to be affected by the project as proposed including the widening of paved shoulders, replacement of culverts, and overlay. Therefore, historic structures, districts, and landmarks was dismissed as an impact topic for further analysis in this EA.

### Museum Collections

The NPS defines a museum object as “a material thing possessing functional, aesthetic, cultural, symbolic, and/or scientific value, usually movable by nature or design. Museum objects include prehistoric and historic objects, artifacts, works of art, archival material, and natural history specimens that are part of a museum collection” (DO #28, 137). No museum objects are located within the study area, and no museum objects would be impacted by the proposed action. Therefore, museum collections was dismissed as an impact topic for further analysis in this EA.

### Archeological Resources

The NPS defines an archeological resource as any material remains or physical evidence of past human life or activities that are of archeological interest, including the record of the effects of human activities on the environment. Archeological resources are capable of revealing scientific or humanistic information through archeological research (DO #28, 67). The project area is a previously disturbed corridor and no known archeological resources occur within the project area. Therefore, archeological resources was dismissed as an impact topic for further analysis in this EA.

### Cultural Landscapes

As described in DO #28, a cultural landscape is “a geographic area, including both cultural and natural resources and the wildlife or domestic animals therein, associated with a historic event, activity, or person, or exhibiting other cultural or aesthetic values” (DO #28, 87). Cultural landscapes are expressed in the way land is organized and divided, patterns of settlement, land use, systems of circulation, and the types of structures that are built. Therefore, cultural landscapes was dismissed as an impact topic for further analysis in this EA.

### Ethnographic Resources

An ethnographic resource is defined as any “site, structure, object, landscape, or natural resource feature assigned traditional legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it” (DO #28, 157). Cape Hatteras National Seashore has no ethnographic resources. Therefore, ethnographic resources was dismissed as an impact topic for further analysis in this EA.

### Indian Trust Resources

Secretarial Order 3175 requires that any anticipated impacts to Indian Trust resources from a proposed action by U.S. Department of the Interior agencies be explicitly addressed in environmental documents. The Federal Indian Trust responsibility is a legally enforceable obligation on the part of the United States to protect tribal lands, assets, resources, and treaty rights, and it represents a duty to carry out the mandates of Federal laws with respect to American Indian tribes. There are no known Indian Trust resources in the study area. Therefore, Indian trust resources was dismissed as an impact topic for further analysis in this EA.

## Geologic Resources

The NPS Management Policies (NPS 2006a) states that the NPS will “...preserve and protect geologic resources as integral components of park natural systems. As used here, the term “geologic resources” includes both geologic features and geologic processes.” Cape Hatteras National Seashore faces the challenge of balancing management of significant natural and cultural resources, such as historic structures and transportation corridors, in this dynamic coastal barrier island system (NPS 1984). The project area is located in the coastal plain geologic formation and is comprised of beach sand, deposited within the past 10,000 years (Fullerton et al. 2003). These barrier islands have been and will continue to be manipulated by natural shoreline processes (e.g., erosion, deposition, dune formation, overwash, inlet formation, and shoreline migration), high energy weather events (e.g., nor'easters, tropical storms, hurricanes), and human activity. The Seashore previously maintained dunes near the U.S. Coast Guard Station and the Life Saving Station. However, since these structures have been relocated, these dunes will no longer be maintained, other than to remove sand that covers any roads. The Town of Nags Head maintains the dunes within town limits through the use of sand fencing and the planting of dune grasses (Town of Nags Head 2009). The potential impacts of high energy weather on the proposed project and the installation of rocks to protect the culvert inlet and outlet will be discussed under Floodplains. Therefore, geologic resources was dismissed as an impact topic for further analysis in this EA.

## Soils

The NPS policy is to protect the abundance and diversity of all naturally occurring soils. The 2006 NPS Management Policies (NPS 2006a), NPS DO #77: Natural Resources Management and other NPS and Cape Hatteras National Seashore policies provide general direction for the protection of soils. Four soil types are found in the study area and are all sands: Carteret sand (CeA), Corolla fine sand (CoB), Corolla-Duckston Complex (CrB), and Duckston fine sand (DtA). Impacts to wetland soils will be discussed under the Wetlands impact topic. Impacts to inlet sediments are addressed in the Surface Water Quality and Quantity impact topic. Impacts of installing new fill materials are discussed in the Floodplains impact topic. The proposed action would be constructed in an area comprised of disturbed soils and fill material from the construction of the existing NC 12. Therefore, soils was dismissed as an impact topic for further analysis in this EA.

## Prime and Unique Farmlands

In August 1980, the Council on Environmental Quality (CEQ) directed that Federal agencies must assess the effects of their actions on farmland soils classified by the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) as prime or unique. Prime or unique farmland is defined as soil that particularly produces general crops such as common foods, forage, fiber, and oil seed. Unique farmland produces specialty crops such as fruits, vegetables, and nuts. According to NRCS, none of the soils in the project area are classified as prime and unique farmlands. Therefore, prime and unique farmlands was dismissed as an impact topic for further analysis in this EA.

### Lightscape

In accordance with NPS 2006 Management Policies (NPS 2006a), the NPS strives to preserve natural, ambient lightscapes, which are natural resources and values that exist in the absence of human-caused light. The proposed action would not change the location of lighting fixtures or alter the lightscape in the study area. No nighttime construction or artificial lighting would be necessary to construct the project. Therefore, lightscape was dismissed as an impact topic for further analysis in this EA.

### Air Quality

The 1963 Clean Air Act (CAA), as amended, requires land managers to protect air quality. Section 118 of the CAA further requires parks to meet all Federal, State, and local air pollution standards, and NPS 2006 Management Policies (NPS 2006a) addresses the need to analyze potential impacts to air quality during park planning. All of North Carolina's coastal counties are located in the Environmental Protection Agency's Ozone Attainment Area. Although construction and demolition activities proposed would have some impacts to air quality, they would be short-term and negligible. The 1963 Clean Air Act, as amended (42 U.S.C. 7401 et seq.) requires Federal land managers to protect Park air quality. Section 118 of the CAA requires the NPS to meet all Federal, State, and local air pollution standards. Therefore, air quality was dismissed as an impact topic for further analysis in this EA.

### Soundscape

The NPS Management Policies 2006 state that the NPS will preserve, to the greatest extent possible, the natural soundscapes of parks. Park natural soundscape resources encompass all the natural sounds that occur in parks, including the physical capacity for transmitting those natural sounds and the interrelationships among park natural sounds of different frequencies and volumes. This is the basis for determining the "affected environment" and impacts on a Park soundscape. Traffic capacity would not increase as a result of this project, but there would be short-term minor impact to the soundscape from the presence of heavy equipment during construction. Therefore, soundscape was dismissed as an impact topic for further analysis in this EA.

### Visual Resources

The NPS 2006 Management Policies (NPS 2006a) notes that the enjoyment of park resources and values by the people of the United States is part of the fundamental purpose of all parks. The Organic Act also states that units of the National Park System are charged with conserving park scenery, along with all the natural and cultural resources which contribute to important views. In the evaluation of visual resources, both the visual character of the site and the quality of the viewshed are analyzed. A viewshed comprises the limits of the visual environment associated with the proposed action including the viewsheds within, into, and out of the site. The Bodie Island Lighthouse is closed to the public. The addition of three feet of pavement on both sides of the road would have a negligible impact to the appearance of the road. Therefore, visual resources was dismissed as an impact topic for further analysis in this EA.

## Sea Level Rise

Of the potential impacts of global climate change, sea level rise will have the greatest impact on coastal North Carolina. Global sea level is rising at an approximate rate of 0.08 inches (two millimeters) per year (Douglas et al. 2001) and is expected to accelerate over the next 100 years (USGCRP 2001). A rise of 0.20-0.63 inches (five-16 millimeters) per year within the next 100 years is predicted for the mid-Atlantic coast of the United States (Titus and Wang 2008).

According to a recent assessment of Cape Hatteras National Seashore's vulnerability to sea level rise, it is highly vulnerable to inundation in the long-term and rapid shoreline retreat in the short-term (Pendleton et al. 2005). The most vulnerable areas within Cape Hatteras National Seashore are those areas with the highest occurrence of overwash and the highest rates of shoreline change (USGS 2004). Assuming sea level rises 0.63 inches (16 millimeters) per year at Cape Hatteras National Seashore, a rise of 9.4 inches (24 centimeters) in sea level would occur during the 15-year lifespan of this environmental assessment. This predicted rise in sea level would have no effect on implementation of the proposed action nor would the proposed action have an impact on sea level rise. Furthermore, no reasonably foreseeable actions would alter overwash occurrences or shoreline change. Therefore, sea level rise was dismissed as an impact topic for further analysis in this EA.

## Species of Special Concern

In addition to NPS policies and management guidelines, the Endangered Species Act of 1973, as amended provides for the protection of rare, threatened, and endangered species (floral and faunal). Federally-listed species, regulated by the U.S. Fish and Wildlife Service and the National Marine Fisheries Service are found in Dare County, North Carolina. These species include:

Green sea turtle, *Chelonia mydas*, Threatened (T)  
Hawksbill sea turtle, *Eretmochelys imbricate*, Endangered (E)  
Kemp's ridley sea turtle, *Lepidochelys kempii*, E  
Leatherback sea turtle, *Dermochelys coriacea*, E  
Loggerhead sea turtle, *Caretta caretta*, T  
Piping plover, *Chradrius melanotos*, T  
Red wolf, *Canis rufus*, E  
Red-cockaded woodpecker, *Picoides borealis*, E  
Roseate tern, *Sterna dougalli dougalli*, T  
Shortnose sturgeon, *Acipenser brevirostrum*, E  
West Indian manatee, *Trichechus manatus*, E  
Seabeach amaranth, *Amaranthus pumilus*, T

No suitable habitat for any federally-listed species is available in the study area, therefore it was determined that the proposed project would have no effect on any federally-listed species.

Correspondence from the U.S. Fish and Wildlife Service concurred with this finding, and coordination with the National Marine Fisheries Services supported this finding.

Correspondence from the North Carolina Department of Environment and Natural Resources (NCDENR) indicated record of the State Significantly Rare sand heather (*Hudsonia tomentosa*) in the study area. Based on the consultation, a survey for this plant was conducted on July 21, 2009 by the Seashore's Natural Resource Manager, which confirmed the presence of the sand heather within the project area. Any sand heather potentially impacted by the proposed action would be relocated by the Seashore prior to the start of construction. Correspondence from the

U.S. Fish and Wildlife Service and NCDENR can be found in Appendix A.

No known federally-listed or rare species or their habitat would be impacted by the proposed action. An increase in noise associated with construction activities would be temporary. The impacts from the proposed improvements to NC 12, including an expansion of the paved shoulders, would be short-term, negligible, and adverse. Therefore, species of special concern was dismissed as an impact topic for further analysis in this EA.

#### Ecologically Critical Areas

Cape Hatteras National Seashore is located in the Southeastern Coastal Plain Bird Conservation Regions and is one of coastal North Carolina's 15 designated Globally Important Bird Areas (American Bird Conservancy 2007). The proposed action would have no impact on Cape Hatteras National Seashore's designation as a Globally Important Bird Area.

Two Registered Significant Natural Heritage Areas occur on Bodie Island: Bodie Island Roadside Ponds and Marshes, and Bodie Island Lighthouse Pond (NC DENR 1987). The 1045-acre Bodie Island Roadside Ponds and Marshes adjacent to the project area NC 12 are significant because they are some of the most heterogeneous marshes in North Carolina. They provide habitat for waterfowl and other water birds, and are primarily used for waterfowl hunting and bird watching. The proposed action would include mitigation measures to keep sediment from reaching the Bodie Island Roadside Ponds and Marshes Significant Natural Heritage Area. The adverse impacts would be short-term and negligible. Therefore, ecologically critical areas was dismissed as an impact topic for further analysis in this EA.

#### Socioeconomic Environment

The study area is located within the Cape Hatteras National Seashore, which is indicated as a conservation land use classification. The proposed improvements to NC 12 would neither change local and regional land use nor impact local businesses or other agencies. Therefore, socioeconomic environment was dismissed as an impact topic for further analysis in this EA.

#### Environmental Justice

Executive Order 12898, "General Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," requires all federal agencies to incorporate environmental justice into their missions by identifying and addressing the disproportionately high and/or adverse human health or environmental effects of their programs and policies on minorities and low-income populations and communities. The proposed action and alternatives would not result in disproportionate high and/or adverse effects to minority or low-income communities since the current location and proposed location are both within the Cape Hatteras National Seashore boundary. Therefore, environmental justice was dismissed as an impact topic for further analysis in this EA.

#### Energy Requirements and Conservation Potential

The CEQ guidelines for implementing NEPA require examination of energy requirements and conservation potential as a possible impact topic in environmental documents. Cape Hatteras National Seashore strives to incorporate the principles of sustainable design and development

into all facilities and Seashore operations. The objectives of sustainability are: to design structures to minimize adverse impacts on natural and cultural values, to reflect their environmental setting, to maintain and encourage biodiversity, to construct and retrofit facilities using energy efficient materials and building techniques, to operate and maintain facilities to promote their sustainability, and to illustrate and promote conservation principles and practices through sustainable design and ecologically sensitive use. Essentially, sustainability is living within the environment with the least impact on the environment. The proposed improvements would minimize adverse impacts on natural and cultural values to the extent possible, and would upgrade the existing road to promote sustainability. Therefore, energy requirements and conservation potential was dismissed as an impact topic for further analysis in this EA.

## **CHAPTER 2: DESCRIPTION OF ALTERNATIVES**

This chapter describes alternatives for improvements to NC 12. Alternatives for the proposed action are intended to improve the safety of motorists, bicyclists, and pedestrians using the road and road shoulders. The NPS and FHWA considered a range of alternatives for the proposed improvements to NC 12. Alternatives were developed that would meet the project objectives. The range of alternatives considered includes three alternatives described below: a no action alternative (Alternative A) and two action alternatives (Alternative B and Alternative C). The range of alternatives considered also includes Alternative D and Alternative E, which are discussed in the Alternatives Considered But Dismissed section.

The CEQ has provided guidance on the development and analysis of alternatives under NEPA. A full range of alternatives, framed by the purpose and need, must be developed for analysis for any Federal action. The alternatives should meet the project/proposal purpose and need, at least to a large degree. They should also be developed to minimize impacts to environmental resources. Alternatives should also be “reasonable,” which CEQ has defined as those that are economically and technically feasible, and show evidence of common sense. Alternatives that could not be implemented if they were chosen (for economic or technical reasons), or do not resolve the need for action and fulfill the stated purpose in taking action to a large degree, are therefore not considered reasonable.

### **ALTERNATIVE A - NO ACTION ALTERNATIVE**

Under Alternative A, the No Action Alternative, no substantial improvements would be performed other than in accordance with routine maintenance operations. Routine road maintenance operations include pavement repairs such as crack sealing and pothole patching. The culverts would be maintained, but not replaced. There would be no change to the width of the paved shoulder. Bicyclists and pedestrians would continue to be able to utilize the two-foot paved shoulder along NC 12. Additional gravel may be placed at the pull-offs to repair the rutting and vegetation loss caused by motorists continuing to drive beyond the paved area of the pull-off. Emergency repairs and replacements may be necessary. Analysis of the No Action Alternative is required as part of the NEPA process in order to provide a basis for the comparison of other feasible alternatives.

### **ALTERNATIVE B - ROAD IMPROVEMENTS**

Under Alternative B, the existing deteriorated road pavement would be resurfaced (Figure 7). Several options regarding the resurfacing of NC 12 are under consideration, and would be refined during final design of the proposed action. Resurfacing would most likely include milling of the existing pavement and recycling this material into a new asphalt wearing surface and/or overlaying asphalt over the existing road surface. The resurfacing strategy chosen would be based on factors such as cost, life-expectancy, and durability.

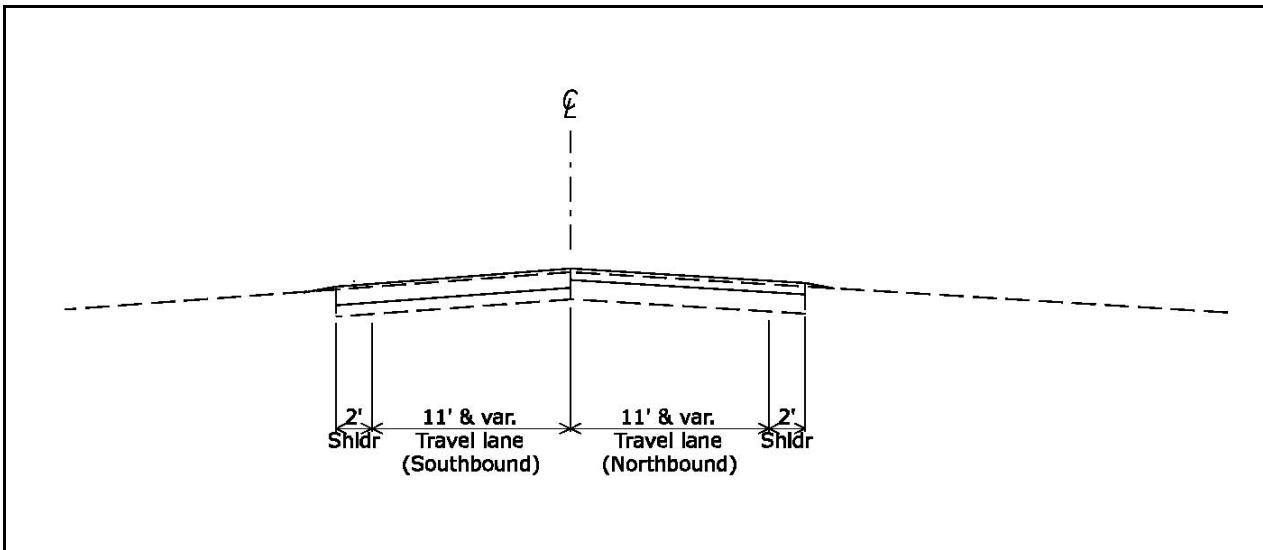


Figure 7. A cross section of the proposed road under Alternative B, matching the existing road dimensions, is shown.

Five parking areas located along the project area would also be milled and/or paved. The Whalebone Information Station parking area would be repaved within the existing pavement limits. A small gravel and grass section within the parking area would be paved. Four existing paved pull-offs along the road would be repaved to match their existing dimensions. Three of the pull-offs include an additional gravel area extending beyond the paved area. The gravel was placed due to vehicles parking in the grass beyond the paved pull-off. In order to discourage vehicles from parking beyond the paved area, the gravel would be removed, and bollards would be placed adjacent to the pullout. Gravel would be left in place where needed to create a trail to the wildlife overlook and hunting blind trails.

Wooden bollards would be replaced where necessary, and regulatory and warning signs would be replaced to ensure that there is adequate retroreflectivity. Retroreflectivity is the reflection of light, typically in the form of vehicle headlights, at night-time.

Along NC 12, three culvert locations contain culverts that have deteriorated and are beyond their useful life (Figure 8). These locations are at approximately mile 1.86, 2.67, and 3.13 (measuring from Whalebone Junction – mile 0.0). At mile 1.86 there are two culverts placed parallel to each other. Both of these culverts would be replaced with the same size and length culverts. Mile 2.67 has a single culvert. This culvert would be replaced with the same size and length culvert. The culvert at mile 3.13 is currently too short. The ends of the culvert are within the vegetated shoulder and recovery zone, and are indicated as a potential hazard to motorists with plastic delineators. This culvert would be replaced with the same diameter culvert, however it would be longer. In order to replace the culverts, an area surround the culverts would be contained and the water would be pumped out.

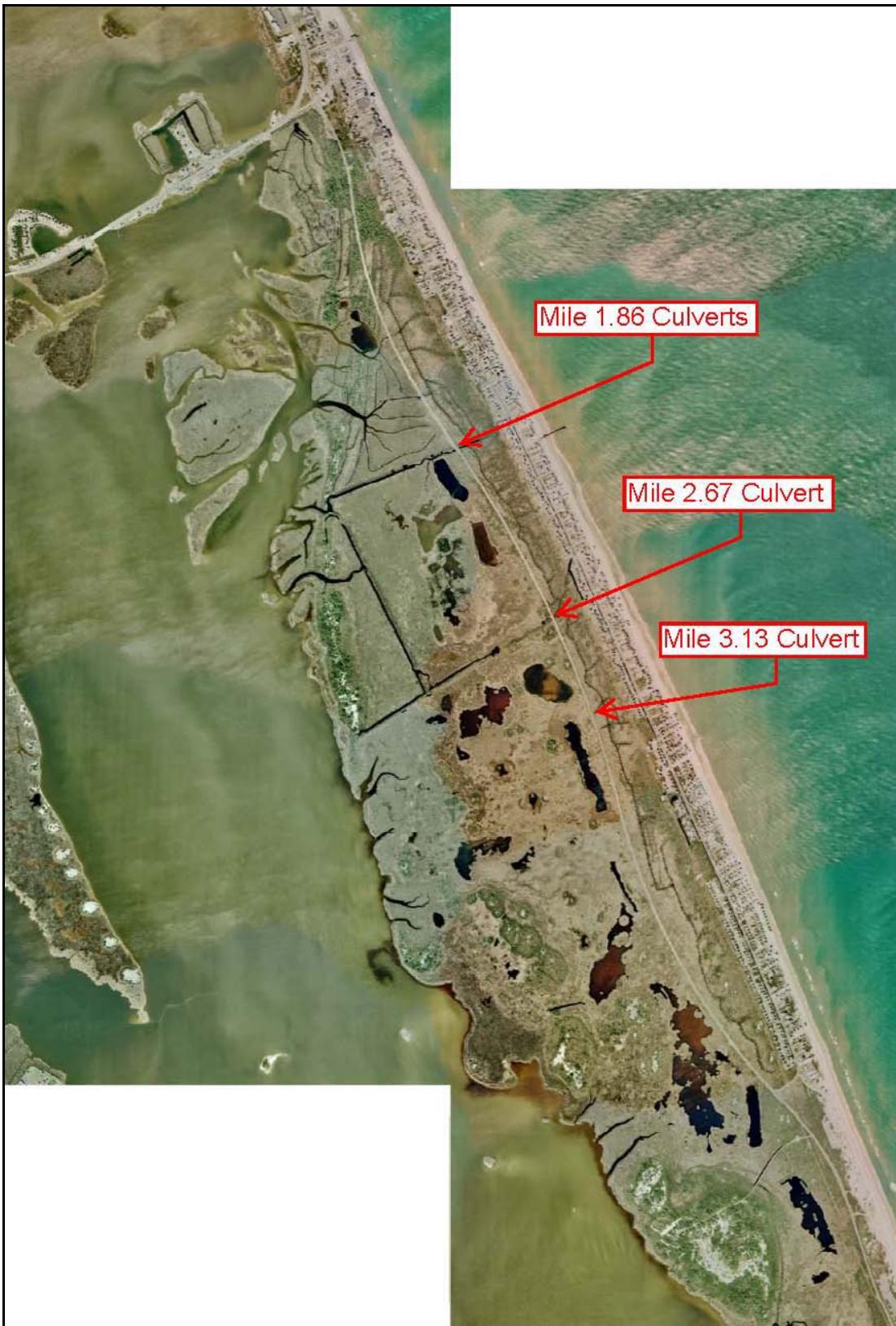


Figure 8. The three culvert replacement locations. (NC OneMap 2009)

## **Traffic Control during Construction**

Portions of NC 12 would be closed to traffic in order to resurface the road and replace the culverts. During lane closures, one lane of traffic would be closed, and traffic in the north and south bound directions would alternate use of the open traffic lane. Signs and flaggers would be in place to direct traffic. Should evacuation be necessary during construction, construction would be halted, and both lanes of traffic would be opened to accommodate evacuating traffic.

## **Staging**

Staging would take place in previously disturbed, paved areas. Locations that may be used for staging include the paved area which previously served as an access road and parking for the U.S. Coast Guard Station, or the Bodie Island Maintenance Facility, located just south of the southern end of South Old Oregon Inlet Road. Construction vehicles would be parking at the staging location when not in use, and materials such as aggregate and topsoil would be stockpiled there.

## **Construction Timing and Duration**

Construction would most likely take place in the spring or fall. Asphalt plants are in operation from March 15<sup>th</sup> through December 15<sup>th</sup>. Construction would also be timed to avoid the peak visitor season for the Seashore during the summer months. It is estimated that Alternative B would be constructed in ten weeks.

## **Mitigation Measures**

Avoidance, minimization, and mitigation measures and Best Management Practices (BMPs) would prevent or minimize potential adverse effects associated with the implementation of Alternative B. These measures and practices and measures would be incorporated into the project design and construction plans.

- Temporary BMPs would be utilized to minimize erosion and sedimentation from ground disturbing activities that expose bare soil. The BMPs may include the use of silt-fence, sediment logs, erosion matting, or check dams. These BMPs would be used only during construction and would be removed once the disturbed area has been permanently stabilized.
- Any dewatering activities to replace the culverts would include the use of a filter bag to filter pumped water. Pumping water directly into the channels would be prohibited. Filter bags would be placed to minimize disruption to surrounding wetlands.
- Disturbed soil would be re-vegetated using specific native seed mixes that do not include invasive or exotic species.
- Any soil excavated during construction would be stockpiled and reused as fill if needed. Fill material is not anticipated for this project; however, should additional soil be needed, the soils would be clean, native soils.
- Should construction unearth previously undiscovered archeological resources, work

would be stopped in the area of any discovery and the Seashore would consult with the State Historic Preservation Officer/Tribal Historic Preservation Officer and the Advisory Council on Historic Preservation (AHP), as necessary, according to §36 CFR 800.13, Post Review Discoveries. In the unlikely event that human remains are discovered during construction, provisions outlined in the Native American Graves Protection and Repatriation Act (1990) would be followed as appropriate.

- Travel lanes of NC 12 would not be closed between Memorial Day and Labor Day. Lanes would not be closed on National holidays or weekends. From Memorial Day through Labor Day, construction would only take place from Tuesday through Thursday.
- The existing access roads, parking areas, and concrete walkways associated with the previous locations of the U.S. Coast Guard Station, U.S. Lifesaving Station, and boathouse would be considered for use as potential staging areas.
- To compensate for temporary and permanent wetland impacts, wetland enhancement would be accomplished by controlling infestations of non-native common reed (*Phragmites australis*) using manual, mechanical, or chemical treatments.

#### ALTERNATIVE C – ROAD IMPROVEMENTS AND WIDENED SHOULDERS (NPS AND FHWA PREFERRED ALTERNATIVE)

Under Alternative C, all of the actions described in Alternative B would be implemented; however, the paved shoulders would be widened (Figure 9). At the edge of the existing pavement the vegetation and soils would be removed to create an area to place approximately five inches of aggregate base (Figure 10). The five-foot-wide shoulders would be in accordance with the Guide for the Development of Bicycle Facilities, published by the American Association of State Highway and Transportation Officials (AASHTO), which recommends that paved shoulders be at least four feet wide to accommodate bicycle travel.

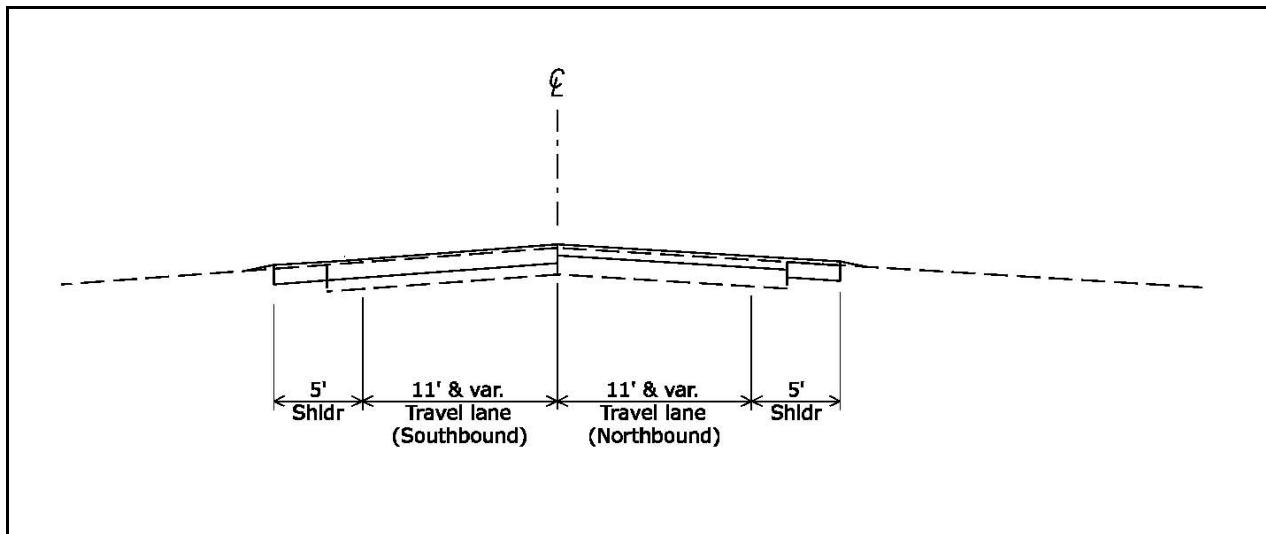


Figure 9. A cross section of the proposed road under Alternative C is shown.

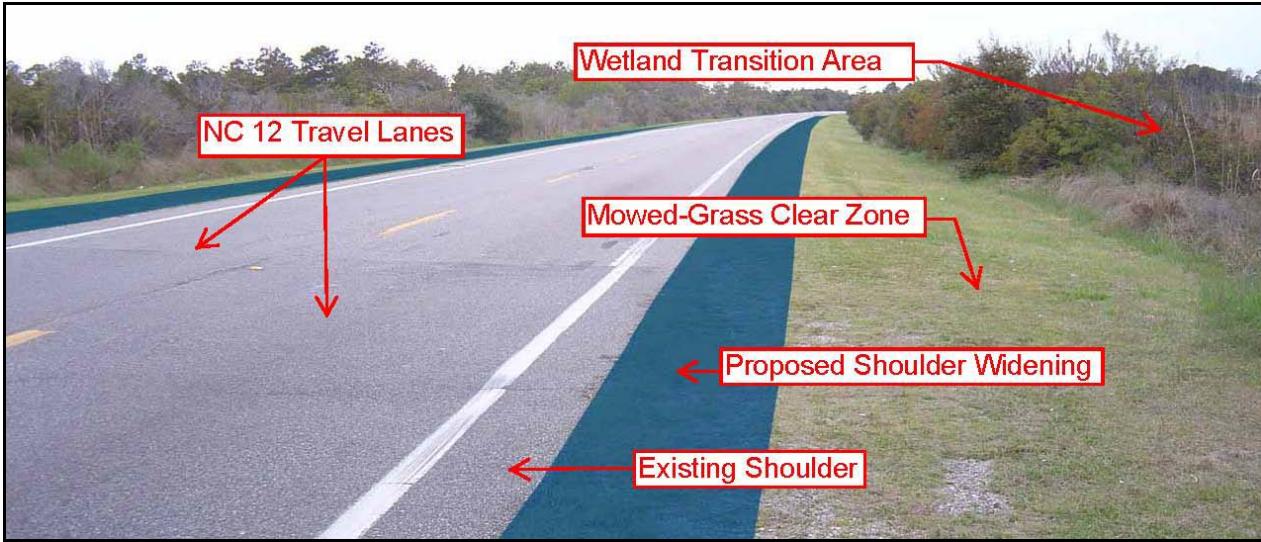


Figure 10. A view of the road with the area to be widened shaded.

### Traffic Control during Construction

Traffic control would be implemented as described under Alternative B.

### Staging

Staging would take place in the same areas specified under Alternative B.

### Construction Timing and Duration

Construction would most likely take place during the spring or fall as specified under Alternative B. Construction of the project is estimated to take 14 weeks to complete, which is four weeks longer than Alternative B.

### Mitigation Measures

All of the mitigation measures implemented under Alternative B would also be implemented under Alternative C. In addition, the following mitigation measures would be implemented:

- The access roads, parking areas, and concrete walkways associated with the U.S. Coast Guard Station, U.S. Lifesaving Station, and boathouse may be removed as mitigation for floodplain impacts and/or stormwater impacts. The need for and amount of impervious surface removal would be determined through coordination with the North Carolina Division of Water Quality and Division of Coastal Management.
- Grassed swales may be utilized to treat stormwater resulting from increased impervious surface in the project area. Coordination with the North Carolina Division of Water Quality would continue through the finalization of the project design to determine whether permanent BMPs are necessary to treat stormwater created from the widened shoulders. Coordination to date has indicated that should permanent BMPs be necessary, grassed swales would work best in a linear transportation system to improve

infiltration of stormwater. The treatment goal would be to control the first 1.5 inches of rainfall through infiltration, if possible. The grassed swales would have a two-foot wide bottom and a three-to-one or five-to-one slope. The extra runoff would be allowed to spill over the back sides of the swale to sheet flow behind it. Grassed swales would only be placed where they could be constructed without impacting wetlands, and where the rainfall drains according to the slope of the road.

## **ENVIRONMENTALLY PREFERABLE ALTERNATIVE**

The Environmentally Preferred Alternative is defined by CEQ as “the alternative that will promote the national environmental policy as expressed in NEPA [Section 101 (b)].” Section 101 (b) goes on to define the Environmentally Preferred Alternative through the application of six criteria, listed below. Generally, these criteria define the Environmentally Preferred Alternative as the alternative that causes the least amount of damage to the biological and physical environment and that best protects, preserves, and enhances historic, cultural, and natural resources, while attaining the widest range of beneficial uses of the environment. Each criterion is presented below, followed by a discussion of how well the alternatives meet each one.

- 1. Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.** All of the Alternatives would continue to provide access for visitors to the Seashore. Under Alternatives A and B, there would be no treatment of stormwater; however, no new additional impervious surface would be added to the area. Alternative C would include the construction of drainage swales to treat stormwater runoff from existing NC 12 and the additional impervious surface from the shoulder expansion where feasible.
- 2. Ensure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings.** Alternative A would allow the continued deterioration of NC 12. Although regularly scheduled maintenance activities would continue, the deteriorated rough road would not be safe or pleasing to visitors. Alternative B would improve NC 12 and make for safer vehicular access, and would provide a smooth asphalt surface that would be pleasing to users of the road. Alternative C would improve NC 12 for both vehicular, bicycle, and pedestrian access.
- 3. Attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences.** Under Alternatives A and B, stormwater would not be treated, and risks to health and safety would increase as the pavement and culverts continued to degrade. Under Alternative B, the improvements to NC 12 would enhance the safety of motorists. Under Alternative C, the improved pavement conditions and widened shoulders would decrease the potential for conflicts between motorists and cyclists. The implementation of Alternative A, Alternative B, and Alternative C are analyzed in this EA to minimize undesirable or unintended consequences.
- 4. Preserve important historic, cultural, and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice.** Important historic and cultural aspects of the project area would continue to be preserved under both Alternatives A, B, and C. Alternative A would continue to preserve important natural aspects of the project area. Alternative B would

impact natural resources through the placement of riprap at the culverts. Alternative C would impact natural resources through the placement of riprap and widening of the paved shoulders.

5. **Achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities.** Under Alternative A, NC 12 would continue to deteriorate. The road would still be available for use by visitors; however, that experience may be diminished by the rough quality of the road surface. Alternative B would improve NC 12 primarily for vehicular use. Under Alternative C, alternative forms of transportation, such as bicycling, would be supported through the construction of widened shoulders. The pavement improvements allow for a smoother safer ride of both vehicles and bicycles. Impacts to the Seashore's resources would be minimized, because the improvements would be made to and immediately adjacent to an existing facility.
6. **Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.** Alternative A would not contribute to this criterion. Under Alternative B, the existing asphalt pavement may be recycled and used as all or part of the new asphalt pavement. Alternative C would likely require new asphalt pavement.

Alternative A best meets criteria one and four. Alternative B best meets criteria three, four, and six. Alternative C best meets criteria two, four, and five defining the Environmentally Preferred Alternative. Alternative C is the Environmentally Preferred Alternative because it supports multiple modes of access and enjoyment despite its greater impact on the natural environment as compared to Alternatives A and B.

## PREFERRED ALTERNATIVE

Alternatives A, B, and C were evaluated to determine whether they met the objectives as identified in Chapter 1, Purpose and Need. Table 2 describes the degree to which each alternative satisfies each objective.

**Table 1. Alternatives Comparison**

<b>Objective</b>	<b>Alternative A</b>	<b>Alternative B</b>	<b>Alternative C</b>
Maintenance of NC 12 as safe public access	Fails to meet objective.	Meets objective.	Meets objective.
Reduction of potential conflicts between vehicles, pedestrians, and bicyclists using NC 12	Fails to meet objective.	Fails to meet objective.	Meets objective.
Improvement of visitor access along Bodie Island	Fails to meet objective.	Meets objective for motorized vehicles only	Meets objective for multiple modes.
Minimization of impacts to natural, cultural, and scenic and aesthetic resources	Meets objective.	Meets objective.	Meets objective, but some natural resources would be more noticeably and adversely impacted than would occur under Alternative B

Implementation of Alternative A would not maintain NC 12 as safe public access, reduce the potential conflicts between vehicles, pedestrians, and bicyclists using NC 12, or improve visitor access along Bodie Island. Implementation of Alternative B would not reduce the potential conflicts between vehicles, pedestrians, and bicyclists using NC 12. Implementation of Alternative C would best meet all of the project objectives; therefore, Alternative C was identified as the NPS and FHWA Preferred Alternative.

The Preferred Alternative is the agency (NPS and FHWA) Preferred Alternative (and is the proposed undertaking for §106 compliance) and defines the rationale for the action in terms of resource protection and management, visitor and operational use, costs, and other applicable factors. All actions described in the Preferred Alternative are consistent with the approved 1984 General Management Plan and related park documents.

## **ALTERNATIVES CONSIDERED BUT DISMISSED**

As mentioned previously, alternatives should be “reasonable.” Unreasonable alternatives may be those that are unreasonably expensive; that cannot be implemented for technical or logistic reasons; that do not meet park mandates; that are inconsistent with carefully considered, up-to-date park statements of purpose and significance or management objectives; or that have severe environmental impacts (NPS 2001a).

### **Alternative D - Multi-use Trail Separate from NC 12 – Both Sides**

A six-foot wide multiple-use paved trail would be constructed parallel to NC 12 on each side of the road, at a distance of five feet from the edge of the existing road. The six-foot width is consistent with the AASHTO Guide for the Development of Bicycle Facilities for multiple-use trails with one-directional movement. This trail would accommodate bicycles and pedestrians. The construction of a paved trail five feet from the existing road would increase the footprint of the transportation corridor. In order to construct this, fill material would need to be placed to create a flat surface, and the side slopes would then transition to the existing ground elevation. Wetlands are located along most of the NC 12 at the edge of the road prism. Due to the five mile-length of the project, a fill of approximately two feet on each side of the road prism would impact over two acres of wetlands. This would result in an unacceptable amount of wetland impacts; therefore, this alternative was dismissed from further consideration in this EA.

### **Alternative E - Multi-use Trail Separate from NC 12 – One Side**

Under this alternative, a 10-foot wide multiple-use trail would be constructed, but only on one side of the road. The trail would be located five feet from the edge of the existing road, and would accommodate bicycles and pedestrians. The 10-foot width is consistent with the AASHTO Guide for the Development of Bicycle Facilities for multiple-use trails with bi-directional movement. This Alternative was dismissed from further consideration in this EA because of unacceptable design challenges. A trail on one side of the road would be difficult to tie into the existing widened shoulders north and south of the study area. Users would have to cross two lanes of traffic to access the trail, causing a potential conflict with vehicles travelling at high speeds along NC 12. This Alternative would also fill approximately three acres of wetlands, an unacceptable impact to wetlands. Therefore, this Alternative was dismissed from further consideration in this EA.

### **Detouring Traffic from NC 12 to South Old Oregon Inlet Road**

While not a stand-alone alternative, detouring traffic from NC 12 to South Old Oregon Inlet Road was analyzed because it would allow for a full closure of NC 12, and a shorter construction duration. South Old Oregon Inlet Road intersects with many driveways, has no paved shoulder, and is adjacent to a large drainage ditch with steep side slopes. Through traffic would not be able to pass vehicles making left-hand turns, and the additional detoured traffic would worsen this condition. It was determined through discussions with NCDOT that South Old Oregon Inlet Road could not safely accommodate the traffic from NC 12. Therefore, it was dismissed from further consideration in this EA.

**Table 2: Impact Summary**

	<b>Alternative A</b>	<b>Alternative B</b>	<b>Alternative C</b>
<b>Floodplains</b>	Overall impact: None	Overall impact: Short-term, negligible, adverse impact from culvert dewatering. Long-term, negligible, adverse impact from riprap.	Overall impact: Short-term, negligible, adverse impact from culvert dewatering. Long-term, minor, adverse impact from riprap and new shoulder material.
	Cumulative impact: None	Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, moderate, and adverse cumulative impact.	Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, moderate, and adverse cumulative impact.
<b>Wetlands</b>	Overall impact: None	Overall impact: Short-and long-term, negligible, adverse impact from dewatering and riprap.	Overall impact: Short- and long-term, negligible, adverse impact from dewatering and riprap.
	Cumulative impact: None	Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, moderate, and adverse cumulative impact.	Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, moderate, and adverse cumulative impact.
<b>Surface Water and Groundwater Quality</b>	Overall impact: None	Overall impact: Short-term, minor, adverse impact from culvert replacement ground disturbance. No long-term impact.	Overall impact: Short-term, minor, adverse impact from culvert replacement and shoulder widening ground disturbance. Long-term, negligible, adverse impact from more bicyclist use.
	Cumulative impact: None	Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, moderate, and adverse cumulative impact	Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, moderate, and adverse cumulative impact.
<b>Stormwater Management</b>	Overall impact: None	Overall impact: No short-term impact. Long-term, negligible, adverse impact from a new small area of pavement.	Overall impact: No short-term impact. Long-term, negligible to minor, adverse impact from wider impervious shoulders.
	Cumulative impact: None	Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, minor, and adverse cumulative impact.	Cumulative impact: Would contribute a noticeable, beneficial increment to the long-term, minor, and adverse cumulative impact.

**Table 2: Impact Summary**

	<b>Alternative A</b>	<b>Alternative B</b>	<b>Alternative C</b>
<b>Vegetation</b>	<p>Overall impact: Long-term, negligible, adverse impact.</p> <p>Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, minor, and adverse cumulative impact.</p>	<p>Overall impact: Short-term, minor, adverse impact from clearing to replace culverts. Long-term, negligible, beneficial impact from gravel removal at pull-offs.</p> <p>Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, minor, and adverse cumulative impact</p>	<p>Overall impact: Short- and long-term, minor to moderate, adverse impact from clearing the replace culverts and widening shoulders.</p> <p>Cumulative impact: Would contribute an Imperceptible, adverse increment to the long-term, minor, and adverse cumulative impact.</p>
<b>Wildlife and Wildlife Habitat</b>	<p>Overall impact: No impact</p> <p>Cumulative impact: None</p>	<p>Overall impact: Short-term, minor, adverse impact from culvert dewatering. Long-term negligible, adverse impact from riprap.</p> <p>Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, negligible, and adverse cumulative impact.</p>	<p>Overall impact: Short- and long-term, minor, adverse impact from culvert dewatering, riprap, and shoulder widening.</p> <p>Cumulative impact: Would contribute a noticeable, adverse increment to the long-term, negligible, and adverse cumulative impact.</p>
<b>Visitor Use and Experience</b>	<p>Overall impact: Long-term, negligible to minor, adverse impact.</p> <p>Cumulative impact: Would contribute a noticeable, adverse increment to the long-term, moderate, and adverse cumulative impact</p>	<p>Overall impact: Short-term, negligible to minor, adverse impact from lane closures. Long-term, minor, beneficial impact from improved transportation facility.</p> <p>Cumulative impact: Would contribute a noticeable, beneficial increment to the long-term, moderate, and beneficial cumulative impact.</p>	<p>Overall impact: Short-term, minor, adverse impact from lane closures. Long-term, moderate, beneficial impact from improved transportation facility and wider shoulders.</p> <p>Cumulative impact: Would contribute a noticeable, beneficial increment to the long-term, moderate, and beneficial cumulative impact</p>
<b>Seashore Operations</b>	<p>Overall impact: Long-term, minor, adverse impact.</p> <p>Cumulative impact: Would contribute a noticeable, adverse increment to the long-term, minor, and adverse cumulative impact</p>	<p>Overall impact: Short-term, minor, adverse impact from lane and information station closures. Long-term, moderate, beneficial impact from rehabilitated road.</p> <p>Cumulative impact: Would contribute a noticeable, beneficial increment to the cumulative long-term, minor, and adverse cumulative impact</p>	<p>Overall impact: Short-term, minor, adverse impact from lane and information station closures. Long-term, moderate, beneficial impact from rehabilitated roadway.</p> <p>Cumulative impact: Would contribute a noticeable, beneficial increment to the long-term, minor, and adverse cumulative impact.</p>

**Table 2: Impact Summary**

	<b>Alternative A</b>	<b>Alternative B</b>	<b>Alternative C</b>
<b>Traffic Operations</b>	<p>Overall impact: Long-term, minor, adverse impact.</p> <p>Cumulative impact: Would contribute a noticeable, adverse increment to the long-term, minor, and adverse cumulative impact.</p>	<p>Overall impact: Short-term, moderate, adverse impact from lane closures. Long-term, minor, beneficial impact from new pavement.</p> <p>Cumulative impact: Would contribute a noticeable, beneficial increment to the long-term, minor, and adverse cumulative impact.</p>	<p>Overall impact: Short-term, moderate, adverse impact from lane closures. Long-term, minor, beneficial impact from new pavement.</p> <p>Cumulative impact: Would contribute a noticeable, beneficial increment to the long-term, minor, and adverse cumulative impact.</p>
<b>Health and Safety</b>	<p>Overall impact: Long-term, moderate, adverse impact.</p> <p>Cumulative impact: Would contribute a noticeable, adverse increment to the long-term, minor, and adverse cumulative impact.</p>	<p>Overall impact: Short-term, minor, adverse impact from lane closures. Long-term, minor, beneficial impact from rehabilitated transportation facility.</p> <p>Cumulative impact: Would contribute a noticeable, beneficial increment to the long-term, minor, and adverse cumulative impact.</p>	<p>Overall impact: Short-term, minor, adverse impact from lane closures. Long-term, moderate, beneficial impact from rehabilitated transportation facility with wider shoulders.</p> <p>Cumulative impact: Would contribute a noticeable, beneficial increment to the long-term, minor, and adverse cumulative impact.</p>
<b>Gateway Communities</b>	<p>Overall impact: Long-term, negligible, adverse impact.</p> <p>Cumulative impact: Would contribute an imperceptible, adverse increment to the long-term, minor, and adverse cumulative impact.</p>	<p>Overall impact: Short-term, moderate, adverse impact from travel delays. Long-term, minor, beneficial impact from rehabilitated transportation facility.</p> <p>Cumulative impact: Would contribute a noticeable, beneficial increment to the long-term, minor, and adverse cumulative impact.</p>	<p>Overall impact: Short-term, moderate, adverse impact from travel delays. Long-term, moderate, beneficial impact from rehabilitated transportation facility.</p> <p>Cumulative impact: Would contribute a noticeable, beneficial increment to the long-term, minor, and adverse cumulative impact.</p>

## **CHAPTER 3: AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES**

This chapter describes the existing environmental conditions in and around the project area and the environmental consequences associated with the alternatives presented in Chapter 2: Alternatives. Chapter 3 is organized by impact topic, and includes the impact topics presented in Chapter 1: Purpose and Need that required further analysis: floodplains, wetlands, surface water and groundwater quality, stormwater management, vegetation, wildlife and habitat, visitor use and experience, Seashore operations, traffic operations, health and safety, and gateway communities.

For each impact topic identified in Chapter 2, a process for impact assessment was developed based on the directives of Sections 2.9 and 4.5(g) of the DO-12 Handbook. The NPS units are directed to assess the extent of impacts on Park resources as defined by the context, duration, and intensity of the effect. While measurement by quantitative means is useful, it is even more crucial for the public and decision-makers to understand the implications of those impacts in the short- and long-term, cumulatively, and within context, based on an understanding and interpretation by resource professionals and specialists. With that interpretation, one can ascertain whether a certain impact intensity to a park resource is “minor” compared to “major” and what criteria were used to base that conclusion.

### **METHODOLOGY**

To determine impacts, methodologies were identified to measure the change in park resources that would occur with the implementation of each alternative. Thresholds were established for each impact topic to help understand the severity and magnitude of changes in resource conditions, both adverse and beneficial, of the various alternatives.

Potential impacts are described in terms of type (Are the effects beneficial or adverse?), context (Are the effects site-specific, local, or even regional?), duration (Are the effects short-term, lasting during construction, or long-term, lasting permanently?), and intensity (Are the effects negligible, minor, moderate, or major?). Because definitions of intensity (negligible, minor, moderate, or major) vary by impact topic, intensity definitions are provided separately for each impact topic analyzed in this document.

Each alternative is compared to a baseline to determine the context, duration, and intensity of resource impacts. For purposes of impact analysis, the baseline is the continuation of current management (the No Action Alternative) projected over the next 10 years. In the absence of quantitative data, best professional judgment was used to determine impacts. In general, the thresholds used come from existing literature, Federal and State standards, and consultation with subject matter experts and appropriate agencies.

### **CUMULATIVE IMPACTS**

The CEQ regulations (40 CFR 1508.7) require the assessment of “cumulative impacts” which are defined as:

*The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other*

*actions.*

In January 1997, the CEQ published a handbook entitled Considering Cumulative Effects Under the National Environmental Policy Act (see <http://ceq.eh.doe.gov/nepa/ccenepa/ccenepa.htm>). The introduction to the handbook opens with, “Evidence is increasing that the most devastating environmental effects may result not from the direct effects of a particular action, but from the combination of individually minor effects of multiple actions over time.”

Cumulative impacts are considered for all alternatives, including the no-action alternative. They were determined by looking at each resource (impact topic), determining which past, present, and future actions would impact the resource for the determined spatial and temporal boundaries, and then combining the impacts of the alternative being considered with other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other ongoing or reasonably foreseeable future projects at the Seashore and, if applicable, the surrounding region.

These cumulative actions are evaluated in the cumulative impact analysis in conjunction with the impacts of particular resources. Because both of these cumulative actions are in the early stages, the evaluation of cumulative impacts was based on a general description of the action. Cumulative impacts are considered for all alternatives, and are presented at the end of each impact topic discussion. In defining the contribution of each alternative to cumulative impacts, the following terminology is used:

**Imperceptible:** The incremental effect contributed by the alternative to overall cumulative impacts is such a small increment that it is impossible or extremely difficult to discern.

**Noticeable:** The incremental effect contributed by the alternative, while evident and observable, is still relatively small in proportion to the overall cumulative impacts.

**Appreciable:** The incremental effect contributed by the alternative constitutes a large portion of the overall cumulative impact.

## Past Actions

### Development of Nags Head

Since its establishment in the 1830's, the Town of Nags Head has continued to develop into a beach community. Along with the construction of housing, associated roads and businesses have also been constructed. The Town of Nags Head has almost reached full build out. (Town of Nags Head 2009).

### Bike Accommodations along NC 12

Wide paved shoulders or a side path extend along NC 12 from Corolla to the intersection with US 64 at Whalebone Junction. The side path continues along US 158, however, there are no bike facilities until approximately one mile south of the Bonner Bridge over the Oregon Inlet. At approximately one mile south of the bridge, wide paved shoulders of NC 12 extend throughout Hatteras to the northern village limits of Ocracoke (NCDOT 2004, NCDOT 2008b).

### Unexploded Ordnance (UXO) Survey

A survey of the Bodie Island bombing target area was completed by the U.S. Army Corps of

Engineers in 2007. The Wilmington Corps District representative stated that the results of the survey stated that no further action was necessary by the Department of Defense (personal communication w/ Corps 2009). The finding that no further action was necessary indicates that there are negligible health or safety risks to anyone in the project area.

#### Relocation of the U.S. Coast Guard Station and Life-Saving Station

The three historic structures (1925 U.S. Coast Guard Station, 1879 Life-Saving Station, and 1916 Boathouse) were relocated to a new site in the summer of 2009. The structures were previously located along the ocean-side of Bodie Island, and were accessible via access roads from NC 12. The new location is along Bodie Island Lighthouse Road. The access roads, parking areas, and concrete walkways remained on-site to be considered for use as potential staging areas for future actions (NPS 2008).

#### **Present and Future Actions**

##### Town of Nags Head Flood Control Projects

The Town of Nags Head has proposed flood control projects to concentrate stormwater within the existing conveyance system. The increased stormwater flows and potentially increasing pollutant loads in the conveyance systems include recommended extended detention wetlands to help provide water quality treatment prior to discharging to the Sound or Ocean. The Milepost 18 problem area includes residential areas along South Old Oregon Inlet Road from Dare Drive to Isabella Street. The existing drainage system includes a series of pipes and channels from Isabella Street to Station 21 across from Ida Street. The drainage system discharges to the National Park Services property on the north end of the Station 21 property (Town of Nags Head 2008).

##### Town of Nags Head Septic Health Initiative

The Town of Nags Head has implemented four programs as part of their Septic Health initiative. These programs include a Septic Tank Inspection and Pumping Program. The overall goal of the inspection and pumping is to have all septic systems in Nags Head inspected and pumped within four to five years. The Water Quality Monitoring Program was created to track the flow of possible septic system pollutants in groundwater and their influence, if any, on nearby surface water constituents. The results will be used to develop a Decentralized Wastewater Master Plan. The third part of the initiative is the Education Program and is the means in which The Town of Nags Head is teaching both young and old the proper use and maintenance of septic systems. The fourth and final part of the initiative is the development of a Decentralized Wastewater Master Plan. (Town of Nags Head 2006)

##### Replacement of Water Main

The existing water main is located underground on the east side of NC 12 within in the project area. Replacement of the underground water line by the NPS may occur within the next five years from the NPS' Bodie Island Maintenance Facility to Oregon Inlet Fishing Center. Replacement of the water main would result in either the abandonment of the existing water main or the removal of the existing line coupled with installation of a new main. If the existing water main is to be abandoned, then the replacement main would potentially be installed on the west side of NC12. The line would be replaced in the area between the edge of the southbound

lane and the existing drainage ditch. Water line service along Lighthouse Bay Drive to the relocated U.S. Coast Guard Station Complex and the Bodie Island Lighthouse would also be replaced and the new line installed along Lighthouse Bay Drive.

#### Bonner Bridge Repair Work

The repairs to Bonner Bridge are estimated to be complete in November 2010. Repair work includes repairs to the bridge's subcaps, pile jackets, concrete, and fender system (NDCOT 2008a). Repair work often requires the closure of one lane of the Bridge, causing delays to motorists on NC 12.

#### Bonner Bridge Replacement

A new bridge will be built across the Oregon Inlet to replace the existing Bonner Bridge. The new replacement Oregon Inlet Bridge is estimated to be complete in 2014. A new structure would be constructed roughly parallel to the existing Bonner Bridge. The Bridge would have eight-foot (2.4-meter) wide shoulders that would be safer for bicycle and pedestrian traffic than Bonner Bridge's two-foot (0.6-meter) wide shoulders. In addition, a bicycle-safe bridge rail on the bridges also would provide increased safety for bicyclists. (NCDOT 2008a)

#### Widening and Repaving Lighthouse Bay Drive

The NPS is considering widening and repaving Lighthouse Bay Drive within the next 10 to 15 years. Lighthouse Bay Drive provides the only road to the Bodie Island Lighthouse. The existing road was paved in the 1990s, and its current width is 18 feet for two-way traffic. Since then, there has been an increase in visitation to the Lighthouse. In April of 1999, a low speed, head-on collision resulted in a fatality. Therefore, widening of Lighthouse Bay Drive is necessary. Widening would result in a 34 foot-wide paved surface (comprised of two 12 foot-wide lanes, each with five foot-wide shoulders to accommodate bicycle traffic).

#### Future Growth of Nags Head

The population of Nags Head in 2005 totaled 3,125 residents. The State Data Center projects the 2025 Nags Head population to be 4,117 residents, for a growth rate of approximately 32 percent.

### **IMPAIRMENT**

The NPS Director's Order 12 requires an impairment finding for actions that impact NPS resources. The 'fundamental purpose' of the National Park System, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve Park resources and values. The NPS managers must always seek ways to avoid or minimize to the greatest degree practicable adverse impacts on Park and monument resources and values. However, the laws do give NPS management discretion to allow impacts to Park resources and values when necessary and appropriate to fulfill the purposes of a Park, as long as the impact does not constitute impairment of the affected resources and values. Although Congress has given NPS management discretion to allow certain impacts within Parks, that discretion is limited by statutory requirement that the NPS must leave Park resources and values unimpaired, unless a particular law directly and specifically provides otherwise.

The prohibited impairment is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of Park resources or values, including opportunities that otherwise would be present for the enjoyment of those resources or values. An impact to any Park resource or value may constitute impairment. However, an impact would more likely constitute impairment to the extent it affects a resource or value whose conservation is:

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the Park;
- key to the natural or cultural integrity of the Park or to opportunities for enjoyment of the Park; or
- identified as a goal in the Park's Master Plan, or General Management Plan or other relevant NPS planning documents.

The impact analysis includes any findings of impairment to park resources and values for each of the alternatives.

## FLOODPLAINS

### Affected Environment

Floodplains are a vital part of our environment and their flooding is a natural occurrence. During high precipitation events flooding of the adjoining land (or floodplain) occurs. The floodplain then acts to convey and store this water. Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps show that the study area is within the 100-year floodplain, specifically Zone AE (Figure 11). Zone AE is defined as an area inundated by 100-year flooding for which base flood elevations have been determined. The base flood elevation is the computed elevation to which floodwater is anticipated to rise during the base flood. The base flood is the flood having a one percent chance of being equaled or exceeded in any given year. This is also referred to as the 100-year flood. The base flood elevations in the project area range between 10 and 11 feet. Ground elevations in the study area range from sea level to 4.5 feet above sea level. NC 12 is generally three to 3.5 feet above sea-level, approximately 1.5 to two feet above the surrounding area. No portion of the project area is located within the velocity zone. Velocity zones (Zone VE) are coastal high hazard areas where wave actions and/or high velocity water can cause structural damage during the base flood (FEMA 2009). Seashore staff have only observed flooding of NC 12 in the project area during strong nor'easters or hurricanes.

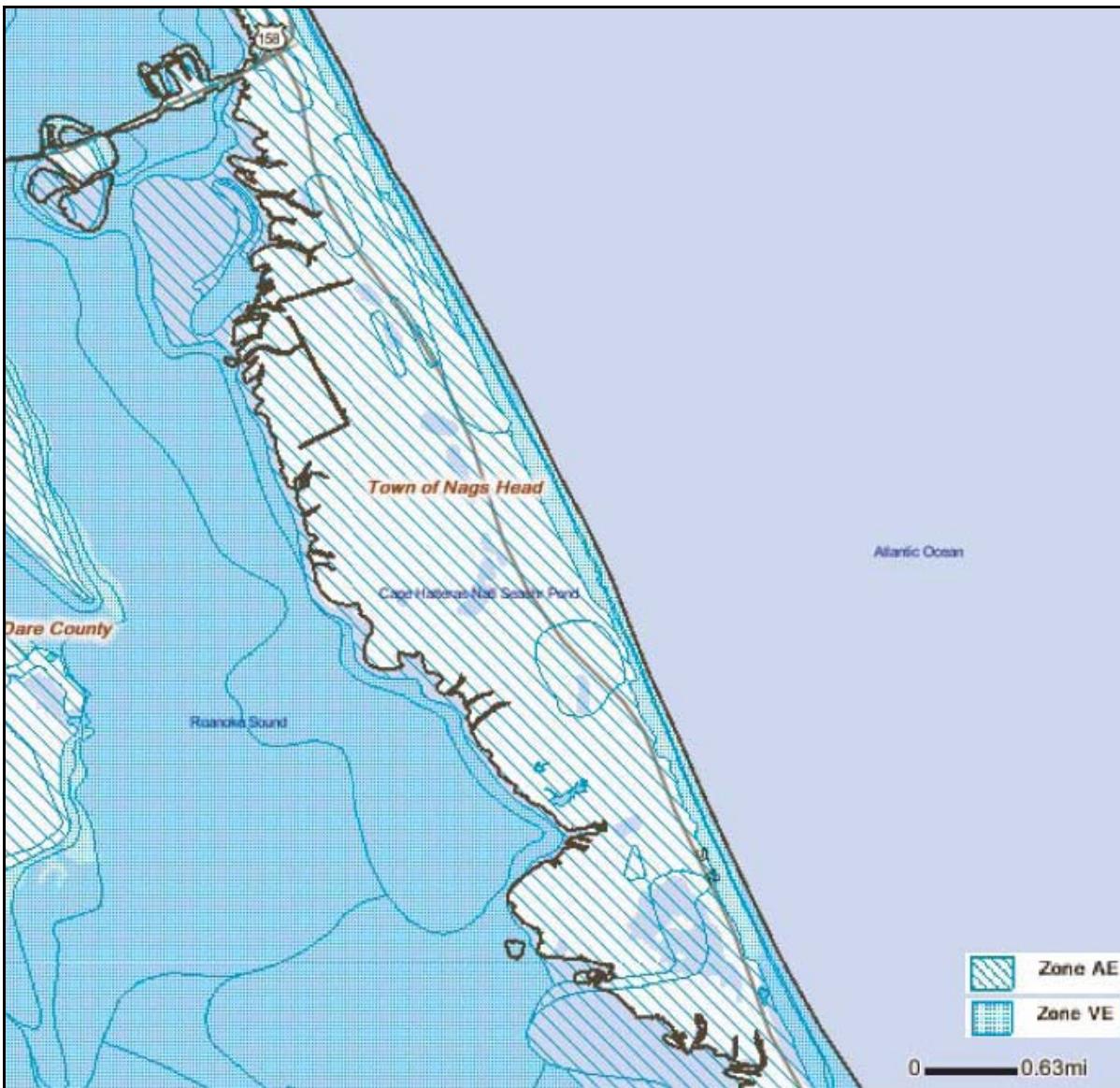


Figure 11. The study area is located within mapped floodplains (FEMA 2009).

## Methodology

A FEMA Flood Insurance Rate Map was obtained and evaluated for the study area. The area was surveyed to determine the ground elevations. Impact analysis was based on the on-site inspection of the study area, review of existing literature and studies, and professional judgment. The proposed action was found to be in an applicable regulatory floodplain. There is no non-floodplain land upon which NC 12 could be relocated in the study area. Therefore, flood conditions and associated hazards must be quantified as a basis for management decision making and a formal Statement of Findings (SOF) for Floodplains has been prepared. The SOF can be found in Appendix C. The NPS and FHWA have determined that the proposed project is consistent to the maximum extent practicable with the enforceable policies of North Carolina's approved coastal management program per the Federal Coastal Zone Management Act of 1972, as amended. A Federal Consistency Determination was prepared and is included in this EA as Appendix B.

*Definition of Intensity Levels:*

Negligible	Impacts would result in a change to floodplain functions and values, but the change would be so slight that it would not be of any measurable or perceptible consequence.
Minor	Impacts would result in a detectable change to floodplain functions and values, but the change would be expected to be small, of little consequence, and localized. There would be no appreciable increased risk to life or property. Mitigation measures, if needed to offset adverse effects, would be simple and successful.
Moderate	Impacts would result in a change to floodplain functions and values that would be readily detectable and relatively localized. Location of operations in floodplains would increase risk to life or property. Mitigation measures, if needed to offset adverse effects, would be extensive, but would likely be successful.
Major	Impacts would result in a change to floodplain functions and values that would have substantial consequences on a regional scale. Location of operations would increase risk to life or property. Extensive mitigation measures would be needed to offset any adverse effects, and their success would not be guaranteed.

*Definition of Duration:*

The duration for short-term impacts to floodplains was determined to be six months, the maximum duration of construction. During construction additional materials may be placed in the floodplain in order to construct the project; however, upon the completion of the project, those materials would be removed. Long-term impacts would extend after the construction of the project is completed, and could be permanent.

Short-term: Effects lasting less than six months

Long-term: Effects lasting longer than six months

*Cumulative Impact Scenario*

The entire island of Bodie Island is located in a floodplain. The formation of the islands through the deposition of sand created a relatively flat, low-lying area. Any structures constructed on the island were built in a floodplain, and added additional fill and material that possibly raised the 100-year flood water surface elevation. The continued development of Nags Head on Bodie Island adds fill material to the floodplain. This fill material displaces flood waters, raising the water surface elevation during flood events. Also, as vegetation is cleared and soils are paved, there is less capacity for floodwater storage. A rise in water surface elevation would not change floodplain mapping because the entire island is essentially floodplains.

**Environmental Consequences**

Alternative A

Under Alternative A there would be no impact to floodplains.

*Cumulative Impacts*

There can be no cumulative impacts because there are no direct impacts to floodplains.

## *Conclusions*

Under Alternative A, there would be no impact to floodplains, and no cumulative impact to floodplains.

## Alternative B

Under Alternative B, cofferdams would be installed in order to dewater the area surrounding the culverts in order to replace them. The culverts would be replaced with culverts of a similar size and capacity, so there would be no rise in water surface elevation or backwater. Construction materials may be stockpiled in the project area to be ready for use during construction. The dewatering of an approximately 148 cubic yards of water surrounding the culverts, and the stockpiling of material would have a short-term, adverse, and negligible impact.

Additional material would be introduced into the project area in order to resurface the pavement, Whalebone Junction Information Station parking areas, and pull-offs only if an overlay of asphalt is placed over the existing pavement. The replacement of existing signs and bollards would not introduce new material. New bollards would also be placed at the pull-offs; however, this amount of introduced material would be negligible. New material would be placed in the project area in the form of riprap (large sized rock) used to protect the new culverts from scour from tidal water movement through the channels. The placement of riprap would introduce non-native materials into the study area. Approximately 70 cubic yards of riprap would be placed at the culverts; however, the displacement of floodwaters as a result would not be noticeable. Therefore, mitigation of floodplain loss would not be undertaken as part of Alternative B. The long-term impacts resulting from the implementation of Alternative B would be adverse and negligible.

## *Cumulative Impacts*

Previous and continued development of Nags Head adds fill material and decreases the floodwater storage capacity. These other past, present and future actions would have a long-term, moderate, and adverse cumulative impact to floodplains. Implementation of Alternative B would contribute an imperceptible, adverse increment to the cumulative long-term, moderate, and adverse impacts to floodplains from the placement of riprap at the culverts.

## *Conclusions*

Alternative B would have short-term and long-term, negligible, adverse impacts to floodplains. Implementation of Alternative B would contribute an imperceptible, adverse increment to the cumulative long-term, moderate, and adverse impacts to floodplains.

## Alternative C – Preferred Alternative

All of the impacts associated with the implementation of Alternative B would also be associated with the implementation of Alternative C. The short-term impacts would be adverse and negligible. Approximately 2,700 cubic yards of soil adjacent to the road would be excavated and approximately 3,150 cubic yards of new material would be added to the project area in order to construct the widened shoulders. This material would consist of aggregate base, asphalt, and aggregate topsoil in addition to the 70 cubic yards of riprap added at the culverts. The net total of new material added to the project area as a result of the implementation of Alternative C would be 520 cubic yards. Mitigation of floodplain loss would be accomplished

through the removal of excess gravel adjacent to the pull-offs. The excavated soils would be primarily fine sand. Sand has a lower ability to store water in comparison to other soils, such as silt and clay soils. The new material would be compacted and impervious, and therefore would have no ability to store water; however, this material would be located along the highest elevations in the project area. The additional material would be visibly noticeable. However, a change in the function of the floodplain such as the frequency, duration, or extent of flooding, would not be noticeably different. Alternative C would have long-term, minor, and adverse impacts to floodplains.

### *Cumulative Impacts*

Previous and continued development of Nags Head adds fill material and decreases the floodwater storage capacity. These other past, present, and future actions would have a long-term, moderate, and adverse cumulative impact to floodplains. Implementation of Alternative C would contribute an imperceptible, adverse increment to the cumulative long-term, moderate, and adverse impacts on floodplains from the placement of riprap at the culverts and road base and pavement to construct the widened shoulders.

### *Conclusions*

Alternative C would have short-term and long-term, negligible to minor, adverse impacts to floodplains. Implementation of Alternative C would contribute imperceptible, adverse increment to the cumulative long-term, moderate, and adverse impacts to floodplains.

## **WETLANDS**

### **Affected Environment**

According to National Wetland Inventory maps, the entire 5.28 mile stretch of NC 12 beyond the road and shoulders is mapped as either a scrub/shrub or emergent wetland, with the exception of portion of the northern end of the project area. A wetland delineation was completed in August 2009. The project area along NC 12 on each side of the road includes the mowed grass clear zone, which after a distance of 15 to 20 feet transitions to a larger estuarine wetland system (Figures 12, 13 and 14). This transition area is classified as scrub-shrub rather than emergent. The majority of the wetlands located in the study area are classified as estuarine intertidal scrub-shrub broad leaved deciduous. Dominant species include bayberry (*Myrica cerifera*), groundsel tree (*Baccharis hamilifolia*), saltbush (*Iva frutescens*), black willow (*Salix nigra*), red bay (*Persea borbonia*), and swamp rose (*Rosa palustris*). Dominant herbaceous species include narrow leaved cattail (*Typha angustifolia*), common reed (*Phragmites australis*), salt meadow hay (*Spartina patens*), salt grass (*Spartina alterniflora*), marsh shield fern (*Thelypteris palustris*), royal fern (*Osmunda regalis*), false nettle (*Boehmeria cylindrica*), seaside goldenrod (*Solidago sempervirens*), and climbing hempweed (*Mikania scandens*). Dominant woody vines include poison ivy (*Toxicodendron radicans*), common greenbrier (*Smilax rotundifolia*), bullbrier (*Smilax bona-nox*), and Virginia creeper (*Parthenocissus quinquefolia*).

A small area located on the west side of the culvert located at mile 2.67 may be classified as estuarine intertidal emergent persistant. This area is dominated by herbaceous species that includes black nettle rush (*Juncus roemerianus*), salt grass (*Spartina alterniflora*), and salt meadow hay (*Spartina patens*). Also, the channels at the culvert sites are classified as estuarine intertidal streambed sand/mud/organic.

Wetlands in the study area perform biotic and hydrologic functions. The scrub-shrub wetlands provide fish and wildlife habitat, in particular, providing foraging habitat and escape cover for many of the amphibian and reptilian species that inhabit the vicinity of the project area. The subtidal and intertidal areas prevalent at the culverts provide habitat for aquatic invertebrates and additional foraging areas for amphibians and reptiles. Hydrologic functions performed by the wetland areas include flood attenuation, erosion and sediment control, and water purification. The scrub-shrub transition zone provides additional flood storage capacity, and also reduces the velocity of runoff from the road. The reduced velocity allows sedimentation of the suspended particles. The scrub-shrub wetlands also remove and sequester nutrients and pollutants before they enter the open water.

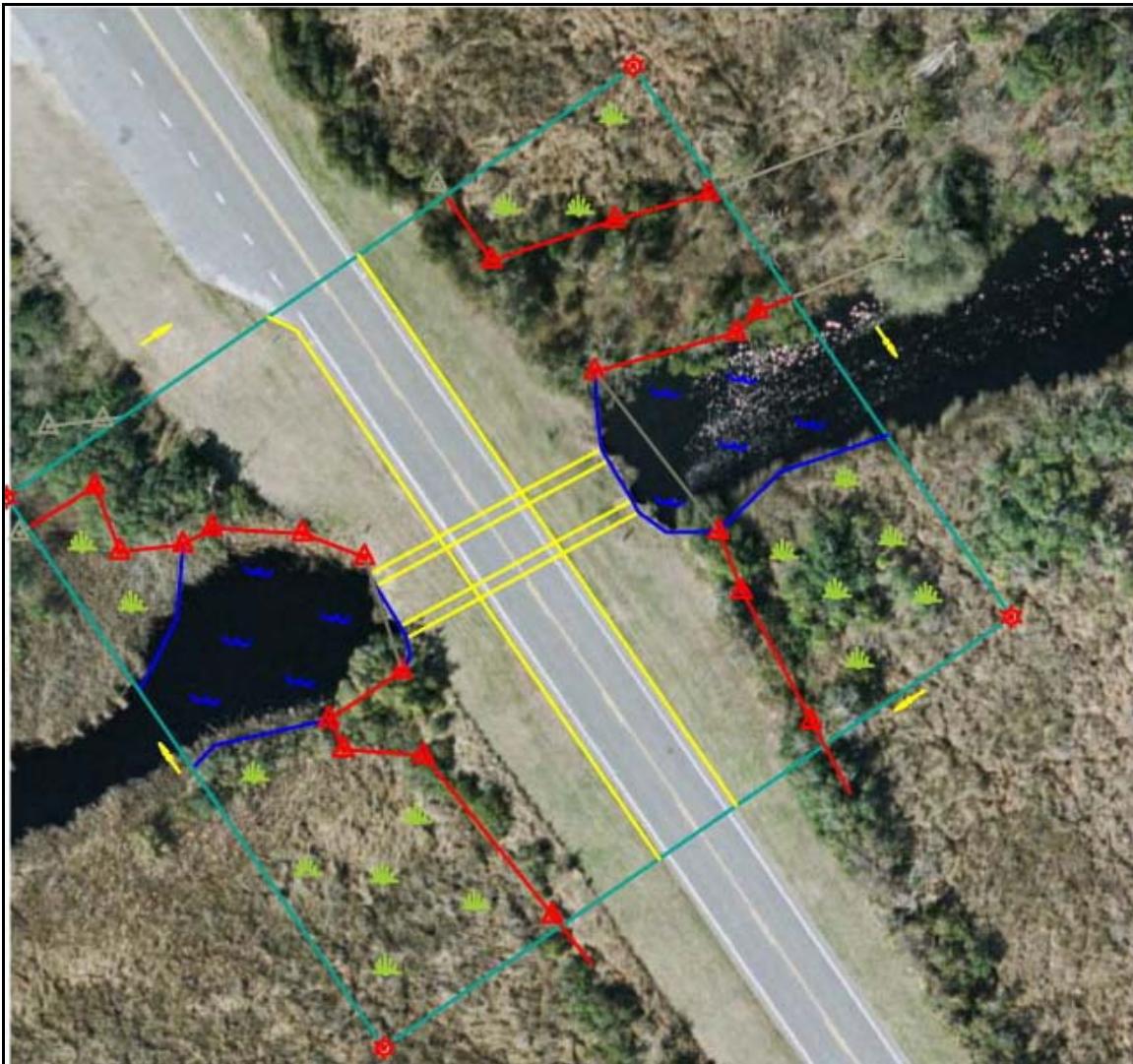


Figure 12. Delineated wetlands are shown surrounding the culvert located at mile 1.86.

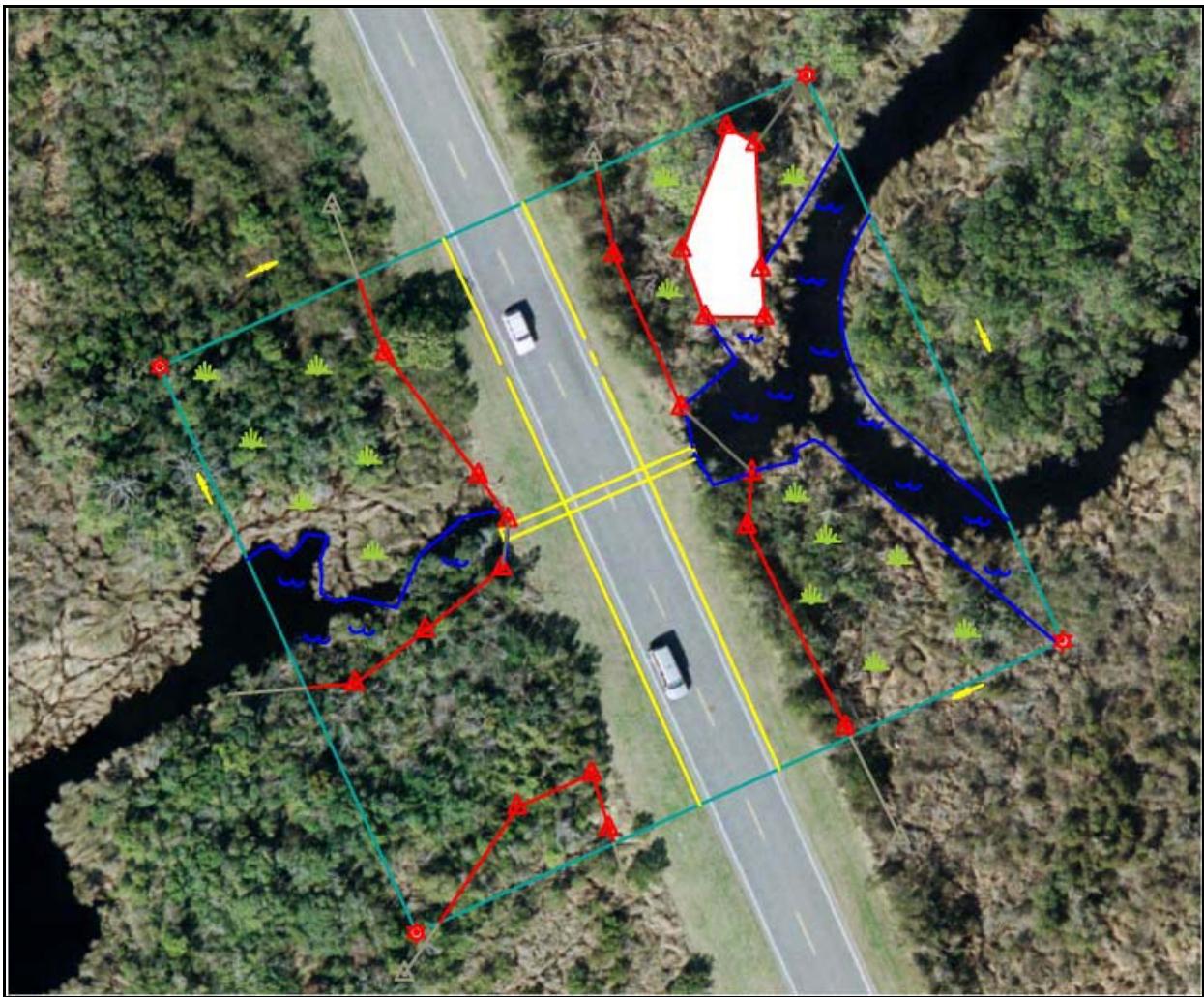


Figure 13. Delineated wetlands are shown surrounding the culvert at mile 2.67.

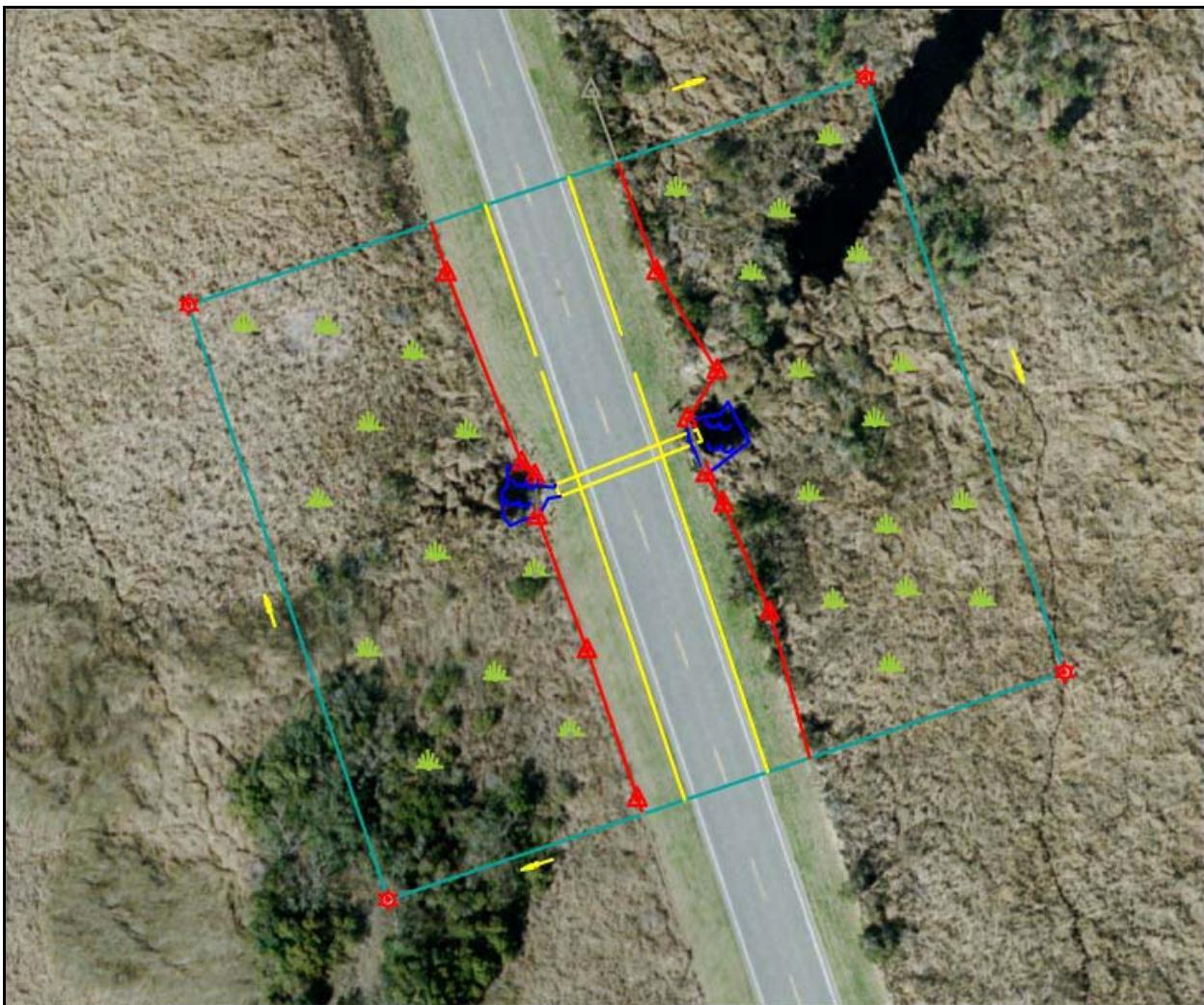


Figure 14. Delineated wetlands are shown surrounding the culvert at mile 3.13.

### Methodology

Available information on wetlands potentially impacted by the proposed alternatives was compiled by viewing National Wetland Inventory maps, and wetland GIS data available from the North Carolina Division of Coastal Management. A wetland delineation was performed to gather site-specific data in accordance with the 1987 Corps of Engineers Wetland Delineation Manual (Environmental Laboratory 1987) and NPS Procedural Manual #77-1 (Jones 2010). In areas containing both vegetation and soils, the Corps manual was used. In unvegetated areas, such as stream channels, the “limits” of these systems were determined as described in Cowardin et al (1979).

Predictions about short-term and long-term impacts to wetlands were based on previous experience with projects of similar scope and characteristics. Analyses of the potential intensity of impacts on wetlands were derived from the available information and the professional judgment of the resource specialists.

*Definition of Intensity Levels:*

Negligible	Wetlands would not be affected or the effects would be at or below the level of detection. There would be no measurable or perceptible effects on wetland plant and animal populations, soils, or hydrology. The effects would be below or at the lower levels of detection (0.0 to 0.01 acres).
Minor	Effects on wetland plant and animal populations, soils, or hydrology would be measurable or perceptible. Mortality of individual plants and animals might occur, but the viability of wetland populations and habitats would not be affected and the community, if left alone, would recover. Changes in wetland soils or hydrology might occur but if left alone, the wetland would recover in time. The effects to wetlands would be detectable and relatively small in terms of area (0.01 to 0.10 acres) and the nature of the change. The action would affect a limited number of individuals of plant or wildlife species within the wetland.
Moderate	A readily measurable change in abundance, distribution, quantity, or quality of populations of plants and animals would occur. Readily measurable changes in soils or hydrology would occur. The wetland would be slow to recover from these changes, or might not recover fully over time. Mitigation measures would be necessary to offset adverse effects, and would likely be successful. The effects to wetlands would be readily apparent over a relatively small area (0.10 acres to 1.0 acres) but the impact could be mitigated by restoring previously degraded wetlands. The action would have a measurable effect on plant or wildlife species within the wetland, but all species would remain indefinitely viable.
Major	Effects on wetland plant and animal populations, soils, or hydrology would be readily apparent, and measurable. Extensive mitigation would be needed to offset adverse effects, and the success of mitigation measures could not be assured. The effects to wetlands would be readily apparent over a relatively large area (1.0 acre or more). The action would have measurable consequences for the wetland area that could not be mitigated. Wetland species dynamics would be upset, and plant and/or animal species would be at risk of extirpation from the area.

*Definition of Duration:*

The duration for short-term impacts to wetlands was determined to be 1.5 years. Construction would be completed in six months, and the wetlands would require another year to regain their functions. During construction temporary measures, such as dewatering, may be necessary. After construction is completed these measures would be removed. Long-term impacts would not recover within one year after the construction is complete, and could be permanent.

Short-term: Effects lasting less than 1.5 years

Long-term: Effects lasting longer than 1.5 years

*Cumulative Impact Scenario:*

Bodie Island consists of relatively flat, low-lying topography. Sand and soil was removed from portions of the island to create a roadbed for NC 12, and to develop Nags Head. This created depressions in the topography, and drainage channels, which became wetland complexes. The fill material placed for NC 12 and to develop Nags Head raised the topography in those areas and removed vegetation, and altered the hydrology. The Town of Nags Head Flood Control projects include the extension of detention ponds, which may create additional open water wetlands, or convert existing wetlands. The widening of Lighthouse Bay Drive, Bonner Bridge Replacement, and continued development of Nags Head could potentially adversely impact wetlands if mitigation on Bodie Island is not completed in conjunction with the actions.

## **Environmental Consequences**

### **Alternative A**

Alternative A would have no additional impact to wetlands.

#### *Cumulative Impacts*

There can be no cumulative impacts because there are no direct impacts to wetlands.

#### *Conclusions*

Under Alternative A, there would be no additional impact to wetlands, and no cumulative impact to wetlands.

### **Alternative B**

In order to replace the culverts under Alternative B, cofferdams would be installed in order to dewater the area surrounding the culverts. Cofferdams are temporary watertight enclosures made of steel sheet pile that are pumped dry. Dewatering would cause temporary impacts primarily to estuarine intertidal streambed wetlands. The dewatering of the canals during the culvert replacement would impact approximately 3,485 square feet (0.080 acres) of wetlands. Resurfacing of the pavement and replacement of the bollards and signs would not impact wetlands. Material would be placed in the form of riprap to protect the inlet and outlet of the culverts after they are replaced. The riprap would be placed in areas delineated as estuarine intertidal streambed and estuarine intertidal scrub-shrub. Approximately 3,267 square feet (0.075 acres) of riprap would be placed. The 0.075 acres of riprap would be placed within the 0.080-acre dewatered area. Approximately 218 square feet (0.005 acres) of wetland would be temporarily impacted, and would return to wetlands after the removal of the cofferdams. Wetland functions would not be impacted under Alternative B. Therefore, the impacts resulting from the implementation of Alternative B would be short-term and long-term, adverse, and negligible.

The area impacted under Alternative B is less than 0.10 acres (4,356 square feet). Therefore, the proposed actions, repair of currently serviceable facilities, are excepted from the Statement of Findings and compensation requirements according to section 4.2.1 of Procedural Manual #77-1: Wetland Protection.

#### *Cumulative Impacts*

Wetlands were impacted by the construction of NC 12 and the construction of channels across Bodie Island. These other past, present, and future actions would have a long-term, moderate, adverse impact to wetlands. Implementation of Alternative B would contribute an imperceptible, adverse increment to the cumulative long-term, moderate, and adverse impacts to wetlands from the placement of riprap into the wetlands.

#### *Conclusions*

Alternative B would have short-term and long-term, negligible, adverse to wetlands. Implementation of Alternative B would contribute an imperceptible, adverse increment to the cumulative long-term, moderate, and adverse impacts to wetlands.

### Alternative C – Preferred Alternative

All of the impacts associated with the implementation of Alternative B would also be associated with the implementation of Alternative C. No additional wetlands would be impacted by the shoulder widening. BMPs, if required, would only be constructed in areas where they could be placed without impacting wetlands. The additional impervious surface created by the widened shoulders and possible construction of BMPs, such as grassed swales, would change the local drainage patterns. However, these changes would not be noticeable. Wetland functions would not be impacted under Alternative C. Alternative C would have short-term and long-term, negligible, and adverse impacts to wetlands.

The area impacted under Alternative C is less than 0.10 acres (4,356 square feet). Therefore, the proposed actions, a bike trail and repair of currently serviceable facilities, are excepted from the Statement of Findings and compensation requirements according to section 4.2.1 of Procedural Manual #77-1: Wetland Protection.

#### *Cumulative Impacts*

Wetlands were impacted by the construction of NC 12 and the construction of channels across Bodie Island. These other past, present, and future actions would have a long-term, moderate, adverse impact to wetlands. Implementation of Alternative B would contribute an imperceptible, adverse increment to the cumulative long-term, moderate, and adverse impacts to wetlands from the placement of riprap into the wetlands.

#### *Conclusions*

Alternative C would have short-term and long-term, negligible, adverse impacts to wetlands. Implementation of Alternative C would contribute an imperceptible, adverse increment to the cumulative long-term, moderate, and adverse impacts to wetlands.

## **SURFACE WATER AND GROUNDWATER QUALITY**

#### **Affected Environment**

Groundwater drains west of Nags Head into five canals perpendicular to South Old Oregon Inlet Road toward Roanoke Sound. Seasonal wind conditions impact the water levels in these canals. In the summer, winds primarily blow from the south and west, pushing water from the Sound through the ditches and increasing the water levels. In the winter, winds primarily blow from the north and east, pushing water from the canals into the South, which decreases the water levels in the canals. Approximately 57.75 inches of rain fall each year in the project area, with an average of 3.29 to 5.56 inches falling each month. The months of August and January receive the highest monthly rainfall (National Climatic Data Center 2002)

The proximity of the canals to a developed area has impacted the nutrient and pathogen levels in the canal water. Previous research and studies have shown that portions of the Seashore have significantly higher levels of nutrients and microbial pathogens in drainage ditches than the marsh locations. The parameters tested showing significantly higher levels included copper, ammonium, phosphate, and fecal coliform bacteria. These previous studies have concluded that septic leachate from Nags Head may be causing the elevated counts in the canals (Mallin 2006).

Stormwater runoff from roads includes pollutants such as cadmium, chromium, copper, zinc,

lead, oil, and grease. Heavy metals attach to the sediment and transport them through waterways. Heavy metals, oil, and grease have a toxic effect on aquatic plants and animals.

In addition to nearby land use impacting water quality, earth disturbing activities also impact the quality of water. Construction activities disturb vegetated areas and expose bare soil. These areas are vulnerable to erosion from wind and water. The eroded soils in water become suspended solids within the water course, and eventually settle to the bottom of the water course as sediment. Suspended solids and excessive sedimentation can have adverse impacts to water quality if not controlled.

## **Methodology**

Available information on water quality potentially impacted by the proposed alternatives was compiled from recent studies. Information regarding existing water quality concerns was obtained through reports and studies done in the study area. Predictions about short-term and long-term impacts to water quality were based on previous experience with projects of similar scope and characteristics. Analyses of the potential intensity of impacts on water quality were derived from the available information and the professional judgment of the resource specialists.

### *Definition of Intensity Levels:*

Negligible	Impacts are chemical, physical or biological effects that would not be detectable, would be well below water quality standards or criteria, and would be within historical or desired water quality conditions.
Minor	Impacts would be detectable but would be well below water quality standards or criteria and within historical or desired water quality conditions.
Moderate	Impacts would be detectable but would be below water quality standards or criteria; however, historical baseline or desired water quality conditions would be altered on a short-term basis.
Major	Impacts would be detectable and would be frequently altered from the historical baseline or desired water quality conditions; and chemical, physical, or biological quality standards or criteria would be slightly and singularly exceeded on a short-term basis

### *Definition of Duration:*

The duration for short-term impacts to water quality was determined to be six months because the construction is expected to be completed in six months. During construction, the ground would be disturbed, exposing bare soil. Erosion from the bare soil, as well as contaminant from construction equipment, would occur during construction and would alleviate once construction is completed and the area is re-vegetated. Long-term impacts would extend beyond the re-vegetation, and could be permanent.

Short-term: Effects lasting less than six months

Long-term: Effects lasting longer than six months

### *Cumulative Impact Scenario:*

The development of Nags Head, and the associated waste, has adversely impacted surface water quality. The introduction of phosphates and nitrogen from waste water and runoff from fertilizers has created undesirable pollutant levels. As more people inhabit and visit Nags Head,

water quality pollution would increase. The Nags Head Septic Initiative would improve the existing water quality; however it would not return water quality to predevelopment conditions.

## **Environmental Consequences**

### **Alternative A**

Implementation of Alternative A would have no impact to surface water and groundwater quality. Pollutants from NC 12 and Nags Head would continue to impact surface water and groundwater quality.

#### *Cumulative Impacts*

There can be no cumulative impact, because there is no direct impact.

#### *Conclusion*

Implementation of Alternative A would have no impact to surface water and groundwater quality.

### **Alternative B**

Resurfacing of the pavement and replacement of bollards and signs would not impact surface water or groundwater quality. The clearing of roadside vegetation and excavation of soils to replace the culverts under the implementation of Alternative B would expose bare soil and increase erosion. Approximately one acre would be disturbed and exposed as a result of construction activities. Best management practices (BMPs) to control erosion, such as the placement of silt fence or erosion logs, and re-vegetation would minimize erosion and sedimentation. Exposed soil areas would be re-vegetated within 14 calendar days. The water removed to dewater the culvert area would be pumped out and filtered prior to being released. The removal of the existing culverts would disrupt the substrate at the bottom of the channels, and the adjacent soils. This would increase turbidity of the water, and temporarily degrade water quality. Construction activities would cause short-term, minor, and adverse impacts to surface water and groundwater quality.

After construction is completed, and the project area is stabilized, there would be no change in the amount of vehicle pollutants as a result of Alternative B. Alternative B would have no long-term impact to surface water and groundwater quality.

#### *Cumulative Impacts*

Surface water and groundwater quality have been impacted and continue to be impacted by the development of Nags Head. These other past, present, and future actions would have long-term, moderate, and adverse cumulative impacts to surface water and groundwater quality. Implementation of Alternative B would contribute an imperceptible, adverse increment to the cumulative long-term, moderate, and adverse impacts on surface water and groundwater quality from the one acre of disturbance associated with the culvert replacement.

### *Conclusions*

Alternative B would have adverse impacts to surface water and groundwater quality that are short-term and minor in nature. Implementation of Alternative B would contribute an imperceptible, adverse increment to the cumulative long-term, moderate, and adverse impacts to surface water and groundwater quality.

### Alternative C – Preferred Alternative

All of the impacts associated with the implementation of Alternative B would also be associated with the implementation of Alternative C. Four additional acres of ground would be disturbed as a result of the shoulder widening for a total of five acres. The construction of any permanent BMPs, if required, would cause additional ground disturbance. Construction activities would cause short-term, minor, and adverse impacts to surface water and groundwater quality because although there would be ground disturbance, BMPs would be implemented to reduce erosion of the exposed soil and sedimentation of adjacent waters.

The widened shoulders may attract additional bike traffic, so pollutants such as trash and rubber from bike tires may increase. However, vehicle capacity would not be added to the project, so the amount of motorized vehicle-born pollutants entering the water would not increase. Therefore, the implementation of Alternative C would cause adverse impacts to surface water and groundwater quality that are of a minor intensity in the short-term and of a negligible intensity in the long-term.

### *Cumulative Impacts*

Surface water and groundwater quality have been impacted and continue to be impacted by the development of Nags Head. These other past, present, and future actions would have long-term, moderate, and adverse cumulative impacts to surface water and groundwater quality. Implementation of Alternative C would contribute an imperceptible, adverse increment to the cumulative long-term, moderate, and adverse impacts on surface water and groundwater quality from the five acres of ground disturbance associated with the culvert replacement, shoulder widening, and pollutants from increased bike use.

### *Conclusions*

Alternative C would have adverse impacts to surface water and groundwater quality that are both short-term and minor, and long-term and negligible in nature. Implementation of Alternative C would contribute an imperceptible, adverse increment to the cumulative long-term, moderate, and adverse impacts to surface water and groundwater quality.

## **STORMWATER MANAGEMENT**

### **Affected Environment**

Impervious surfaces, such as asphalt roads and parking areas, do not allow precipitation to percolate. The rainfall collects and flows along the impervious surface. Pollutants from vehicles such as oil and emissions are concentrated in the stormwater. There are currently no stormwater management features along NC 12. Stormwater flows as sheet-flow from NC 12 across the approximately 15 to 20 foot-wide mowed grass clear zone into the transition area and wetlands adjacent to the road prism. Stormwater also enters the ditches/channels running

perpendicular to NC 12. Stormwater is non-point pollution is regulated by Section 402 of the Clean Water Act.

## Methodology

The existing road was analyzed to determine existing stormwater flow as a result of the super-elevation of the road. The area was surveyed to determine the land elevations and topography. Also, the length of NC 12 was analyzed to determine the super-elevation of the pavement. Calculations and predictions regarding the quantity of impervious surface and its relationship to stormwater were made. Predictions about short-term and long-term impacts to vegetation were based on previous experience with projects of similar scope and characteristics. Analyses of the potential intensity of impacts on stormwater were derived from the available information and the professional judgment of the Seashore resource specialists.

### *Definition of Intensity Levels:*

Negligible	The increase in the quantity of stormwater would be below the level of detection.
Minor	The increase in the quantity of stormwater would be measurable; however the increase in pollutants in the road runoff would be below the level of detection. Mitigation measures would be easy to implement, and would be successful.
Moderate	The increase in the quantity of stormwater would be measurable, and the increase in pollutants in the road runoff would be detectable and localized. Mitigation measures would be difficult to implement.
Major	The increase in the quantity of stormwater would be measurable, and the increase in pollutants in the road runoff would be detectable, and the effects would be regional. Mitigation measures would be difficult, and their success would not be guaranteed.

### *Definition of Duration:*

The duration for short-term impacts to stormwater was determined to be six months because the construction is expected to be completed in six months. Long-term impacts would be permanent.

Short-term: Effects lasting less than six months

Long-term: Effects lasting longer than six months

## *Cumulative Impact Scenario*

The construction of roads, parking lots, and buildings on Bodie Island created impervious surfaces which do not allow for the percolation of rainwater. As development continues, the ratio of impervious surface would increase, which increases the amount of stormwater runoff. The Town of Nags Head Flood Control Projects would correct existing stormwater features to increase their efficiency, but the amount of impervious surface would not decrease.

## Environmental Consequences

### Alternative A

Implementation of Alternative A would have no impact to stormwater. Stormwater would continue to flow as sheet flow from the road, across the vegetated clear zone and into the wetlands along the NC 12.

### *Cumulative Impacts*

There can be no cumulative impact, because there is no direct impact.

### *Conclusions*

Implementation of Alternative A would have no impact to stormwater.

### Alternative B

Under Alternative B, stormwater runoff from the existing road would not be treated. Rainfall would continue to flow from NC 12 across the mowed-grass clear zone and enter the adjacent wetlands. Existing impervious area in the project area totals approximately 17 acres (740,520 square feet). Resurfacing of the road pavement and paved parking areas and replacement of the bollards, signs, and culverts would not impact stormwater. A small amount of impervious surface would be created by paving a 500 square foot-size (0.01 acre) area within the Whalebone Junction parking area. The impervious area in the study area would be increased by less than one percent. Approximately 1,067 square feet (0.03 acre) of gravel would be removed adjacent to the pull-offs. At pull-offs with trails or an overlook, a gravel path would be left in place. There would be a long-term, negligible, and adverse impact to stormwater. Stockpiling of materials would be done in existing impervious areas; therefore, there would be no short-term impacts to stormwater.

### *Cumulative Impacts*

Roads, parking lots, and buildings continue to create new impervious surface and stormwater. These other past, present, and future actions would have a long-term, minor, and adverse impact to stormwater. Implementation of Alternative B would contribute an imperceptible, adverse increment to the cumulative long-term, minor, and adverse impacts to stormwater from the creation of an additional 500 square feet of impervious surface.

### *Conclusions*

Implementation of Alternative B would result in long-term, negligible, and adverse impacts to stormwater. Implementation of Alternative B would contribute an imperceptible, adverse increment to the cumulative long-term, minor, and adverse impacts to stormwater.

### Alternative C – Preferred Alternative

All of the impacts associated with the implementation of Alternative B would also be associated with the implementation of Alternative C. Approximately two acres (87,120 square feet) of impervious surface would be added to the existing 17 acres (740,520 square feet) of impervious surface in the study area from construction of the widened shoulders and paving of a small area within the Whalebone Junction Information Station parking area. The impervious area in the study area would be increased by approximately 12 percent. This would create more water dispersing as sheet flow from the road. BMPs, if determined to be required during final design of the project through coordination with the NC Division of Water Quality and Division of Coastal Management, would treat this additional stormwater volume prior to entering the adjacent wetlands. The removal of existing impervious surface adjacent to the project area may be required to offset the creation of new impervious surface. Should no permanent BMPs to capture and hold stormwater be included in the proposed project, the stormwater runoff from

the additional and existing impervious area would continue to flow from NC 12 across the mowed-grass area beside the road and enter the adjacent wetlands and ditches. Therefore, Alternative C would have long-term, adverse impacts to stormwater that would range from negligible to minor.

### *Cumulative Impacts*

Roads, parking lots, and buildings continue to create new impervious surface and stormwater. These other past, present, and future actions would have a long-term, minor, and adverse impact to stormwater. Implementation of Alternative C would contribute a noticeable, beneficial increment to the cumulative long-term, minor, and adverse impacts to stormwater from the creation of an additional 87,000 square feet of impervious surface.

### *Conclusions*

Implementation of Alternative C would result in long-term, negligible to minor, and adverse impacts to stormwater. Implementation of Alternative B would contribute a noticeable, beneficial increment to the cumulative long-term, minor, and adverse impacts to stormwater.

## **VEGETATION**

### **Affected Environment**

The study area is comprised of two vegetation communities, the mowed-grass clear zone community and the scrub-shrub wetland community. Immediately adjacent to the paved road are mowed grass road shoulders. This shoulder area is comprised of species such as red fescue (*Fescue rubra*), small caragrass (*Arthraxon hispidus*), nimblewill (*Muhlenbergia schreberi*), field paspalum (*Paspalum laeve*), white clover (*Trifolium repens*). Both small caragrass and white clover and introduced non-native species (USDA 2009).

The scrub-shrub wetland vegetation community includes species such as bayberry (*Myrica cerifera*), groundsel tree (*Baccharis hamilifolia*), saltbush (*Iva frutescens*), black willow (*Salix nigra*), red bay (*Persea borbonia*), and swamp rose (*Rosa palustris*). Dominant herbaceous species include narrow leaved cattail (*Typha angustifolia*), common reed (*Phragmites australis*), salt meadow hay (*Spartina patens*), salt grass (*Spartina alterniflora*), marsh shield fern (*Thelypteris palustris*), royal fern (*Osmunda regalis*), false nettle (*Boehmeria cylindrica*), seaside goldenrod (*Solidago sempervirens*), and climbing hempweed (*Mikania scandens*). Dominant woody vines include poison ivy (*Toxicodendron radicans*), common greenbrier (*Smilax rotundifolia*), bullbrier (*Smilax bona-nox*), and Virginia creeper (*Parthenocissus quinquefolia*). Also, a small area located on the west side of the culvert located at mile 2.67 is dominated by herbaceous species that includes black nettle rush (*Juncus roemerianus*), salt grass (*Spartina alterniflora*), and salt meadow hay (*Spartina patens*).

### **Methodology**

Available information on vegetation and vegetative communities potentially impacted by the proposed alternatives was compiled during the wetland delineation (Jones 2010). The Natural Heritage Database was also accessed to compile lists of vegetation found in the project area. Predictions about short-term and long-term impacts to vegetation were based on previous experience with projects of similar scope and vegetative characteristics. Analyses of the potential intensity of impacts on vegetation were derived from the available information on the

Seashore and the professional judgment of the Seashore resource specialists.

*Definition of Intensity Levels:*

Negligible	Individual plants would be affected, but changes in the natural function and character of the native vegetation communities in terms of growth, abundance, reproduction, distribution, structure, or diversity of native species would not be measurable or perceptible.
Minor	Effects on multiple plants would be measurable or perceptible. However, the natural function and character of native vegetation communities in terms of growth, abundance, reproduction, distribution, structure, or diversity of native species would only be perceptible in small localized areas.
Moderate	A change would occur in the natural function and character of the native vegetation communities in terms of growth, abundance, reproduction, distribution, structure, or diversity of native species, but not to the extent that vegetation community properties (i.e., size, integrity, or continuity) change.
Major	Effects on native vegetation community properties would be readily apparent and would substantially change the natural function and character of the vegetation community.

*Definition of Duration:*

The duration for short-term impacts to vegetation was determined to be 1.5 years because the construction is expected to be completed in six months, and vegetation would re-establish in 1.5 years.

Short-term: Effects lasting less than 1.5 years

Long-term: Effects lasting longer than 1.5 years

*Cumulative Impact Scenario:*

Vegetation was cleared over time to construct NC 12, and to develop Nags Head. Species not native to the island were planted as part of landscaping and re-vegetation efforts. The designation of the southern portion of the island as the Cape Hatteras National Seashore provided protection against further clearing of vegetation. Future projects to widen Lighthouse Bay Drive, replace the water main, replace the Bonner Bridge, and continue to develop Nags Head would adversely impact vegetation.

## Environmental Consequences

### Alternative A

Drivers avoiding deteriorated pavement areas, particularly at the pull-offs may drive and park vehicles on the mowed area adjacent to the road. Repeated driving on the vegetation would eventually destroy vegetation in these areas. Alternative A would have a long-term, negligible, and adverse impact to vegetation.

### *Cumulative Impacts*

Vegetation would continue to be cleared to further develop Nags Head and to complete road and bridge projects. These other past, present, and future actions would have a long-term, minor, and adverse impact to vegetation. Alternative A would contribute an imperceptible, adverse increment to the cumulative long-term, minor, and adverse impacts to vegetation from repeated driving over the mowed grass adjacent to the pull-offs.

### *Conclusions*

Implementation of Alternative A would result in long-term, negligible, and adverse impacts to vegetation. Implementation of Alternative A would contribute an imperceptible, adverse increment to the cumulative long-term, minor, and adverse impacts to vegetation.

### Alternative B

Under Alternative B, approximately one acre of the vegetation would be removed around the culverts to remove the existing culverts and replace them. Resurfacing of the road would have no impact to vegetation. Replacement of signs would have a negligible impact, because signs would be replaced in the same location. At the pull-off locations, the installation of bollards would restrict motorists from parking on the mowed-grass adjacent to the pull-offs, which would reduce rutting and ground disturbance. These areas are primarily located within the mowed grass vegetation community. These areas would be re-vegetated using a native seed mix. The seed mix would likely include species such as: Indiangrass (*Sorghastrum nutans*), little bluestem (*Schizachyrium scoparium*), and switchgrass (*Panicum virgatum*). Although the mowed grass vegetation community would be impacted during construction, the disturbed area would be re-vegetated with similar native species. A small area of wetland vegetation would also be impacted in order to replace the culverts. This area would be revegetated with native wetland species. Alternative B would have a short-term, minor, and adverse impact.

Approximately 1,067 square feet (0.03 acres) of gravel adjacent to the pull-offs would be removed, and this area would also be re-vegetated with the native seed mix. Alternative B would have a long-term, negligible, and beneficial impact to vegetation.

### *Cumulative Impacts*

Vegetation would continue to be cleared to further develop Nags Head and to complete road and bridge projects. These other past, present, and future actions would have a long-term, minor, and adverse impact to vegetation. Alternative B would contribute an imperceptible, adverse increment to the cumulative long-term, minor, and adverse impacts to vegetation from the disturbance to one acre of mowed grass.

### *Conclusions*

Implementation of Alternative B would result in short-term, minor, and adverse impacts and long-term, negligible, and beneficial impacts to vegetation. Implementation of Alternative B would contribute an imperceptible, adverse increment to the cumulative long-term, minor, and adverse impacts to vegetation.

### Alternative C – Preferred Alternative

All of the impacts associated with the implementation of Alternative B would also be associated with the implementation of Alternative C. In addition to the one acre disturbed as described under Alternative B, approximately four additional acres of the mowed grass vegetation community adjacent to the road would be removed in order to construct the widened shoulders. Two acres (87,120 square feet) of this area would be permanently converted to the wider shoulders, and the remaining three acres (130,680 square feet) of disturbed area would be re-vegetated. If grass swales area constructed as a permanent BMP to mitigate for stormwater

impacts, an additional six acres of vegetation would be disturbed; however, this area would be re-vegetated. If the removal of impervious surface is required to offset stormwater and/or floodplain impacts, this area would be re-vegetated as appropriate according to the soils and hydrology of the area. Approximately 212 acres (9,237,872 square feet) of the mowed grass vegetation community is available in the project area. The minor to moderate and adverse impacts of the implementation of Alternative C would be both short-term and long-term in nature.

### *Cumulative Impacts*

Vegetation would continue to be cleared to further develop Nags Head and to complete road and bridge projects. These other past, present, and future actions would have a long-term, minor, and adverse impact to vegetation. Alternative C would contribute a noticeable, adverse increment to the cumulative long-term, minor, and adverse impacts to vegetation from the disturbance of five acres of mowed grass.

### *Conclusions*

Implementation of Alternative C would result in short-term and long-term, minor to moderate, and adverse impacts to vegetation. Implementation of Alternative C would contribute an imperceptible, adverse increment to the cumulative long-term, minor, and adverse impacts to vegetation.

## **WILDLIFE AND WILDLIFE HABITAT**

### **Affected Environment**

Wildlife habitat in and adjacent to the project area is comprised of several types. Immediately adjacent to the road is a mowed grassed corridor. The noise from the road and disruption through regular mowing make this marginal wildlife habitat. Along most of the project area adjacent to the mowed grass corridor is a scrub/shrub and emergent wetland habitat. This habitat extends along both sides of the road. This habitat is exceptional for wildlife, as there is limited contact and disturbance from human activities. In the northern portion of the project area adjacent to the mowed grass corridor is an upland wooded habitat, comprised primarily of pine trees.

Commonly observed species include various falcons (e.g., *Falco peregrinus*, *Falco sparverius*), songbirds (families Hirundinidae, Emberizidae, Fringillidae, Icteridae, Laniidae, Corvidae) and shorebirds. Cedar waxwings (*Bombycilla cedrorum*), Carolina wrens (*Thryothorus ludovicianus*), warblers (family Parulidae), eastern meadowlarks (*Sturnella magna*), thrushes (family Turdidae), and northern cardinals (*Cardinalis cardinalis*) frequent the nearby shrub thicket. Various butterflies, including monarchs (*Danaus plexippus*), swallowtails (family Papilionidae), sulfurs (family Pieridae), and dragonflies are also frequently observed. Mammals observed in the project area and adjacent habitats include eastern grey squirrels (*Sciurus carolinensis*), red and grey foxes (*Vulpes vulpes* and *Urocyon cinereoargenteus*, respectively), feral cats (*Felis catus*), raccoon (*Procyon lotor*), opossum (*Didelphis marsupialis*), eastern cottontail rabbits (*Sylvilagus floridanus*), various mice (*Peromyscus* spp.), and white-tailed deer (*Odocoileus virginianus*). Aquatic habitat in the study area is primarily in the form of ditches/channels running from Nags Head to the Roanoke Sound and the adjacent tidal marshes. This habitat is utilized by fish, shellfish, crabs, cottonmouth snakes, waterfowl, and wading birds (NPS 2009). Commonly observed aquatic species include the mummichog (*Fundulus heteroclitus*), a small fish (Jones 2010). Large open water ponds are also adjacent to the study area, and utilized by

waterfowl species such as ducks, geese, terns, black skimmers, and rails (NCDENR 1987).

## Methodology

Information regarding wildlife species was obtained from the North Carolina Natural Heritage Program database and from previous studies conducted within the Seashore. Predictions about short-term and long-term impacts to wildlife and wildlife habitat were based on previous experience with projects of similar scope and characteristics. Analyses of the potential intensity of impacts on wildlife and wildlife habitat were derived from the available information and the professional judgment of the resource specialists.

### *Definition of Intensity Levels:*

Negligible	There would be no observable or measurable impacts to native species, their habitats, or the natural processes sustaining them.
Minor	Impacts on native species, their habitats, or the natural processes sustaining them would be detectable. Occasional responses by some individuals to disturbance would be expected, but without interference to feeding, reproduction, resting, or other factors affecting population levels. Small changes to local population numbers, population structure, and other demographic factors might occur. However, some impacts might occur during critical reproduction periods for a species, but would not result in injury or mortality. Sufficient habitat in the Seashore would remain functional to maintain the viability of the species in the Seashore.
Moderate	Impacts on native species, their habitats, or the natural processes sustaining them would be detectable. Frequent responses to disturbance by some individuals would be expected, with some adverse impacts to feeding, reproduction, resting or other factors affecting local population levels. Some impacts might occur during critical periods of reproduction or in key habitats in the Seashore and result in harassment, injury, or mortality to one or more individuals. However, sufficient population numbers or habitat in the Seashore would remain functional to maintain the viability of the species in the Seashore.
Major	Impacts on native species, their habitats, or the natural processes sustaining them would be detectable. Frequent responses to disturbance by some individuals would be expected, with adverse impacts to feeding, reproduction, or other factors resulting in a decrease in Seashore population levels. Impacts would occur during critical periods of reproduction or in key habitats in the Seashore and result in direct mortality or loss of habitat that might affect the viability of a species in the Seashore. Local population numbers, population structure, and other demographic factors might experience large declines.

### *Definition of Duration:*

The duration for short-term impacts to wildlife and wildlife habitat was determined to be 1.5 years because the construction is expected to be completed in six months, and habitat would re-establish in a year. Long-term impacts would last beyond the recovery period after construction is completed, and could be permanent.

Short-term: Effects lasting less than 1.5 years

Long-term: Effects lasting longer than 1.5 years

### *Cumulative Impact Scenario:*

Wildlife habitat on Bodie Island was removed through development to build structures and roads. The southeastern portion of Bodie Island provides a large area of undeveloped wildlife habitat. This area is protected as a National Park System unit, and therefore would not be developed in the future.

Projects to replace a water line and widen Lighthouse Bay Drive would take place within previously disturbed areas that have already been impacted.

## **Environmental Consequences**

### **Alternative A**

There would be no impact to wildlife and wildlife habitat as a result of the implementation of Alternative A.

#### *Cumulative Impacts*

There can be no cumulative impact because there is no direct impact.

#### *Conclusions*

Alternative A would have no impact to wildlife or wildlife habitat.

### **Alternative B**

Construction activities associated with pavement resurfacing and bollard, sign, and culvert replacement (such as pavement milling, driving sheet pile, and running construction equipment) creates additional noise that would disrupt wildlife in the project area. Wildlife would likely relocate during noisy activities and return after their completion. Dewatering of the culvert areas is necessary for the culvert removal and replacement. The dewatering would kill any aquatic species present in the water or substrate. Alternative B would have a short-term, minor, and adverse impact to wildlife and wildlife habitat.

Riprap would be placed at the culvert inlet and outlet, impacting approximately 3,267 square feet (0.075 acres) of wildlife habitat. Most of the habitat impacted by the placement of riprap would be aquatic habitat. Alternative B would also have a long-term, negligible, and adverse impact to wildlife and wildlife habitat.

#### *Cumulative Impacts*

Wildlife habitat is protected as part of the Cape Hatteras National Seashore; however, habitat continues to be impacted by developed and road and utility improvement projects. These other past, present, and future actions would have a long-term, negligible, and adverse impact to wildlife and wildlife habitat. Alternative B would contribute an imperceptible, adverse increment to the cumulative long-term, negligible, and adverse impacts to wildlife and wildlife habitat from the placement of riprap at the culverts and the noise associated with construction activities.

#### *Conclusions*

Implementation of Alternative B would result in short-term, minor, and adverse impacts and long-term, negligible, and adverse impacts to wildlife and wildlife habitat. Implementation of Alternative B would contribute an imperceptible, adverse increment to the cumulative long-term, negligible, and adverse impacts to wildlife and wildlife habitat.

### Alternative C – Preferred Alternative

All of the impacts associated with the implementation of Alternative B would also be associated with the implementation of Alternative C. Approximately two acres of mowed grass habitat would be permanently impacted by converting to widened shoulders. This habitat type is marginal in value because of its proximity to the road, recurring disturbance from mowing, and because it provides minimal cover. Should permanent BMPs be implemented, such as grassed swales, ground disturbance to construct the vegetated swales would temporarily reduce the amount of mowed grass habitat available. However, this habitat would return after construction is completed. If the removal of impervious surface is required to mitigate for impacts to stormwater and/or floodplains, wildlife habitat would be restored. Wider shoulders may attract additional bicyclists and pedestrians along NC 12. The increase in the presence of humans may disturb wildlife adjacent to the road. Implementation of Alternative C would result in minor and adverse impacts that are both short-term and long-term in duration.

### *Cumulative Impacts*

Wildlife habitat is protected as part of the Cape Hatteras National Seashore; however, habitat continues to be impacted by developed and road and utility improvement projects. These other past, present, and future actions would have a long-term, negligible, and adverse impact to wildlife and wildlife habitat. Alternative C would contribute an imperceptible, adverse increment to the cumulative long-term, negligible, and adverse impacts to wildlife and wildlife habitat from the placement of riprap at the culverts, noise associated with construction activities, the permanent removal of two acres of mowed grass habitat, and an increase in the presence of bicyclists and pedestrians.

### *Conclusions*

Implementation of Alternative C would result in short-term and long-term, minor, and adverse impacts to wildlife and wildlife habitat. Implementation of Alternative C would contribute an imperceptible, adverse increment to the cumulative long-term, negligible, and adverse impacts to wildlife and wildlife habitat.

## **VISITOR USE AND EXPERIENCE**

### **Affected Environment**

Visitation at Cape Hatteras National Seashore has grown steadily over the years, increasing from 264,500 visitors in 1955 to approximately 2.2 million visitors in 2004 (NPS 2005). Visitor use reports for 2005 indicate that through October approximately 2.1 million visitors had journeyed through Cape Hatteras National Seashore. Highest use occurs during June, July, and August and accounts for approximately 45 percent of the annual recreation visits (based on 2004 data). Another 23 percent of annual visitation occurs during the fall (September, October, and November), 22 percent in the spring (March, April, and May), and, nine percent in the winter (December through February) (NPS Public Use Statistics Office 2005a).

Recreational activities located on Bodie Island include swimming, fishing/boating, visiting lighthouses, shelling, off-road vehicle use, birding, ranger programs, kayaking/canoeing, windsurfing, and hunting. At Coquina Beach there is parking, and showers are available to beach users. A marina is located at the southern end of Bodie Island. Lighthouse interpretative facilities are available at the Bodie Island Lighthouse, and camping is permitted

at the Oregon Inlet.

#### *Beach Access*

Along the 5.28 mile stretch of NC 12, there are no beach access areas. However, South Oregon Inlet Road runs parallel to NC 12. Along South Oregon Inlet Road there are multiple local, neighborhood, and regional beach access areas. NC 12 connects to South Oregon Inlet Road in two locations, at Whalebone Junction, and at the southern end of South Oregon Inlet Road. The high season for beach access and beach house rental in Nags Head is approximately June 15<sup>th</sup> through August 15<sup>th</sup>.

Beginning at South Oregon Inlet Road at Whalebone Junction heading south, pedestrian access is usually available at the following streets: Governor, Huron, Holden, Hargrove, Ida, Isabella, Islington, Indigo, Jay, June, James, Jacob, Juncos, Ehmann, and National Park Service (Figure 15). Public beach driving is allowed on seashore beaches of Bodie Island unless marked as closed. In the Town of Nags Head, driving is allowed on designated areas of the beach from October 1<sup>st</sup> through April 30<sup>th</sup> by permit only. Vehicle Access is available at Juncos Street; however, the beach is closed to driving from Junction Street to the South Town Line due to impassable structures located in close proximity to the tide line and/or the width of the beach (Town of Nags Head 2009).



Figure 15. NCDOT Bike Map, also shows Beach Access Points. (NCDOT 2009)

### *Hunting and Fishing*

Only waterfowl hunting is permitted within the Seashore, and only in designated areas on Bodie Island per 36 CFR 7.58. Twenty permanent blinds are available, and are assigned to applicants via a lottery (Figure 16). Shooting hours are two hours prior to sunrise until sunset on every day of the week except for Sunday. Hunting at the Seashore follows state hunting seasons, except for teal season in September, which conflicts with other visitor use during the

Labor Day holiday weekend. The most popular hunting season is duck season, which runs the first Saturday in October through the through the first Saturday in November, and the second Saturday in December through the end of January. The busiest hunting periods are opening weekend, Thanksgiving (for waterfowl other than ducks, such as geese and swans), and the end of December. Hunting trails to the permanent blinds are accessed from NC 12. Fishing has been observed at the culverts along NC 12, and is typically cast netting for bait and crabs.



Figure 16. The hunting blind locations are shown as numbered locations, with the access trails to the blinds shown as dashed lines. (NPS 2009)

## **Methodology**

Available information regarding visitor use was compiled by talking to Seashore staff. Information regarding hunting seasons and hunting blinds was obtained via personal communication. Predictions about short-term and long-term impacts to visitor use and experience were based on previous experience of projects of similar scope and characteristics. Analyses of the potential intensity of impacts to visitor use and experience were derived from the available information, best professional judgment, and previous project investigations.

### *Definition of Intensity Levels:*

Negligible	Changes in visitor use and/or experience would be below or at the level of detection. The visitor would not likely be aware of the effects associated with the alternative.
Minor	Changes in visitor use and/or experience would be detectable, although the changes would be slight. The visitor would be aware of the effects associated with the alternative, but the effects would be slight.
Moderate	Changes in visitor use and/or experience would be readily apparent. The visitor would be aware of the effects associated with the alternative and would likely be able to express an opinion about the changes.
Major	Changes in visitor use and/or experience would be readily apparent and severely adverse or exceptionally beneficial. The visitor would be aware of the effects associated with the alternative and would likely express a strong opinion about the changes.

### *Definition of Duration:*

The construction of an action alternative would most likely be six months; therefore, the short-term duration is six months. Long-term impact duration would extend beyond the construction of the project and could be permanent.

Short-term: Effects lasting six months or less

Long-term: Effects lasting beyond six months

### *Cumulative Impact Scenario:*

Visitors have been attracted to Bodie Island since the 1960's to use the beach, ocean, and ponds. The construction of NC 12 increased visitation, as access to the area was improved. Development of Nags Head also increased visitation as more facilities were made available. Planned road and bridge improvement projects would create travel delays that adversely impact visitor experience at the Seashore. The widening and repaving of Lighthouse Bay Drive would improve visitor facilities, and this would likely improve the visitor experience.

## **Environmental Consequences**

### Alternative A

The asphalt pavement of NC 12 would continue to deteriorate, creating riding surface that is not enjoyable to bicyclists or motorists. The sealed cracks and patched potholes would detract from visual enjoyment of the road. Approximately 1.6 million visitors travel NC 12 in the project area, and would be impacted by the road deterioration. Bicyclists and pedestrians would continue to use the two-foot wide shoulders on NC 12, creating a potential for conflicts with vehicles traveling at high speeds. The parking area at Whalebone Junction Information Station would also continue to deteriorate. As this is the first contact opportunity for the NPS with

visitors, visitors would likely express a negative opinion regarding a deteriorated facility. Other recreational activities, such as: swimming, fishing/boating, visiting lighthouses, shelling, off-road vehicle use, birding, ranger programs, kayaking/canoeing, windsurfing, and hunting would not be directly impacted. However, visitors would be impacted when gaining access to those recreational activities via NC 12. Impacts from Alternative A would be long-term, negligible to minor, and adverse.

#### *Cumulative Impacts*

Road and facility developments have increased the ability for visitors to access recreational areas and activities. These other present and future actions would have a long-term, moderate, and beneficial impact to visitor use and experience. Alternative A would continue to contribute a noticeable adverse increment to the cumulatively long-term, moderate, and beneficial impacts to visitor use and experience.

#### *Conclusions*

Impacts from Alternative A would be long-term, negligible to minor, and adverse. Alternative A would continue to contribute a noticeable adverse increment to the cumulatively long-term, moderate, and beneficial impacts to visitor use and experience.

#### Alternative B

During construction, visitor access to features and facilities along NC 12 would be disrupted. Access to the Whalebone Junction Information Station would be restricted while pavement activities are completed for the parking area. The next visitor contact station for visitors to use restrooms and learn about the Seashore is available at the Bodie Island Visitor Center, approximately six miles to the south. Access to the pull-offs would be restricted during construction activities also. The estimated number of motorists traveling NC 12 during construction that would be impacted (using construction duration and ADT) would be 315,000. Construction would not occur in the summer or winter seasons, which are peak seasons for beach visitors and waterfowl hunters. If construction occurs during any waterfowl hunting seasons, waterfowl hunting would still be permitted, and access to NC 12 and the blinds during lane closures would be restricted to only those holding hunting permits. This access would be enforced by Seashore rangers. The noise associated with construction activities would likely frighten waterfowl causing them to leave the immediate area. A maximum of 1,520 waterfowl hunters would be impacted if construction occurred in the fall months. Construction noise would also adversely impact birding in the project area. Ditch fishing would not be permitted while NC 12 is closed, or while construction is underway in the vicinity of the ditches. Visitors would likely express a negative opinion about lane closures and the associated delays. Other recreational activities, such as: swimming, fishing/boating, visiting lighthouses, shelling, off-road vehicle use, ranger programs, kayaking/canoeing, and windsurfing would not be directly impacted. However, visitors would be impacted when gaining access to those recreational activities via NC 12. During construction, impacts would be short-term, negligible to minor, and adverse.

Resurfacing of the road and parking areas would provide a more enjoyable driving experience for visitors traveling in both vehicles and bicycles. Approximately 1.6 million motorists would enjoy the road improvements. Improvements to the pavement at the Whalebone Junction Info and new signs and bollards would also be noticeable and enjoyed by visitors to the Seashore. Therefore, impacts from Alternative B would be long-term, moderate, and beneficial.

### *Cumulative Impacts*

Road and facility developments have increased the ability for visitors to access recreational areas and activities. These other present and future actions would have a long-term, moderate, and beneficial impact to visitor use and experience. Alternative B would contribute a noticeable beneficial increment to the cumulatively long-term, moderate, and beneficial impacts to visitor use and experience from the improved road conditions.

### *Conclusions*

Impacts from Alternative B would be short-term, negligible to minor, and adverse, and also long-term, moderate, and beneficial. Alternative B would contribute a noticeable beneficial increment to the cumulatively long-term, moderate, and beneficial impacts to visitor use and experience.

### Alternative C – Preferred Alternative

All of the impacts associated with the implementation of Alternative B would also be associated with the implementation of Alternative C. The duration of the lane closures would likely be longer in order to construct the widened paved shoulders. The estimated number of motorists traveling NC 12 during construction that would be impacted (using construction duration and ADT) would be 441,000. However, once construction is completed, wider shoulders would provide a more enjoyable experience for bicyclists and pedestrians, as they would be further away from vehicle traffic. During construction, impacts would be short-term, minor, and adverse. Long-term impacts as a result of the implementation of Alternative C would be moderate and beneficial.

### *Cumulative Impacts*

Road and facility developments have increased the ability for visitors to access recreational areas and activities. These other present and future actions would have a long-term, moderate, and beneficial impact to visitor use and experience. Alternative C would contribute a noticeable beneficial increment to the cumulatively long-term, moderate, and beneficial impacts to visitor use and experience from the improved road conditions and widened shoulders.

### *Conclusions*

Impacts from Alternative C would be short-term, minor, and adverse, and also long-term, moderate, and beneficial. Alternative B would contribute a noticeable beneficial increment to the cumulatively long-term, moderate, and beneficial impacts to visitor use and experience.

## **SEASHORE OPERATIONS**

### **Affected Environment**

Seashore maintenance and operations include daily activities required to ensure the proper functioning, repair, and rehabilitation of the Seashore's assets and infrastructure, including tasks related to buildings, trails, roads, utilities, campgrounds, and on-going operational monitoring (NPS 2008b). The 5.28 mile-segment of NC 12, including pull-offs, and the Whalebone Junction parking area, are currently maintained by the NPS. Maintenance of these areas includes

pavement repairs such as crack sealing and pothole patching, mowing of the vegetated shoulders and recovery area, and re-striping of the pavement markings.

Seashore operations also includes protection and visitor services and interpretation activities related to providing visitors a safe experience, emergency services, and law enforcement, and providing visitors with the desired educational experience. Protection and visitor services in the project area include patrols by Seashore rangers the regulation of waterfowl hunting. The Whalebone Junction Information Station is owned by the NPS and operated, through a Memorandum of Understanding, by the Outer Banks Visitors Bureau (OBVB) as an OBVB Welcome Center. The OBVB staffs the Whalebone Junction Information Station from 9 a.m. to 5 p.m., seven days a week, with flexible hours during the months of December, January, and February. The OBVB staff provide information and literature to visitors regarding amenities, mainly on Hatteras and Ocracoke Islands. There are no NPS interpretive staff stationed at this facility.

## **Methodology**

Available information regarding Seashore operations was compiled by talking to Seashore staff. Predictions about short-term and long-term impacts to Seashore operations were based on previous experience of projects of similar scope and characteristics. Analyses of the potential intensity of impacts to operation were derived from the available information and best professional judgment.

### *Definition of Intensity Levels:*

Negligible	Seashore operations would not be impacted or the impact would not have a noticeable or measurable impact on Seashore or agency operations.
Minor	Impacts would be noticeable and would result in a measurable, but small, change in Seashore operations. Any required changes in Seashore staffing and funding would be accommodated within normal budget cycles and expected annual funding without appreciably affecting other operations within the Seashore. Current levels of funding and staffing would not be reduced or increased, but priorities would need to be changed.
Moderate	Impacts would be readily apparent and would result in a substantial change in Seashore operations that would be noticeable to staff and the public. Required changes in Seashore staffing and/or funding would not be accommodated within expected annual funding and would measurably affect other operations within the Seashore by shifting staff and funding levels between operational divisions. Increases or decreases in staff and funding would be needed or other Seashore operations would have to be reduced and/or priorities changed.
Major	Impacts would be readily apparent and would result in a substantial change in Seashore operations that would be noticeable to staff and the public and would be markedly different from existing operations. These changes in Seashore staffing and/or funding would not be accommodated by expected annual funding and would require the Seashore to readdress its ability to sustain current Seashore operations. Increases or decreases in staff and funding would be needed and/or other Seashore programs would have to be substantially changed or eliminated.

### *Definition of Duration:*

Construction would most likely be six months or less. The duration for short-term impacts would be six months because any impacts associated with construction would last only until all construction related actions were completed. Long-term impacts would extend beyond six months, and could be permanent.

Short-term: Effects lasting six months or less  
Long-term: Effects lasting beyond six months

*Cumulative Impact Scenario:*

The designation of the National Seashore in 1952 created a National Park Service unit. The Seashore entrance road on Bodie Island (NC 12) was redesigned by the NPS between 1955 and 1958 (NPS 2007). This created a facility that required maintenance, because in the project area, NC 12 is maintained by the NPS. As NC 12 has continued to age, the maintenance required for this and other aging structures increases. The cost associated with the maintenance also increases.

**Environmental Consequences**

Alternative A

Pavement would continue to deteriorate, which would cause increased maintenance to patch potholes and fill cracks in the pavement. The increase in maintenance activities would expend additional funding and time. Alternative A would have a long-term, minor, and adverse impact to Seashore operations.

*Cumulative Impacts*

As roads and structures age, maintenance needs are increased. These other past, present, and future actions would have a long-term, minor, and adverse cumulative impact to Seashore operations. Implementation of Alternative A would contribute a noticeable, adverse increment to the cumulative long-term, minor, and adverse impacts on Seashore operations from the continued pavement deterioration.

*Conclusions*

Alternative A would have a long-term, minor, and adverse impact to Seashore operations. Implementation of Alternative A would contribute a noticeable, adverse increment to the cumulative long-term, minor, and adverse impacts on Seashore operations.

Alternative B

Closure of the Whalebone Junction Information Station parking area during construction for pavement repairs would adversely impact OBVB staff. OBVB staff would be unable to access or operate the Whalebone Junction Information Station during this time. It is estimated that access would be suspended for 4 days. Closure of NC 12 traffic lanes would also adversely impact law enforcement because they would experience difficulty patrolling the project area during lane closures. Hunting regulation would also be more difficult to patrol and enforce during lane closures. Alternative B would have a short-term, minor, and adverse impact to Seashore operations.

The removal of existing pavement and placement of new pavement would beneficially impact Seashore operations, as road conditions would be improved and maintenance needs (both time and expenditures) would decrease for approximately seven-10 years. The replacement of existing bollards and signs would decrease the need to replace and/or maintain these bollards and signs for the near future. The new culverts would also have a longer life span (up to 100

years), and would decrease maintenance needs. Therefore, Alternative B would have a long-term, moderate, and beneficial impact to Seashore operations.

#### *Cumulative Impacts*

As roads and structures age, maintenance needs are increased. These other past, present, and future actions would have a long-term, minor, and adverse cumulative impact to Seashore operations. Implementation of Alternative B would contribute a noticeable, beneficial increment to the cumulative long-term, minor, and adverse impacts on Seashore operations because less maintenance is generally needed for a rehabilitated road.

#### *Conclusions*

Alternative B would have a short-term, minor, and adverse impact and a long-term, moderate, and beneficial impact to Seashore operations. Implementation of Alternative B would contribute a noticeable, beneficial increment to the cumulative long-term, minor, and adverse impacts on Seashore operations.

#### Alternative C

All of the impacts associated with the implementation of Alternative B would also be associated with the implementation of Alternative C. In addition, if BMPs such as grassed swales were incorporated into the project, mowing of the mowed-grass clear zone adjacent to NC 12 may become more difficult. The conversion of a portion of the mowed grass clear zone to pavement would reduce the area that requires mowing, but would increase the amount of pavement requiring maintenance. Under Alternative C, the impacts to Seashore operations would be short-term, minor, and adverse, and long-term, moderate, and beneficial.

#### *Cumulative Impacts*

As roads and structures age, maintenance needs are increased. These other present and future actions would have a long-term, minor, and adverse cumulative impact to Seashore operations. Implementation of Alternative C would contribute a noticeable, beneficial increment to the cumulative long-term, minor, and adverse impacts on Seashore operations because less maintenance is generally needed for a rehabilitated road.

#### *Conclusions*

Alternative C would have short-term, minor, and adverse impacts and long-term, moderate, and beneficial impacts to Seashore operations. Implementation of Alternative C would contribute a noticeable, beneficial increment to the cumulative long-term, minor, and adverse impacts on Seashore operations.

### **TRAFFIC OPERATIONS**

#### **Affected Environment**

The Seashore averages over 2.2 million recreational visitors per year, with the majority of them visiting during the peak season that runs from May through September. Most of these visitors use NC 12 to access the southern end of the Outer Banks. In addition, NC 12 serves residential and commercial traffic to the southern end of the Outer Banks, which includes eight villages

with 44,000 residents. The Average Daily Traffic (ADT) for NC 12 is 4,500 vehicles per day (NCDOT 1996); however, the ADT during the peak season is 7,450 vehicles per day (FHWA 2008). Therefore, lanes of NC 12 cannot be closed to traffic between Memorial Day and Labor Day. Lanes of NC 12 also cannot be closed to traffic on National holidays or weekends. From Memorial Day to Labor Day, construction can only take place from Tuesday through Thursday. In the project area, NC 12 provides access to the southern end of Nags Head, hunting blinds, a private shooting range, and a Navy communications tower. NC 12 also serves as the evacuation route for Outer Banks villages south of Nags Head. In order from the Village of Ocracoke northward, those villages are: Ocracoke, Hatteras, Frisco, Buxton, Avon, Salvo, Waves, Rodanthe, and South Nags Head.

## **Methodology**

Traffic counts for NC 12 were provided by NCDOT. Traffic counts were also taken during FHWA's safety study in 2008 during peak season. Predictions about impacts were based on previous experience of projects of similar scope and characteristics. Analyses of the potential intensity of impacts to safety were derived from the available information on the Seashore and best professional judgment.

### *Definitions of Intensity:*

Negligible	The impact would be a change that would not be perceptible or would be barely perceptible by road users.
Minor	The impact would have an adverse change to travel times. The impact would be noticeable, but would result in little inconvenience or benefit to road users.
Moderate	The impact would impact the travel time of a large number of road users and would result in a noticeable change in travel time, convenience, or benefit.
Major	There would be a substantial impact on the travel time of a large number of road users and would result in a highly noticeable change in travel times, convenience, or benefit.

### *Definition of Duration:*

Short-term impacts would be immediate during construction. Construction would last no longer than six months. Long-term impacts would be those persisting or resulting following implementation of the alternative, lasting six months or longer.

Short-term: Effects lasting six months or less

Long-term: Effects lasting beyond six months

### *Cumulative Impacts Scenario:*

The development of Nags Head and towns north and south of Nags Head, have impacted traffic operations. More residents and vacationers utilize the existing roads. The other present and future actions that would impact traffic operations include the Bonner Bridge repair and replacement. The lane closures and traffic delays associated with these projects would have an adverse impact to traffic operations. However, once these projects are completed they would have a beneficial impact to traffic operations.

## **Environmental Consequences**

### **Alternative A**

Maintenance of the NC 12 and associated culverts would continue, but eventually the culverts would fail. This failure would require closure of the road and emergency repairs. The detours and lane closures associated with the repairs could happen at any time of the year. Therefore, the impacts of Alternative A to traffic operations would be negligible to major, adverse, and long-term.

#### *Cumulative Impacts*

Road projects would improve traffic operations in the long-term. However, continued residential, recreational, and commercial development would increase traffic on Bodie Island. The other past, present, and future actions would have a long-term, minor, adverse impact on traffic operations. Implementation of Alternative A would contribute a noticeable, adverse increment to the cumulative long-term, minor, and adverse impacts on traffic operations because of the potential for culvert failures and the continued deterioration of the road.

#### *Conclusions*

Alternative A would have a long-term, negligible to major, and adverse impact to traffic operations. Implementation of Alternative A would contribute a noticeable, adverse increment to the cumulative long-term, minor, and adverse impacts on traffic operations.

### **Alternative B**

Lane closures would be necessary in order to resurface the pavement and replace bollards, signs and culverts. In the off-peak months, NC 12 has an ADT of 4,500 vehicles that would be required to travel on a single lane of NC 12 during lane closures. Lane closures are estimated to be implemented for 10 weeks. Motorists may use South Old Oregon Inlet Road instead of NC 12 to avoid travel delays during lane closures. South Old Oregon Inlet Road has an annual average daily traffic (AADT) of 670 vehicles. The lane closures on NC 12 would lengthen travel times for motorists. Lane closures would require motorists to alternate use of the remaining travel lane open for traffic. The length of stoppage time to allow for oncoming traffic to pass would typically not exceed 15 minutes. The change in traffic patterns and road signage could be confusing for motorists. In order to minimize the impact of the road construction on traffic operations, construction would not be done in the summer or winter, when there are more people traveling along NC 12 and South Old Oregon Inlet Road. Alternative B would have a short-term, moderate, and adverse impact to traffic operations.

Once construction is completed, and NC 12 is opened to traffic, the improved driving surface of the road would allow motorists to drive at a consistent speed. The improvements reduce conflict between vehicles, bicycles, and pedestrians. Therefore, Alternative B would have long-term, minor, and beneficial impacts to traffic operations.

#### *Cumulative Impacts*

Road projects would improve traffic operations in the long-term. However, continued residential, recreational, and commercial development would increase traffic on Bodie Island. The other past, present, and future actions would have a long-term, minor, adverse impact on

traffic operations. Implementation of Alternative B would contribute a noticeable, adverse increment in the short-term and would contribute a noticeable, beneficial increment in the long-term to the cumulative long-term, minor, and adverse impacts on traffic operations from the lane closures during construction and the improved road after construction is completed.

### *Conclusions*

Alternative B would have short-term, moderate, adverse and long-term, minor, beneficial impacts to traffic operations. Implementation of Alternative B would contribute a noticeable, beneficial increment to the cumulative long-term, minor, and adverse impacts on traffic operations.

### Alternative C – Preferred Alternative

All of the impacts associated with the implementation of Alternative B would also be associated with the implementation of Alternative C. Lane closures would be in place for approximately four more weeks than under Alternative B in order to construct the widened shoulders. Alternative C would have a short-term, moderate, and adverse impact to traffic operations.

The widened paved shoulders would create more space between bicyclists and/or pedestrians and the vehicles in the travel lanes. This would also allow motorists to drive at a more consistent speed, instead of slowing down to avoid potential conflicts with bicyclists and/or pedestrians. Therefore, Alternative C would have long-term, moderate, and beneficial impacts to traffic operations.

### *Cumulative Impacts*

Road projects would improve traffic operations in the long-term. However, continued residential, recreational, and commercial development would increase traffic on Bodie Island. The past, present, and future actions would have a long-term, minor, adverse impact on traffic operations. Implementation of Alternative C would contribute a noticeable, adverse increment in the short-term and a noticeable, beneficial increment in the long-term to the cumulative, minor, and adverse impacts on traffic operations from the lane closures during construction and the improved road after construction is completed.

### *Conclusions*

Alternative C would have short-term, moderate, adverse and long-term, moderate, beneficial impacts to traffic operations. Implementation of Alternative C would contribute a noticeable, beneficial increment to the cumulative long-term, minor, and adverse impacts on traffic operations.

## **HEALTH AND SAFETY**

### **Affected Environment**

The NPS Management Policies 2006 state that while recognizing that there are limitations on its capability to totally eliminate all hazards, the NPS and its concessionaires, contractors, and cooperators will seek to provide a safe and healthful environment for visitors and employees. The existing road has deteriorated, creating an uneven driving surface. Available crash data was reviewed along NC 12 provided by NC DOT and the NPS. NC DOT provided data for the

three-year period from 2003 to 2006, while NPS crash data was reviewed for the period between 1999 and 2006 between accident location nodes 0120 (US 64/US 264 intersection with NC Rte 12) through 0130 (Bodie Island Maintenance Access Road). A total of 16 crashes were reviewed and the majority of crashes reported may be attributed to driver error and animal-vehicle collisions. The primary crash contributing factors related to driver error incidents include failure to give full time and attention, improper backing or turning maneuvers, and following too closely. Several of the crashes related to driver error involved multi-vehicle left turn and rear end collisions. One of these crashes resulted in a fatality from a driver making a left turn by U-turn on the road. However, the remaining reported crashes were property damage only incidents without injuries.

The peak months of bicycle use are typically April, May, and October. During these times official sponsored bicycle tours occur and consist of large groups of approximately 500 riders without any vehicle restrictions using NC 12. Bicycle Crash Data is limited; however, the NDCOT Division of Bicycle and Pedestrian Transportation reports 19 crashes (nine on United States Routes, and six on North Carolina Routes) in Nags Head from 1997 through 2006 where at least one unit was a bicycle (NCDOT 2009).

## **Methodology**

Available information regarding health and safety was compiled, including crash data in the project area. Predictions about short-term and long-term impacts to health and safety were based on previous experience of projects of similar scope and characteristics. Analyses of the potential intensity of impacts to health and safety were derived from the available information on the Seashore and best professional judgment.

### *Definition of Intensity Levels:*

Negligible	Changes in health and safety would be below or at the level of detection.
Minor	Changes in health and safety would be detectable, although the changes would be slight.
Moderate	Changes in health and safety would be readily apparent.
Major	Changes in health and safety would be readily apparent and severely adverse or exceptionally beneficial.

### *Definition of Duration:*

The construction of an action alternative would most likely be six months or less, therefore the short-term duration is six months. Long-term impacts would extend beyond six months, and could be permanent.

Short-term: Effects lasting six months or less

Long-term: Effects lasting beyond six months

### *Cumulative Impact Scenario:*

The construction of NC 12 established a primary travel-way along the Outer Banks. As the towns along NC 12 developed, and destinations such as the Seashore were established, visitation to the Outer Banks increased. The increased visitation increased the number of vehicles, bicyclists, and pedestrians utilizing the road corridor. The presence of different modes of travel creates a potential for conflict between and among the user groups. The other present and future actions that would impact health and safety include the flood control projects, septic

health initiative, and future growth of Nags Head. The flood control and septic health initiatives would improve health and safety.

## **Environmental Consequences**

### **Alternative A**

The paved surface of NC 12 would continue to deteriorate. This deterioration would include potholes, rutting, and cracks in the asphalt surface. Patching and spot repairs would be done to address the deterioration, but they would continue to be noticeable to motorists. During rainfall events, water would accumulate on the road, creating a potential safety hazard for drivers. Bicyclists would continue to utilize the two-foot paved shoulder. The proximity of the bicyclists to vehicles traveling at speeds of 55 miles per hour or greater would continue to present a potential safety hazard.

Maintenance of the culverts would continue, but eventually the culverts would fail. The failure of the culverts would be a hazard to motorists, bicyclists, and pedestrians traveling along NC 12. Faded signs and deteriorated and missing bollards would also be potentially hazardous to motorists in the project area. Therefore, Alternative A would have a long-term, moderate, and adverse impact to health and safety.

### ***Cumulative Impacts***

The minor improvement to health and safety from flood control and septic health initiatives would likely be overshadowed by the adverse impacts associated with the increase in the potential for conflicts between vehicles, bicyclists, and pedestrians. These other past, present, and future actions would have a long-term, minor, and adverse cumulative impact to health and safety. Implementation of Alternative A would contribute a noticeable, adverse increment to the cumulative long-term, minor, and adverse impacts on health and safety from the continued deterioration of the road facility.

### ***Conclusions***

Alternative A would have a long-term, moderate, and adverse impact to health and safety. Implementation of Alternative A would contribute a noticeable, adverse increment to the cumulative long-term, minor, and adverse impacts on health and safety.

### **Alternative B**

During the construction of Alternative B, lane closures would be implemented. The change in traffic patterns would be confusing to motorists and the presence of construction equipment and workers would present potential conflicts with motorists. In the short-term, impacts would be minor and adverse. NC 12 would be resurfaced, creating a smooth driving surface.

The replacement of the culverts would reduce the potential for collapse of the culvert and potential conflicts with motorists. The replacement and/or placement of bollards and signs would also improve the safety of visitors and Seashore staff. Therefore, Alternative B would have long-term impacts to health and safety that would be minor and beneficial.

### *Cumulative Impacts*

The minor improvement to health and safety from flood control and septic health initiatives would likely be overshadowed by the adverse impacts associated with the increase in the potential for conflicts between vehicles, bicyclists, and pedestrians. These other past, present, and future actions would have a long-term, minor, and adverse cumulative impact to health and safety. Implementation of Alternative B would contribute a noticeable, beneficial increment to the cumulative long-term, minor, and adverse impacts to health and safety from the improved road facility.

### *Conclusions*

Alternative B would have long-term, minor, and beneficial impacts to health and safety. Implementation of Alternative B would contribute a noticeable, beneficial increment to the cumulative long-term, minor, and adverse impacts to health and safety.

### Alternative C – Preferred Alternative

All of the impacts associated with the implementation of Alternative B would also be associated with the implementation of Alternative C. In addition, the paved shoulders would be widened, providing five-foot wide paved shoulders for use by bicyclists and pedestrians. The five-foot wide shoulders would provide a wider buffer between bicyclists/pedestrians and vehicles, which may reduce the potential for conflicts and crashes. Therefore, Alternative C would have long-term, moderate, and beneficial impacts to health and safety.

### *Cumulative Impacts*

The minor improvement to health and safety from flood control and septic health initiatives would likely be overshadowed by the adverse impacts associated with the increase in the potential for conflicts between vehicles, bicyclists, and pedestrians. These other past, present, and future actions would have a long-term, minor, and adverse cumulative impact to health and safety. Implementation of Alternative C would contribute a noticeable, beneficial increment to the cumulative long-term, minor, and adverse impacts to health and safety from the improved road facility.

### *Conclusions*

Alternative C would have long-term, moderate, and beneficial impacts to health and safety. Implementation of Alternative C would contribute a noticeable, beneficial increment to the cumulative long-term, minor, and adverse impacts to health and safety.

## **GATEWAY COMMUNITIES**

### **Affected Environment**

Gateway communities are cities or towns located in close proximity to National Parks, and serve as a portal to these Federal lands. They contain amenities that are often not available in the national parks, such as food, lodging, and transportation. The southern end of the Town of Nags Head is located adjacent to the northern end of the Seashore. South Nags Head is accessible from the west via intersections at Whalebone Junction or South Old Oregon Inlet Road. The detour necessary during road closures would follow South Old Oregon Inlet Road

from Whalebone Junction to the southern intersection of NC 12 with South Old Oregon Inlet Road. Motorists may also choose to take this alternate route during traffic delays due to lane closures during construction. South Nags Head contains multiple businesses, including restaurants, and residences that would experience a temporary change in traffic volume during these times. In order to reach any towns south of Nags Head, such as Avon, Salvo, or Hatteras, drivers must travel through the Seashore along NC 12.

## Methodology

Available information regarding gateway communities was compiled. Predictions about short-term and long-term impacts to gateway communities were based on previous experience of projects of similar scope and characteristics. Analyses of the potential intensity of impacts to gateway communities were derived from the available information on the Seashore and best professional judgment.

### *Definition of Intensity Levels:*

Negligible	Changes in use of gateway communities would be below or at the level of detection.
Minor	Changes in use and visitation to gateway communities would be detectable, although the changes would be slight.
Moderate	Changes in use and visitation to gateway communities would be readily apparent.
Major	Changes in use and visitation to gateway communities would be readily apparent and severely adverse or exceptionally beneficial.

### *Definition of Duration:*

The construction of an action alternative would most likely be six months or less, therefore the short-term duration is six months. Long-term impacts would extend beyond six months, and could be permanent.

Short-term: Effects lasting six months or less

Long-term: Effects lasting beyond six months

### *Cumulative Impact Scenario:*

The establishment of the Seashore created an attraction within the existing attraction of the Island and its beaches. This also created gateway communities, where visitors could visit prior to entering or after exiting the Seashore for eating, shopping, and lodging. The other present and future actions that would impact gateway communities include the Bonner Bridge repair and replacement and the water main replacement. These projects would cause lane closures and delays to traffic. The delays on NC 12 may cause drivers to travel along South Old Oregon Inlet Road instead of NC 12. The increased traffic in South Nags Head would increase the travel times of residents and visitors traveling to and within this area. The future growth of Nags Head would also impact gateway communities. Additional growth of residents and visitors would increase congestion in south Nags Head, particularly during the summer. The growth of businesses would provide additional services to residents and visitors.

## **Environmental Consequences**

### **Alternative A**

As the road conditions along NC 12 continue to deteriorate, drivers may choose to travel along South Old Oregon Inlet Road instead of NC 12. However, the number of drivers choosing this alternative route is not likely to be excessive, as the speed limit of South Old Oregon Inlet Road (35 miles per hour) is lower than the speed limit of NC 12 (55 miles per hour). The additional traffic along South Old Oregon Inlet Road would impact the residential traffic in South Nags Head. Potential emergency culvert placement or road repairs along NC 12 would also cause travel delays. Therefore, Alternative A would cause long-term, negligible, and adverse impacts.

### *Cumulative Impacts*

Increased visitation and planned road improvement projects would cause travel delays and inconvenience visitors. These other past, present, and future actions would have a long-term, minor, and adverse cumulative impact to gateway communities. Implementation of Alternative A would contribute a noticeable, adverse increment to the cumulative long-term, minor, and adverse impacts on gateway communities from the deteriorated road facility.

### *Conclusions*

Alternative A would have a long-term negligible adverse impact to gateway communities. Implementation of Alternative A would contribute a noticeable, adverse increment to the cumulative long-term, minor, and adverse impacts on gateway communities.

### **Alternative B**

The lane closures associated with culvert replacement and pavement resurfacing may cause traffic to detour to South Old Oregon Inlet Road. The additional traffic would increase travel times for residents and visitors to Nags Head. Traffic delays may dissuade visitors for visiting the Seashore or south Nags Head. The additional traffic through south Nags Head also has the potential to increase the use of businesses and services in south Nags Head. Therefore, Alternative B would have short-term, moderate, and adverse impacts to gateway communities.

Improvement to the pavement conditions on NC 12 would create a smooth driving surface, with a higher speed limit than South Old Oregon Inlet Road. These conditions would promote the use of NC 12 as the primary route of travel for Seashore visitors. The extensively repaired road would also minimize future maintenance needs and reduce the need for any future emergency repairs, limiting inconveniences and delays to motorists. Therefore, Alternative B would have long-term, moderate, and beneficial impacts to gateway communities.

### *Cumulative Impacts*

Increased visitation and planned road improvement projects would cause travel delays and inconvenience visitors. These other past, present, and future actions would have a long-term, minor, and adverse cumulative impact to gateway communities. Implementation of Alternative B would contribute a noticeable, beneficial increment to the cumulative long-term, minor, and adverse impacts on gateway communities from the improved road facility.

### *Conclusions*

Alternative B would have short-term moderate adverse impacts and long-term moderate beneficial impacts to gateway communities. Implementation of Alternative B would contribute a noticeable, beneficial increment to the cumulative long-term, minor, and adverse impacts on gateway communities.

### Alternative C – Preferred Alternative

All of the impacts associated with the implementation of Alternative B would also be associated with the implementation of Alternative C. The construction duration for Alternative C would be four weeks longer than Alternative B to construct the widened shoulders, increasing the number of days that motorists may experience delays. Alternative C would have short-term, moderate, and adverse impacts to gateway communities.

Widened shoulders would accommodate bicycles. The connection of bicycle-friendly roads through the Outer Banks creates an additional tourism opportunity that may draw new visitors to the gateway communities. Therefore, Alternative C would have long-term, moderate, and beneficial impacts to gateway communities.

### *Cumulative Impacts*

Increased visitation and planned road improvement projects would cause travel delays and inconvenience visitors. These other past, present, and future actions would have a long-term, minor, and adverse cumulative impact to gateway communities. Implementation of Alternative C would contribute a noticeable, beneficial increment to the cumulative long-term, minor, and adverse impacts on gateway communities from the improved road facility and widened shoulders.

### *Conclusions*

Alternative C would have short-term, moderate, and adverse impacts and long-term, moderate, and beneficial impacts to gateway communities. Implementation of Alternative C would contribute a noticeable, beneficial increment to the cumulative long-term, minor, and adverse impacts on gateway communities.

## **CONCLUSIONS**

### **Alternative A**

While Alternative A would not impact floodplains, wetlands, surface water and groundwater quality, stormwater management, or wildlife and wildlife habitat; the continued deterioration of NC 12 would have adverse impacts on health and safety of its users. The continued driving of vehicles off of the paved area would adversely impact vegetation. The deteriorated pavement conditions and narrow paved shoulders would adversely impact visitor use and experience, Seashore operations, traffic operations, health and safety, and gateway communities. The cumulative impacts would range from none to long-term, moderate, and adverse. Analysis of potential impacts of Alternative A did not identify any major adverse impacts to these resources. Therefore, implementation of Alternative A is not likely to result in impairment of any Seashore resource or value.

## **Alternative B**

The impacts of Alternative B are categorized as those short-term impacts occurring during construction, and the long-term impacts associated with the post-construction period.

Alternative B would have short-term, adverse impacts to: floodplains, wetlands, surface water and groundwater quality, vegetation, wildlife and wildlife habitat, visitor use and experience, Seashore operations, traffic operations, health and safety, and gateway communities.

Alternative B would have no short-term impact to stormwater management. After construction is completed, Alternative B would have long-term, beneficial impacts to: vegetation, visitor use and experience, Seashore operations, traffic operations, health and safety, and gateway communities. Alternative B would have long-term, adverse impacts to: floodplains, wetlands, stormwater management, and wildlife and wildlife habitat. Alternative B would have no long-term impact to surface water and groundwater quality. The cumulative impacts would range from negligible to long-term moderate and adverse. Analysis of potential impacts of Alternative B did not identify any major adverse impacts to these resources. Therefore, implementation of Alternative B is not likely to result in impairment of any Seashore resource or value.

## **Alternative C – Preferred Alternative**

The impacts of Alternative C are also categorized as the short-term impacts occurring during construction, and the long-term impacts associated with the post-construction period.

Alternative C would have short-term, adverse impacts to: floodplains, wetlands, surface water and groundwater quality, vegetation, wildlife and wildlife habitat, visitor use and experience, Seashore operations, traffic operations, health and safety, and gateway communities.

Alternative C would have no short-term impact to stormwater management. After construction is completed, Alternative C would have long-term, adverse impacts: floodplains, wetlands, surface water and groundwater quality, stormwater management, vegetation, wildlife and wildlife habitat. Alternative C would have long-term, beneficial impacts to: visitor use and experience, Seashore operations, traffic operations, health and safety, and gateway communities. The beneficial impacts of Alternative C would be more noticeable than the beneficial impacts of Alternative B to Seashore visitors, because the widened paved shoulders would accommodate existing and future pedestrian and bicycle use through the Seashore. The cumulative impacts would range from negligible to long-term, moderate, and adverse. Analysis of potential impacts of Alternative C did not identify any major adverse impacts to these resources. Therefore, implementation of Alternative C is not likely to result in impairment of any Seashore resource or value.

## CHAPTER 4: PUBLIC INVOLVEMENT AND COORDINATION

This chapter documents the scoping process for this project and includes the official list of recipients for the document. As required by NPS policies and planning documents, it is the Seashore's objective to work with State, Federal, and local governmental and private organizations to ensure that the Seashore and its programs are coordinated with theirs, and are supportive of their objectives, as far as proper management of the Seashore permits, and that their programs are similarly supportive of Seashore programs.

### PUBLIC INVOLVEMENT

Comments from the public are solicited at two stages in the project planning process, public scoping and the public comment period. Information about the proposed project was made available to the public on the NPS's Planning, Environment, and Public Comment (PEPC) website during the public scoping comment period, from February 3, 2009 through March 4, 2009. Flyers providing details of the proposed project and contact information for comments was sent to a mailing list comprised of Federal, State, and local agencies, elected officials, organizations, and advocacy groups. Public notices were run in the Virginian-Pilot and the Coastland Times on February 1, 2009 announcing the public scoping comment period. Comments were generally in support of the proposed project. Concerns were raised regarding impacts to natural resources and impacts to traffic operations as a result of detours and lane/road closures.

Nine comments were received, and are summarized below:

- Five comments were in support of the project;
- One comment recommended extending the widened shoulders to two miles south of the Oregon Inlet Bridge to complete continuous length of widened shoulders;
- One comment was in opposition to the project, and stated concerns with the impact of additional pavement and stormwater pollution to the marshes and wildlife;
- Two comments were concerned with the closure of NC 12 and how the closures would impact traffic on South Old Oregon Inlet Road (SR 1243) and access to the beach; and
- One comment proposed installing paved cycling and pedestrian pathways located off of the existing NC 12 road.

This EA will be available for public review from March 10, 2010 through April 8, 2010. During this 30-day period, hardcopies of the EA will be available for review at the Bodie Island Visitor Center, and the Manteo Branch of the Dare County Library located at 700 North Highway, Highway 64 and Burnside Road, Manteo, NC. An electronic version of this document can be found on the NPS's PEPC website at <http://parkplanning.nps.gov/caha>. This site provides access to current plans, environmental impact analyses, and related documents on public review. An electronic version may also be found at the FHWA, Eastern Federal Lands Highway Division's website at <http://efl.fhwa.dot.gov/planning/nepa.htm>.

## **AGENCY COORDINATION AND PERMITS**

### **Agency Coordination**

Other Federal, State, and local governments were contacted during the planning process. Appendix A contains copies of written correspondence with those agencies.

Scoping letters were also sent to the NC State Clearinghouse to solicit comments regarding the proposed action on January 26, 2009. Comments were received from the North Carolina Department of Environment and Natural Resources Division of Coastal Management, the Division of Water Quality, the Division of Marine Fisheries, and the NC Wildlife Resources Commission. These comments provided recommendations for analysis to be provided in the EA, design recommendations, and identified permits that may be necessary. Early Coordination Letters were sent to the U.S. Fish and Wildlife Service (USFWS) and the NC Department of Environment and Natural Resources Natural Heritage Program in order to gather input regarding federally-listed and rare species that may be present in the study area. Copies of the agency responses are located in Appendix A: Agency Coordination Letters.

A letter was submitted to the USFWS dated March 24, 2009. No suitable habitat for any federally-listed species is available in the study area, therefore it was determined that the proposed project would have no effect on any federally-listed species. In an email dated May 14, 2009, the USFWS concurred with this finding.

A letter was submitted to the National Marine Fisheries Service (NMFS) dated December 17, 2009 requesting concurrence that the proposed project is not likely to adversely affect any federally-listed marine or anadromous species. Through coordination with NMFS, it was determined that the proposed project would have no effect to any federally-listed marine or anadromous species. In an email dated February 25, 2010, the NMFS concurred with this finding.

A letter was submitted to the NCDENR dated March 24, 2009. Correspondence from the NCDENR dated July 7, 2009 indicated record of the State Significantly Rare sand heather (*Hudsonia tomentosa*) in the study area. A survey for this plant was conducted on July 21, 2009 by the Seashore's Natural Resource Manager, as recommended by NCDENR. The survey confirmed the presence of the sand heather within the project area. Any sand heather potentially impacted by the proposed action would be relocated by the Seashore prior to the start of construction.

The proposed action was reviewed by the Seashore's National Historic Preservation Act Specialist. It was determined that the project would have no adverse effects to cultural resources. The NC State Historic Preservation Officer reviewed the proposed action and determined that there are no historic properties that are likely to be affected by the project as proposed including the widening of paved shoulders, replacement of culverts, and overlay.

A site visit was completed with a Coastal Area Management Act representative to provide an overview of the proposed project on November 4, 2009. Coastal wetlands were also indentified during the site visit.

## **Permits**

If the action alternatives were implemented, several permits would be required in order to construct the project. These permits include:

### Coastal Area Management Act (CAMA) Federal Consistency Review

This review process is required under the Federal Coastal Zone Management Act. Consistency review by the NCDENR Division of Coastal Management applies to any activity within the State's twenty coastal counties that may have a reasonable foreseeable effect on any coastal resource or any coastal use within the State's coastal zone since it is a Federal activity. The purpose of the consistency review program is to assure that Federal projects and private projects that require Federal approval are consistent with the relevant enforceable policies of the State's certified coastal management program. This authority exists under the Federal Coastal Zone Management Act, and State legislation such as the: State's Coastal Area Management Act (CAMA), Chapter 7 of Title 15A of the North Carolina Administrative Code, the State's Dredge and Fill Law, the local land-use plan applicable to the proposed project, and Executive Order #15 issued by Governor Hunt on Oct. 27, 1977.

### CAMA Major Permit

The CAMA Permits are issued by the Division of Coastal Management under the authority of North Carolina General Statutes §113A-118, §113-229 and 15A NCAC 07J .0201. The proposed project would involve development in an Area of Environmental Concern, and requires other State or Federal permits; therefore, it would require a Major Permit. A site visit is often required to discuss the project and obtain a permit application. Applications for major permits are reviewed by 10 State and four Federal agencies before a decision is made. This permit involves a fee and a 75 day review period.

### Erosion and Sediment Control Certificate of Approval

This project would disturb greater than one acre of bare soil, and therefore would need an erosion and sediment control Certificate of Approval from the North Carolina Division of Land Resources, under GS 113A-50 thru GS 113A-66. Erosion and Sediment Control plans aim to protect adjoining properties, streams, and other water resources of the State. The permit requires a fee, and has a 30-day review period.

### Clean Water Act Section 404 Permit

The Federal Water Pollution Control Act, more commonly known as the "Clean Water Act," under Section 404, directs the Secretary of the Army, acting through the Chief of Engineers, to issue permits for the discharge of dredged or fill material into waters of the United States at specified disposal sites. This project would discharge dredged or fill material into the waters of the United States, including special aquatic sites such as wetlands. The proposed project would most likely qualify for coverage under Nationwide Permit Three, Maintenance, and/or Nationwide Permit 14, Linear Transportation Projects. There is no associated fee, and the review period is typically 45 calendar days for Nationwide Permits.

### 401 Water Quality Certification

The 401 Water Quality Certification is a "certification," needed for any Federal permit involving

impacts to water quality. Most 401 Certifications are triggered by Section 404 Permits issued by the U.S. Army Corps of Engineers. Typical types of projects involve filling in surface waters or wetlands. Section 401 of the Clean Water Act delegates authority to the States to issue a 401 Water Quality Certification for all projects that require a Federal permit (such as a Section 404 Permit). The "401" is essentially verification by the State that a given project will not remove or degrade existing, designated uses of "Waters of the State," or otherwise violate water quality standards. Mitigation of unavoidable impacts and inclusion of stormwater management features are two of the most important aspects of water quality review. This certification is issued by the N.C. Division of Water Quality, Surface Water Protection, 401 Oversight and Express Permits Unit under the authority of GS 143, Article 21, Part 1 and Section 401, Clean Water Act and GS 143-215.3 (a)(1); 143-215.3 (c); 143B-282 (1)(u). There is a fee associated with this certification and the review period can be up to 60 calendar days.

#### NPDES (National Pollutant Discharge Elimination System) Stormwater Permit

Construction activities that disturb one or more acres of land require an NPDES permit. This permit is issued by the N.C. Division of Water Quality, Stormwater Permitting Unit under Section 402 of the Clean Water Act; 40 CFR Parts 122-125; Parts 130-131; and Part 133; 15A NCAC 2H .0100. Coverage under general permits requires a 30-60 day review period, and an associated permit fee (NCDENR 2009).

#### Coastal Stormwater Permit

The North Carolina Division of Water Quality oversees the Coastal Stormwater Program. The Coastal Stormwater Rule was revised effective October 1, 2008. The provisions of the amended Coastal Stormwater Rule apply to the project if the project creates more than 10,000 ft<sup>2</sup> (0.23 acres) of impervious area.

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## CHAPTER 5: REFERENCES

- American Association of State Highway and Transportation Officials. 1999. Guide for the Development of Bicycle Facilities. Available on the Internet at [www.communitymobility.org/pdf/aashto.pdf](http://www.communitymobility.org/pdf/aashto.pdf)
- American Bird Conservancy. 2007. Globally Important Bird Areas of the United States. Available on the Internet at <http://www.abcbirds.org>
- Ball, Jeff. 2009. Soil and Water Relationships. The Samuel Roberts Noble Foundation. Available on the Internet at <http://www.noble.org/AG/Soils/SoilWaterRelationships/Index.htm>
- Bass, Robert A. 2009. Value Analysis Study for Cape Hatteras National Seashore. Atlanta GA. 2009.
- Brinson, M. M. 1993. A hydrogeomorphic classification for wetlands. Technical Report WRP-DE-4. USACE. Washington DC. 1993.
- Cowardin, L.M., Carter C., Golet F., and LaRoe E. 1979. Classification of wetlands and deep water habitats of the United States. US FWS, FWS/OBS-79/31.
- Dare County. 2003 Dare County Land Use Plan.
- Douglas, B. C., M. S. Kearney, and S. P. Leatherman. 2001. Sea Level Rise: History and Consequences. San Diego: Academic Press. *As cited in S.P. Leatherman and P.J. Kershaw, 2001. Sea Level Rise and Coastal Disasters: Summary of a Forum, October 25, 2001, Washington, DC. National Research Council of the National Academies. Available on the Internet at [http://books.nap.edu/html/ndr/sea\\_level\\_rise.pdf](http://books.nap.edu/html/ndr/sea_level_rise.pdf)*
- Federal Emergency Management Agency. 2009. Map Viewer. Available on the Internet at <https://hazards.fema.gov/femaportal/wps/portal/>
- Google Earth. 2009. Available on the Internet at <http://earth.google.com>
- ICW-NET, LLC. (History of Nags Head). 2008. Available on the Internet at <http://www.nags-head.com>
- Jones, Harold. 2010. Wetland Delineation Report. AH Environmental Consultants. 2010.
- Mallin, Michael A., M. R. McIver and V. L. Johnson. National Park Service. 2006. Assessment of Coastal Water Resources and Watershed Conditions at Cape Hatteras National Seashore, North Carolina. Technical Report NPS/NRWRD/NRTR- 2006/351.
- National Climatic Data Center/NESDIS/NPAA. Climatology of the United States No. 81, North Carolina. Revised February 2002. Available on the Internet at <http://cds.ncdc.noaa.gov/climate normals/clim81/NCnorm.pdf>
- National Park Service. 1984. Cape Hatteras National Seashore General Management Plan / Development Concept / Amended Environmental Assessment.

- National Park Service. 1999. Resource Management Plan.
- National Park Service. 2001a. Director's Order #12: Conservation Planning, Environmental Analysis, and Decision-making. Available on the Internet at  
<http://www.nps.gov/policy/DOrders/Dorders12.html>
- National Park Service. 2003 Procedural Manual #77-2: Floodplains Management. Available on the Internet at <http://www.nature.nps.gov/rm77/floodplain.cfm>
- National Park Service. 2006. Management Policies. Available on the Internet at  
<http://www.nps.gov/policy/MP2006.pdf>
- National Park Service. 2007. The Creation and Establishment of Cape Hatteras National Seashore: The Great Depression through Mission 66. Available on the Internet at  
[http://www.nps.gov/history/history/online\\_books/caha/caha.ah.pdf](http://www.nps.gov/history/history/online_books/caha/caha.ah.pdf)
- National Park Service. 2008a. Procedural Manual #77-1: Wetland Protection. Available on the Internet at <http://www.nature.nps.gov/water/wetlands/DO%2077-1%20PROC%20MANUAL%20FEB%202008%20-%20FINAL.pdf>
- National Park Service. 2008b. Relocation of the Bodie Island U.S. Coast Guard Station Complex Environmental Assessment. Cape Hatteras National Seashore, North Carolina.
- Natural Resources Conservation Service. 2008. Web Soil Survey 2.0. Available on the Internet at <http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm>
- Neff, Joseph. Battling Nature for Bonner Bridge. The News Observer. October 27, 2007.
- North Carolina Department of Environment and Natural Resources. 1987. North Carolina Registry of Natural Heritage Areas: Letter of Intent and Agreement to Register and Protect a Natural Area.
- North Carolina Department of Environment and Natural Resources. 2009. Environmental Permit Handbook. Available on the Internet at  
<http://portal.ncdenr.org/web/csc/permits/category>
- North Carolina Department of Transportation, Division of Bicycle and Pedestrian Transportation. 1994. North Carolina Bicycle Facilities Planning and Design Guidelines.
- North Carolina Department of Transportation. Bicycling and Walking in North Carolina: A Long Range Transportation Plan. 1996. Available on the Internet at  
<http://www.ncdot.org/transit/bicycle/about/Longrangeplan2.pdf>
- North Carolina Department of Transportation. Pathways to Prosperity, The Economic Impacts of Investments in Bicycle Facilities. 2004. Available on the Internet at  
[http://www.ncdot.org/transit/bicycle/safety/Economic\\_Impact\\_Study\\_PDFs/OBX%20EIS%20Tech%20Rprt%20Full.pdf](http://www.ncdot.org/transit/bicycle/safety/Economic_Impact_Study_PDFs/OBX%20EIS%20Tech%20Rprt%20Full.pdf)

- North Carolina Department of Transportation. 2008a. NC 12 Replacement of Herbert C. Bonner Bridge, Final Environmental Impact Statement and 4(f) Evaluation. Available on the Internet at <http://www.ncdot.gov/projects/bonnerbridgerepairs/newsupdates/>
- North Carolina Department of Transportation. 2008b. NCDOT GIS Digital Bicycle Maps & Route Information. Available on the Internet at <http://www.ncdot.org/it/gis/DataDistribution/BikeMaps/Thumbs.html?thumb=Dare>
- North Carolina Department of Transportation. 2008c. State Transportation Improvement Program. Available on the Internet at [http://www.ncdot.org/PLANNING/development/tip/TIP/pdf/2009-2015\\_STIP.pdf](http://www.ncdot.org/PLANNING/development/tip/TIP/pdf/2009-2015_STIP.pdf)
- North Carolina Department of Transportation. 2009. North Carolina Bicycle Crash Facts. Available on the Internet at [http://www.pedbikeinfo.org/pbcat/facts\\_bike.cfm](http://www.pedbikeinfo.org/pbcat/facts_bike.cfm)
- North Carolina Division of Coastal Management. 2008a. CAMA Handbook for Development in Coastal North Carolina. Available on the Internet at <http://dcm2.enr.state.nc.us/Handbook/contents.htm>
- North Carolina Division of Coastal Management. 2008b. North Carolina Coastal Wetlands. Available on the Internet at [http://dcm3.enr.state.nc.us/website/nccoastal\\_wetlands/viewer.htm](http://dcm3.enr.state.nc.us/website/nccoastal_wetlands/viewer.htm)
- North Carolina Division of Coastal Management. 2008c. North Carolina Oceanfront Shorelines and Setback Information. Available on the Internet at <http://dcm3.enr.state.nc.us/website/ncshore>
- North Carolina Floodplain Mapping Program. 2009. <http://www.ncfloodmaps.com/>
- North Carolina Natural Heritage Program. 2005. Significant Natural Heritage Area Report: Bodie Island Roadside Ponds and Marshes.
- Outer Banks Scenic Byway Advisory Committee. 2008. Corridor Management Plan for the Outer Banks Scenic Byway. Available on the Internet at <http://www.co.dare.nc.us/OBScenicBywy/Report.pdf>
- Pendleton, E. A., E. R. Thieler, and S. J. Williams. 2005. Coastal Vulnerability Assessment of Cape Hatteras National Seashore (CAHA) to Sea-Level Rise. U.S. Geological Survey Open-File Report 2004-1064. Available on the Internet at <http://pubs.usgs.gov/of/2004/1064/index.html>
- President of the United States. 1994. General Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. Available on the Internet at <http://www.fs.fed.us/land/envjust.html>
- Schafale, M. P. and A. S. Weakley. 1990. Classification of the Natural Communities of North Carolina: Third Approximation. North Carolina Natural Heritage Program, Division of Parks and Recreation, Department of Environmental and Natural Resources. Raleigh, N.C.
- Town Of Nags Head. 2006. Draft Land Use Plan. Available on the Internet at

[http://www.townofnagshead.net/index.asp?Type=B\\_BASIC&SEC={2B1F224C-88C4-4EF8-B471-8421F60AA5CE}&DE={2B3E7BEB-B03C-4D05-B331-9A0C49EE2E11}](http://www.townofnagshead.net/index.asp?Type=B_BASIC&SEC={2B1F224C-88C4-4EF8-B471-8421F60AA5CE}&DE={2B3E7BEB-B03C-4D05-B331-9A0C49EE2E11})

Town of Nags Head. 2008. Stormwater Management Plan (flood control projects). Available on the Internet at  
[http://www.townofnagshead.net/index.asp?Type=B\\_PR&SEC={4C25AA5A-7376-4E36-8405-78E760F242E2}&DE={08D9DDEA-D56D-4A8D-A025-284C20DF9C83}](http://www.townofnagshead.net/index.asp?Type=B_PR&SEC={4C25AA5A-7376-4E36-8405-78E760F242E2}&DE={08D9DDEA-D56D-4A8D-A025-284C20DF9C83})

Town of Nags Head. 2009. Nags Head 2009-2010 Beach Driving and Access Map.  
<http://www.townofnagshead.net/vertical/Sites/%7BB2CB0823-BC26-47E7-B6B6-37D19957B4E1%7D/uploads/%7BEA139972-2068-4CD3-8919-5BE9282A78D8%7D.PDF>

United States Coast Guard. 2009. Bodie Island Lighthouse. Available on the Internet at:  
<http://www.uscg.mil/history/weblighthouses/LHNC.asp>

United States Department of Transportation, Federal Highway Administration, Eastern Federal Lands Highway Division. 2008a. Draft Design Scoping Report for PRA-CAHA 10(2).

United States Department of Transportation, Federal Highway Administration, Eastern Federal Lands Highway Division. 2008b. Draft Pavement Report Number Fy09-06.

United States Department of Transportation, Federal Highway Administration, Eastern Federal Lands Highway Division. 2008c. Safety Study: Description: Feasibility of Improving Vehicle-Bicycle Safety by Adding Bike Lanes. Report Number 1-08.

U.S. Global Change Research Program (USGCRP), National Assessment Synthesis Team. 2001. Climate Change Impacts on The United States: The Potential Consequences of Climate Variability and Change. Cambridge University Press. *As cited in S.P. Leatherman and P.J. Kershaw, 2001. Sea Level Rise and Coastal Disasters: Summary of a Forum, October 25, 2001, Washington, DC. National Research Council of the National Academies.* Available on the Internet at [http://books.nap.edu/html/ndr/sea\\_level\\_rise.pdf](http://books.nap.edu/html/ndr/sea_level_rise.pdf)