

**Section 4.0  
Environmental  
Resources  
and Consequences**



**Final Environmental Assessment and  
Nationwide Section 4(f) Evaluation**

## IV. ENVIRONMENTAL RESOURCES AND CONSEQUENCES

This Environmental Resources and Consequences section outlines the existing conditions of the social, cultural and natural environments within the study area, as well as the consequences associated with implementing the selected alternative. In accordance with FHWA Technical Advisory T 6640.8A, a detailed evaluation of the impacts was only prepared for the selected alternative and is summarized below.

A summary of the potential environmental impacts associated with the selected alternative is presented at the conclusion of Section IV, page 48 of this FINAL Environmental Assessment/Nationwide Section 4(f) Evaluation.

### IV. A. SOCIAL ENVIRONMENT

The National Environmental Policy Act (NEPA) requires identifying the social and economic resources in the study area, including neighborhood and community resources, as well as impacts on regional transportation patterns and traffic safety. This project is unique in that the entire study area is part of the Delaware Seashore State Park; therefore the following section pertains to only social and economic resources related to the park. For each resource, the existing conditions and consequences of implementing the selected alternative are presented. If applicable, proposed mitigation strategies are presented at the conclusion of the resource section.

#### IV.A.1. Population and Housing

**a. Existing Conditions:** The Indian River Inlet is located in Sussex County, the southern-most county in Delaware. The county is predominately rural, agricultural with scattered development concentrated in municipal areas, along major highways and coastal areas. According to the *2003 Sussex County Comprehensive Plan Update*, 52% of the residential growth has occurred around the inland bays and coastal communities. The residential growth in these areas is related to the growing seasonal populations and tourism to Delaware's state parks and beaches (page 7).

There is one private residential development adjacent to the Indian River Inlet at the end of Road 50A, called South Shore Marina, formerly Rack Turn Point. According to 2000 Census data, there were nineteen housing units: twelve were owner occupied and seven were vacant. Of those vacant, six were identified as seasonal residences. New development in this community has continued. According to a field survey in April 2003, South Shore Marina contained a mix of single-family and multi-family housing units on 23 lots. Of these 23 lots, there were two mobile homes, fifteen mobile homes converted to permanent residences, eleven new-detached homes with one under construction, twelve vacant lots, and 23 town homes.

According to the 2000 Census, there were 25 people living at South Shore Marina. Twenty-three people classified themselves as white and the remaining two were identified as Asian. The majority of the people living in this development are over the age of 50 (85 percent) as reported in the 2000 Census, indicating the residents may be retirees.

**b. Consequences:** In accordance with Executive Order 12898 with reference to FHWA Actions to Address Environmental Justice, this project will not adversely impact any minority, low income or elderly populations. Access to Road 50A will be maintained during and after construction of project for residents living at South Shore Marina. During construction the residents at South Shore Marina will experience minor, temporary inconveniences, but a reconfigured access road will be constructed with the completion of the project. There are no residential or business relocations as a result of implementing this project.

#### IV.A.2. Economy and Employment

**a. Existing Conditions:** The economy of Sussex County relies on the tourism industry of summer visitors to the regional beaches. There were over two million visitors to the Delaware Seashore State Park in the 2002. The 2002 annual revenue at the park was \$1.2 million with an additional \$1 million from the marina (K. Farrall, July 2003). The Delaware Seashore State Park currently employs 71 employees, as shown in **TABLE 3**.

**Table 3: Summary of Delaware Seashore State Park Employees**

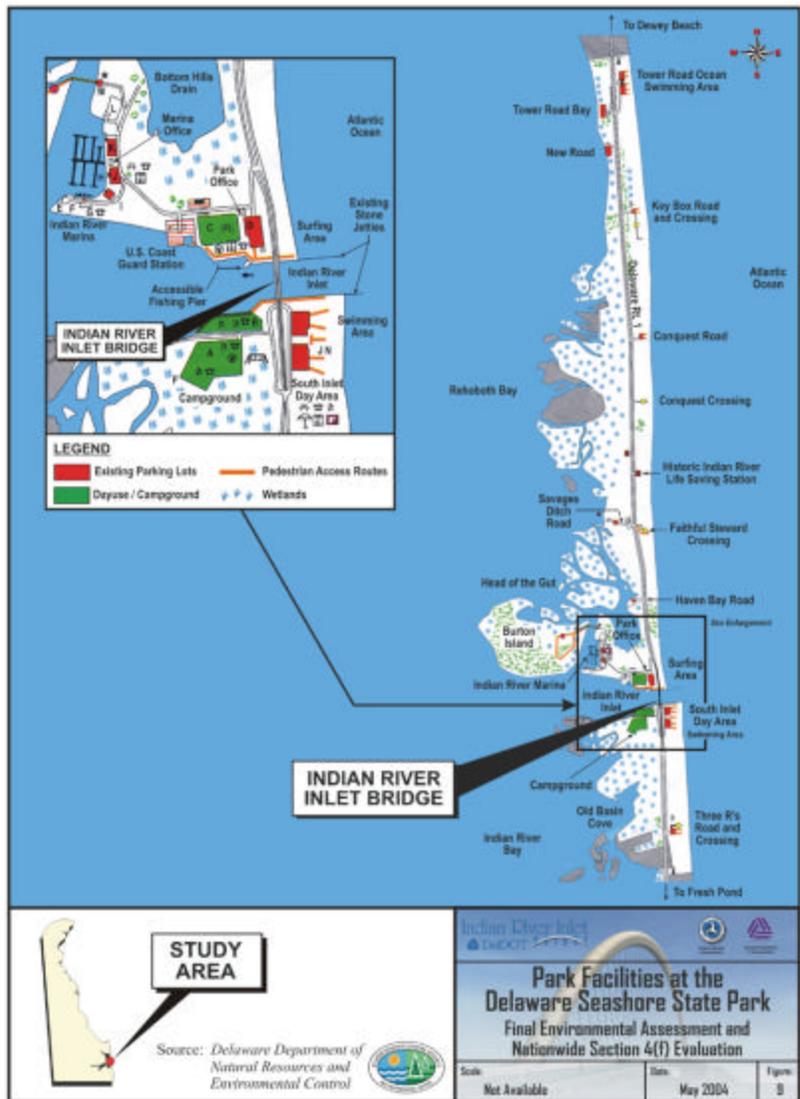
Position	Number of Employees			
	Full Time	Seasonal	Fee Collectors	Campground Registrars
Park Office	6	8	20	5
Maintenance	7	12	0	0
Marina	1	12	0	0
<b>TOTAL</b>	<b>14</b>	<b>32</b>	<b>20</b>	<b>5</b>

State Route 1 and the Indian River Inlet Bridge serve as a vital link between the northern and southern beaches of Delaware. In addition, SR 1 serves local traffic, providing access to businesses, services, and residences. The residents rely on SR 1 for economic livelihood of the area, serving local traffic to businesses and services, as well as seasonal traffic to the area’s coastal communities. SR 1 provides the most direct route for coastal residents to travel to medical services, schools and other coastal communities.

**b. Consequences:** The project will not have a negative impact on the coastal economy of the area. Improvements made to SR 1, park access and the park have the potential to draw more visitors into the area, which may also necessitate the need for more full-time and seasonal employees for the park. By ensuring SR 1 as a safe connection across the inlet, the project improvements will ensure that direct access is maintained for coastal residents to travel to jobs, medical services, schools and other coastal communities.

**IV.A.3. Public Lands/ Section 4(f) Resources**

**a. Existing Conditions :** The immediately adjacent land north and south of the existing Indian River Inlet Bridge (including lands adjacent to the existing SR 1 right-of-way) is designated as the Delaware Seashore State Park, a large contiguous 2,687-acre park. The park is a narrow strip of land about six miles in length (north-south), which varies in width from approximately 0.25 miles to 1.5 miles (east-west) and is bounded by the Atlantic Ocean to the east and the Inland Bays to the west. This contiguous park is owned by DNREC and is managed and operated by the DNREC - Division of Parks and Recreation. The 2,687 continuous acres of the park are comprised predominantly of wetland and upland habitat dune areas which are accessible to all park users; however, vehicular access is limited to the beach and other park facilities through the existing park access roads north and south of the bridge and designated access roads that enter/exit the park to/from SR 1.



The park area adjacent to the Indian River Inlet is a heavily used recreational facility that accommodates overnight tent and RV camping, within designated areas, and is predominantly used for beach access (swimming and sunbathing), fishing, and other passive recreational uses. **FIGURE 9** represents the existing Delaware Seashore State Park configuration.

**b. Consequences:** The proposed action will replace the existing SR 1 Bridge over the Indian River Inlet with a new bridge. This action requires the permanent and temporary use of parklands, as well as acquisition of parkland currently located within the Delaware Seashore State Park. The park is a significant publicly owned park. Therefore, the requirements of both Section 4(f) of the Department of Transportation Act of 1966 must be met. Because the involvement with the Delaware Seashore State Park will be minor (i.e., the area of the park is greater than 100 acres and the involvement will not exceed 1% of that area), the format of a Nationwide Section 4(f) Evaluation for Minor Involvements with Parks, Recreation Area, and Wildlife and Waterfowl Refuges is applicable (Federal Register, Vol. 52, No. 160, August 19, 1987). The Nationwide Section 4(f) Evaluation was prepared to address those requirements (**APPENDIX A**).

The Delaware Seashore State Park is the only Section 4(f) resource "used" by the proposed project. There are no other publicly owned parks, recreation areas, wildlife or waterfowl refuges in the study area. In addition, cultural resources investigations have concluded that no cultural resources (architectural or archeological) will be directly affected by the proposed bridge project.

The Selected Alternative will require the permanent and temporary use of park property. Permanent parkland use will be achieved through the acquisition of additional right-of-way from DNREC to accommodate the realigned SR 1 and reconfigured and improved park access roads. The land required for permanent use is located adjacent to existing DelDOT right-of-way and does not currently support active or passive recreational uses, but does support existing uplands and wetland habitats. The permanent use of parklands north of the inlet is solely attributed to the reconstruction/improvement of a park access road that will connect the relocated SR 1 to the park facilities. South of the inlet, the permanent use is attributed the realigned SR 1, reconnection/improvement of park access roads, and is required to maintain public access to existing Road 50A which serves an existing residential development west and south of the Inlet. The areas of land required are detailed in **TABLE 4**.

**Table 4: Impacts of the Selected Alternative on Section 4(f) Property**

Project Area	Proposed Parkland Use Requirements for Construction		Existing DelDOT R/W Available To Vacate	Net Park R/W Change <sup>1</sup>
	Permanent Use for SR 1	Permanent Use For Park Access Roads		
Northeast Quadrant	0.0 acres	0.0 acres	3.0 acres	+3.0 acres
Northwest Quadrant	0.0 acres	2.1 acres	1.1 acres	-1.0 acre
Southeast Quadrant	0.2 acres	1.3 acres	1.9 acres	+0.4 acres
Southwest Quadrant	0.2 acres	5.0 acres	0.7 acres	-4.5 acres
<i>Total Estimate</i>	<i>0.4 acres</i>	<i>8.4 acres</i>	<i>6.7 acres</i>	<i>-2.1 acres</i>

Note: <sup>1</sup> Net Park R/W Change = Existing R/W Available to Vacate less Permanent Use Requirement. Negative numbers indicate a loss of property while positive numbers indicate a gain in property.

As shown in **TABLE 4** DelDOT will acquire approximately 0.4 acres of right-of-way to facilitate the construction of the realigned SR 1 and vacate to DNREC approximately 6.7 acres of excess right-of-way upon completion of the project. This approximate 6.7 acres of vacated right-of-way is offset by a permanent use requirements associated with the reconfigured and enhanced safety of the park access roads. The alignments of the park access roads were a result of design requests made by DNREC to facilitate improvements within their

facility as well as provide public access to Road 50A. The additional requirements of DNREC as they related to the reconfigured park access road results in a net decrease in right-of-way to the park of approximately 2.1 acres. However, DNREC has indicated through the coordination for this project that they will accept a net loss recognizing that the impacts are a result of maintaining vehicular access to the park.

Through these coordination efforts with DNREC, DeIDOT has also identified temporary use areas that are required to construct the proposed action. These temporary use areas have been identified as reasonable, prudent, and feasible to facilitate construction of the proposed action. Because parklands and significant natural resources surround the proposed action, DeIDOT requires these temporary uses to physically construct the bridge, provide storage and stockpiling of construction materials, construct potential mitigation and enhancement elements of the project, as well as provide for the continued use of the Delaware Seashore State Park during construction. The parkland areas where temporary use is required are currently used for day-use parking areas, internal circulation access and circulation roads, overnight camping, passive recreational activities, or support existing protected lands such as dune ecosystems, wetlands, and upland habitat. Park users will be restricted to use these temporary use areas during construction.

#### **IV.A.4. Section 6(f) Compliance**

##### **a. Existing Conditions**

A Nationwide Section 6(f) Evaluation was prepared by the Delaware Department of Transportation (DeIDOT), on behalf of the Federal Highway Administration (FHWA) to fulfill the requirements of Section 6(f) of the Land and Water Conservation Fund Act.

Section 6(f) of the Land and Water Conservation Fund Act (16 USC 460) states,

*The Secretary of the Interior must approve any conversion of property acquired or developed with assistance under this Act (Land and Water Conservation Funds) to other than public, outdoor recreation use.*

The park is a publicly owned public park and recreation area that has been improved with Land and Water Conservation Funds. Therefore, the requirements of Section 6(f) must be met.

##### **b. Consequences**

The Selected Alternative, as described in **Section III.D**, will require the permanent and temporary use of park property. The permanent uses are unavoidable since construction, maintenance, and operation of the proposed project will require realignment of SR 1 and reconfiguration, reconnection and safety improvements of the Delaware Seashore State Park access roads to the realigned SR 1. Further, DNREC and National Park Service (NPS) staff have indicated there are no Section 6(f) issues “resulting from this project and that all lands needed for this project are with in the current Department of Transportation right of way” (February 10, 2004 DNREC letter). The temporary uses are equally unavoidable due to construction requirements of the Selected Alternative and construction activities at the proposed mitigation areas.

Given that DNREC and NPS staff have indicated that use of park property to maintain and improve the park access roads is not a Section 6(f) issue, it is reasonable to conclude that DeIDOT has met the requirements for replacement lands under Section 6(f) of the Land and Water Conservation Fund Act. The Selected Alternative does result in permanent and temporary impacts to specific park functions that will be replaced through additional minimization measures such as park restoration, reconstruction, and enhancement. These findings have been made by FHWA with concurrence from DeIDOT and DNREC.

#### IV.A.5 Noise and Air Quality

##### a. Existing Conditions:

SR 1 is a separated arterial highway with two travel lanes with full shoulders in each direction north and south of the existing Indian River Inlet bridge. As SR 1 approaches the existing bridge the median width narrows as SR 1 traverses the Inlet on two side-by-side structures. The existing roadway cross section for the SR 1 northbound bridge consists of two twelve foot travel lanes with 2 foot offset to face of barrier (west side) and edge of sidewalk (east side). The existing SR 1 northbound sidewalk is five feet wide without a barrier between the sidewalk and the travel lane offset. The existing roadway cross section for the SR 1 southbound bridge consists of two twelve foot travel lanes with two foot offsets to the median barrier (east) and barrier that separates the sidewalk from the travel way. The sidewalk width on the southbound bridge is approximately four feet wide.

Existing noise sources adjacent to the SR 1 Indian River Inlet Bridge improvement project include boat movements to and from the Atlantic Ocean, the ocean waves as they crash onto the beach, movement within the Delaware Seashore State Park including recreation vehicle activities at the existing campground site as well as traffic on SR 1.

Air quality conformity is a way to ensure that federal funding and approval are given to those transportation activities that are consistent with air quality goals. It ensures that these transportation projects do not worsen air quality or interfere with the 'purpose' of the State Implementation Plan (STIP), which is to meet the National Ambient Air Quality Standards (NAAQS) for this project. The responsibility of conformity falls upon the area Metropolitan Planning Organization (MPO) and DelDOT. However, Sussex County does not fall within the jurisdiction of an MPO. Therefore, DelDOT assesses potential air quality affects for projects within Sussex County, and as such recommendations for air conformity determination.

Currently Sussex County's air quality designation is moderate attainment, meaning the county as a whole meets NAAQS. Because the Indian River Inlet Bridge project is a bridge replacement project that will provide no additional capacity to SR 1, the project is exempt from air quality conformity analysis.

**b. Consequences:** The selected alternative includes two, twelve-foot travel lanes in each direction of the roadway with ten-foot shoulders, each including a five-foot bike through lane for higher speed bicyclist. The proposed bridge will include a twelve-foot wide bikeway/walkway along its eastern edge to facilitate pedestrian/bicycle movement north and south of the Inlet, which is separated from the travel way by a one-foot wide barrier. Proposed improvements to the Indian River Inlet Bridge in addition to future park improvements proposed by DNREC, may improve seasonal traffic flow on SR 1, as well as increase seasonal use of the park.

No permanent noise sensitive areas will be impacted by the project. The entire project lies within the Delaware Seashore State Park. However, the majority of the adjacent land is undeveloped wetlands. Active human use areas include the nearby Atlantic Ocean beaches to the east of the project and recreational vehicle campgrounds to the west of the project, both north and south of the inlet, with the north section used as an overflow camp area only. These areas, while open to the public nearly year-round (300 days March through December), are mainly seasonal and transitional activity areas and will not be permanently impacted by noise from this project. During construction, areas adjacent to the construction site are likely to experience varied periods and degrees of potential noise impact, which are anticipated to be not significant in nature or duration. Although no construction noise impacts beyond the construction site are anticipated, per Delaware Department of Transportation Noise Policy §X.2-3, DelDOT will determine which noise mitigation measures may be necessary, and if construction noise impacts occur within the study area, the contractor will implement them. Construction activity will generally occur during normal working hours, but may include extended weekday work hours and possibly limited weekend work efforts. Should extended work hours be required, DelDOT will follow public outreach and notification efforts consistent with Section 10 of the Delaware Bond bill for FY 2004 legislation.

The proposed action is exempt from air quality conformity analysis, since it will not result in capacity increases to SR 1. Localized air quality within the study area is directly related to boat movements on the Indian River Inlet, vehicle movement within the park, including RV activities and traffic on SR 1. The increase and enhancement of pedestrian/bicycle paths on the proposed bridge as well as enhanced park pedestrian circulation will encourage park visitors to walk over the bridge (from north park to south park) as well as walk along the path to enjoy the ocean vistas east of the project. These pedestrian and bicycle friendly pathways will result in positive affects on local air quality since potential vehicle trip from the north to south sides of the inlets, and vice versa, will potentially be decreased in the future.

DeIDOT, working in coordination with DNREC, has identified an area within the Delaware Seashore State Park for possible use as a temporary concrete batch plant site. This temporary facility (concrete batch plant) is required due to the amount of poured in place concrete anticipated for the project and because the closest existing concrete batch plant is located over a 30 minute drive, without traffic, to the site. Since concrete pours will be required throughout the year and concrete delivery travel times will be affected by local traffic conditions, especially during the summer, it will not be reasonable or practical to use the existing batch plant facilities for this project. Accordingly, a temporary concrete batch plant facility located north of the inlet and west of the existing park office, as shown in **FIGURE 6**, is part of this project. The park area where this temporary use is being investigated currently supports an over flow RV campground area and does not support existing natural or cultural resources. Potential noise impacts associated with the concrete batch plant will be temporary in nature and not adversely affect the existing or proposed park use.

The temporary concrete plant operator will obtain permits from both DNREC and Sussex County, and conform to local and state requirements. The state and or county may require more stringent compliance (PM 2.5 particulate material) with EPA requirements beginning in April 2005. Regardless, potential local air quality affects associated with the temporary concrete batch plant are not envisioned. Although there maybe potential localized degradation in air quality by the proposed temporary batch plant, these potential increases will be more than offset by a reduction in concrete trucks traveling through Sussex County to deliver concrete to the bridge site. The reduction in concrete vehicle trips to and from the bridge site, especially during the summer months will positively affect local air quality within Sussex County.

#### **IV.A.6. Hazardous Materials**

**a. Existing Conditions:** DeIDOT conducted a Phase I Environmental Site Assessment and lead paint sampling for the project. Review of DNREC's Tank Management Branch files, revealed that there were several incidents where petroleum product was potentially released into the soil and groundwater from underground storage tanks (UST) and aboveground storage tanks (AST) located at the Indian River U.S. Coast Guard Station, Indian River Marina and the Delaware Seashore State Park locations. No further information was available about these incidents; however they do not appear to have been significant releases.

Paint samples were obtained from the bridge steel superstructure and were tested for presence of lead based paint. The results of the analysis of these samples revealed no presence of lead based paint on the bridge steel superstructure.

**b. Consequences:** The assessment concluded that the no sampling is recommended for the project at this time. Petroleum hydrocarbon impacted soil and/or groundwater may be encountered in the vicinity of the former UST locations. If impacted soil and/or groundwater are encountered during the project, a Contaminated Materials & Water Management Work Plan (CMWMWP) should be prepared to address the handling and disposal of contaminated materials during intrusive activities. For more information refer to the *Addendum #1 to the June 2003 Phase I ESA Report, Tank Management Branch FOIA File Review Summary*.

Because lead paint was not found in the paint chip samples from the bridge, no special precautions will be required for lead paint when the existing bridge is demolished. For more information refer to the *Addendum #2 to the June 2003 Phase I ESA Report, Paint Sampling at Indian River Inlet Bridge*.

#### IV.A.7. Traffic and Safety

**a. Existing Conditions:** SR 1 serves as a main north-south route for local and regional traffic along the Delaware coastline. This roadway also provides access to the Delaware Seashore State Park both north and south of the inlet. Existing access to the parking lot and marina on the north side of the inlet is accomplished through a single point at-grade intersection with full, unsignalized access through a median break. Existing access south of the inlet is provided by an at-grade U-Road, providing right only turns in and out of the park and no median opening. The park operates year-round with a majority of the activity occurring during the summer months. The SR 1 mainline currently operates at a level of service (LOS) B, well within the acceptable range. The north park access option operates at a LOS A. However, there are times when traffic on SR 1 is steady enough that left turning vehicles out of the park have difficulty making this turn and the delay can take quite some time resulting in a LOS F. The south park access with right only turns operates at a LOS A.

The 2003 traffic data was collected from various sources for SR 1 and the park entrances during the Memorial Day (May 23-26, 2003) and Independence Day (July 4, 2003) weekends. The summer data was collected to determine peak operating conditions along SR 1 and the park access roads. The traffic conditions presented below only exist during the summer weekend months; the remainder of the year the traffic on SR 1 and the park access roads is substantially less.

The results of the traffic collection indicate the peak day was Saturday and the peak hour was around noon for both periods. The peak, two-way traffic data for these weekends was 27,052 vehicles per day, 2,467 during peak hour (Memorial Day Weekend) and 39,516 vehicles per day and 2,907 vehicles during peak hour (Independence Day Weekend). The Memorial Day traffic was low due to rainy weather experienced all weekend, which reduced the number of visitors to the park.

Traffic at the park entrance was collected on the peak park travel day of July 4, 2003. At the south park access location the maximum hourly volumes are:

- Northbound Rights In: 314 vph
- Northbound Rights Out: 203 vph
- Southbound Rights In: 106 vph
- Southbound Rights Out: 178 vph

At the north park access location the maximum hourly volumes are:

- Northbound Lefts In: 148 vph
- Northbound Rights In: 66 vph
- Southbound Rights In: 123 vph
- Southbound Rights Out: 175 vph

There are currently no traffic signals in the study area. The nearest traffic signals are located in Dewey Beach (5 miles to the north) and Bethany Beach (3.5 miles to the south). Therefore the study area is within an eight and half mile stretch of unsignalized area.

**b. Consequences:** Projected future peak summer conditions with the existing road configurations would result in the mainline having a LOS C. The north park access would operate at a LOS C, however the left turn movement from the park onto southbound SR 1 would operate at a LOS F. In future projections, the south park access would remain at a LOS A.

For future peak summer conditions with the proposed conditions, the SR 1 mainline and the south park access would remain with the existing configurations. The north park access option will continue to operate at a LOS F under the proposed improvements, but with less delay than would be experienced without the improvements.

Because this is a relatively low volume movement, even with the future expansion plans at the park, no additional improvements were considered to further reduce delay at this time.

The traffic analysis did not recommend the installation of traffic signals in the study area. With less than two accidents per year over the past fifteen years, the park access intersections have not demonstrated a safety risk to motorists on SR 1. The installation of traffic signals may increase the number and severity of crashes at this location. Also the traffic volumes on SR 1 are significantly greater than the park access traffic and stopping through traffic, even for short intervals, would have the potential to create long queues during peak summer conditions. For more information refer to the *Indian River Inlet Bridge Traffic and Safety Summary*.

## **IV.B. NATURAL ENVIRONMENT**

This section provides a general overview and description of the natural environment of the study area. A description of each natural resource category presents the existing conditions and potential consequences of the selected alternative to that resource. The consequences section presents those resources found within the right-of-way of the selected alternative and a discussion of potential mitigation concludes the discussion if applicable.

### **IV.B.1. Geology and Topography**

**a. Existing Conditions:** The entire study area is located within the Coastal Plain physiographic province, where thick sedimentary deposits overlay deep crystalline basement rock. In the southeastern corner of Delaware, these deposits are up to 10,000 feet thick. The Indian River Inlet Bridge study area is underlain with Quaternary-aged, lowland deposits of unconsolidated sands, gravels, silts, clays and shell beds. Surface materials within the study area are mostly beach sands with a western edge of marsh muds and clays. The topography of the area is generally flat with a zone of dunes, sand flats and swales along the beach, and areas of low, remnant dunes and tidal marshes scattered west of SR 1 and east of the coastal bay. The highest elevations within the study area are located on the existing bridge approaches (35 feet). Natural dune elevations are approximately fifteen feet north of the inlet and approximately 20 feet south of the inlet. The beach and dune system is regulated by DNREC through the Beach Preservation Act of 1972, which regulates activities shoreward of the building line (defined for the study area as a line “100 feet landward of the adjusted seaward most 10-foot elevation contour above the National Geodetic Vertical Datum”).

**b. Consequences:** Construction of the selected alternative will not impact the existing foredune (shoreward most dune) and no road construction will take place shoreward of the building line. Some portions of the existing roadway north of the inlet are within the building line, but the selected alternative will relocate the bridge and roadway to the west, beyond the building line. A six-acre upland habitat system will be reestablished shoreward of the building line in those areas where the existing roadway will be removed. Stabilized pedestrian access paths will also be constructed north of the inlet and shoreward of the building line to facilitate beach access from the north inlet parking areas and bike trails. Construction shoreward of the building line will require a permit from DNREC. Some areas of sand flats and remnant dunes west of SR 1 and north of the inlet will be impacted, as will some areas of tidal marsh west of SR 1. Additional areas of sand flats east of SR 1, but west of the building line and south of the inlet will be graded down to the roadway elevation. Coordination with DNREC will continue as this project approaches final design.

### **IV.B.2. Floodplains**

**a. Existing Conditions:** The entire study area, except the approach ramps to the existing bridge, is designated as 100-year flood zone as indicated on Federal Emergency Management (FEMA) Flood Insurance Rate Maps (FIRMs). The FEMA designation of “100-year flood zone” indicates that there is a 1% chance that flood elevations will exceed the area elevation each year. Some areas immediately north and east of the project location are designated as “100-yr shallow flooding zone”. This designation indicates that the chance of flooding is 1% annually, but with flooding depths from one to three feet. **FIGURE 10** shows the extent of the 100-year floodplain within the study area.

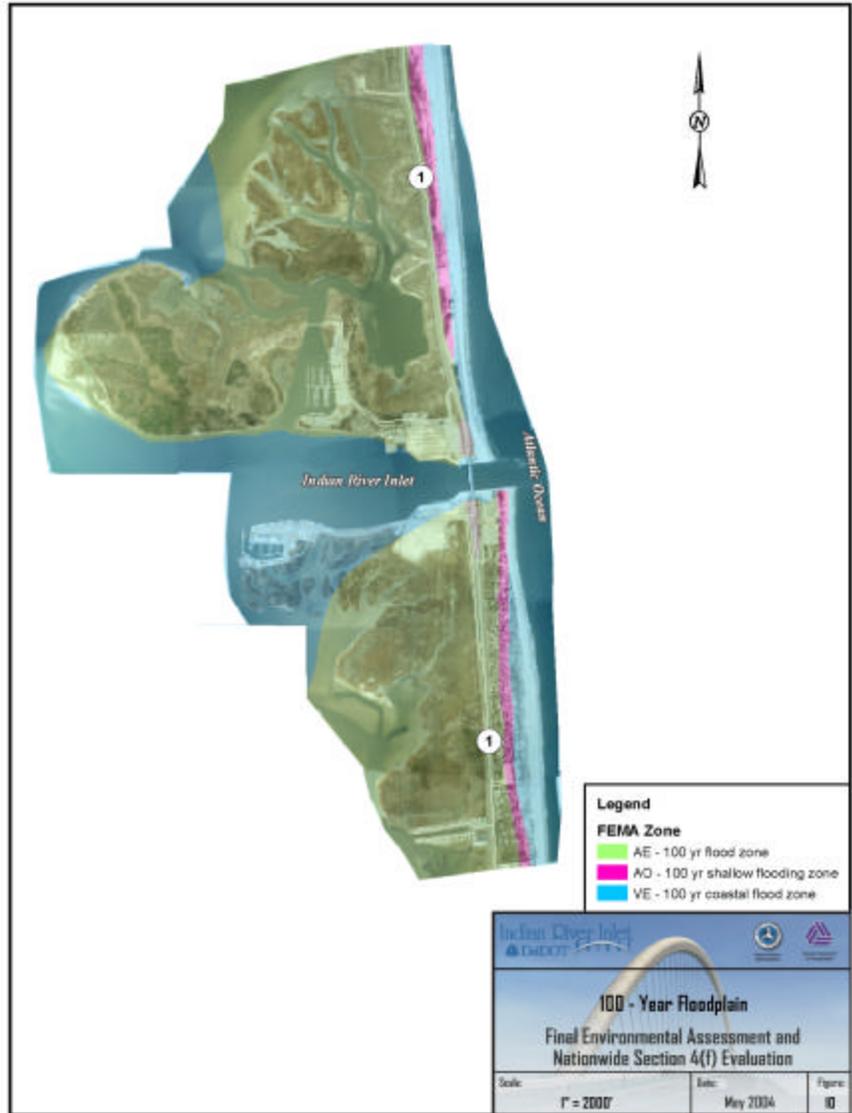
**b. Consequences:** This project will not significantly alter the 100-year floodplain area because the entire study area and surrounding area is within the 100-year floodplain and will remain in the 100-year floodplain after construction is complete for the project. Coordination with DNREC officials in charge of dune restoration have indicated that the existing dune system in the northeast portion of the study area is adequate to protect the roadway from reasonable threats of flooding. The project will not require any mitigation efforts to the floodplain in the study area. However, DNREC- Division of Soil and Water will review the project for Federal floodplain management compliance.

**IV.B.3. Water Resources and Water Quality**

**Existing Conditions:** The water resources within the study area consist of both surface and ground water. These surface water resources include the Atlantic Ocean, the Indian River Inlet and the Rehoboth and Indian River Bays. All of these surface water resources are tidally influenced saltwater bodies. The Indian River Bay south of the inlet and Rehoboth Bay north of the inlet, are wide and shallow, with an average water depth of less than twelve feet. The Indian River Inlet has been scoured to a much greater depth, with some areas having a water depth of up to 95 feet. All areas of the Atlantic Ocean near the project consist of near-shore waters generally less than twenty feet deep.

The tides along the ocean and within the inlet range from four to five feet, while tides in Rehoboth and Indian River Bay average approximately two feet between high and low tide. The groundwater resources in the project vicinity consist of unconfined, surficial aquifers and deeper, confined aquifers. The unconfined, surficial aquifer is known as the Columbia aquifer, and it is an important source of fresh water for stream base flow and deeper, confined, fresh water aquifers beyond the study area. According to the State of Delaware 2002 Watershed Assessment Report (305(b)), the Columbia aquifer has a significant ground water discharge into the Indian River and Rehoboth Bays.

Federal agencies and the State of Delaware have conducted intensive water quality monitoring of the Indian River Bay and Rehoboth Bay. In a 1998 report, the DNREC- Division of Water Resources, Water Assessment Section identified these bays as being highly enriched with the nutrients nitrogen and phosphorus. The 2002 Watershed Assessment Report also states that there is a significant contribution of nitrate from groundwater discharge into the bays from the Columbia aquifer. Additional surface-water sources of these nutrients are believed to be point source discharges directly into the bays combined with non-point source discharges along



tributaries in the upper watersheds. The existing bridge and roadway currently have no stormwater management infrastructure. All runoff from the existing roadway enters ditches and storm drain systems that are directly connected to the surface waters of the Rehoboth and Indian River Bays.

**b. Consequences:** The selected alternative is not expected to adversely affect the surface water quality of the surrounding bays, ocean or inlet, nor is it expected to adversely impact the aquifer in the study area. The selected alternative incorporates a comprehensive stormwater management infrastructure, and all increases in impervious surface will pass through stormwater management facilities and receive water quality treatment prior to entering the surface waters surrounding the project site. The design of the stormwater management infrastructure follows guidelines laid out in the *Delaware Erosion and Sediment Control Handbook* (1989), the *Delaware Sediment and Stormwater Regulations* (1991), and DelDOT's *Standard Erosion Control Details and Specifications*. Although runoff from the proposed bridge deck will flow through scuppers into the Indian River Inlet, on-site stormwater management facilities will be designed to compensate for this direct discharge from the bridge as well as treating increases in impervious areas required by the project. Therefore, the project will not have significant impacts on the surface water quality of the Indian River or Rehoboth Bays or the Indian River Inlet, nor will it impact the water quality or recharge of the local aquifer.

#### **IV.B.4. Coastal Zone Management**

**a. Existing Conditions:** The state of Delaware is located within the Coastal Zone and the entire study area is located within the Coastal Strip defined by the Delaware State Coastal Zone Act of 1971. Heavy industry, manufacturing, and non-conforming uses are regulated under this Act. The current use in the project is not regulated and that status is not expected to change as a result of this project. Coordination with DNREC will continue throughout this project, and permits will be obtained.

**b. Consequences:** No adverse impacts to coastal zone management areas will result from this project. However, a DNREC Coastal Zone Management Consistency Application Permit has been submitted to DNREC to obtain approval and easement for this project.

#### **IV.B.5. Stormwater Management**

**a. Existing Conditions:** Currently, there are no stormwater management facilities along SR 1 near Indian River Bridge. Stormwater management facilities were not required when the original bridge was constructed in the late 1960's. A combination of open and closed drainage systems currently conveys the stormwater runoff. Highway drainage runs off as sheet flow into roadside ditches, or is collected by inlets along the roadway. Drainage east of SR 1 is directed through culverts under the road, and combines with bayside drainage before discharging directly into numerous drainage trenches, which lead into Indian River Bay.

**b. Consequences:** The Indian River Inlet Bridge project has been analyzed to determine the stormwater management requirements that result from the project. The roadway portion of the proposed project will result in a net increase of approximately 5.9 acres of impervious surface. This includes new pavement associated with the mainline roadway, access roads and day use parking lots, as well as credit for existing roadway pavement to be removed. The park portion of the proposed project will result in a net increase of approximately 3.2 acres of impervious surface. This includes new pavement associated with the reconfiguration of the northern and southern campgrounds, as well as a new network of pedestrian/bicycle paths.

The stormwater management goals of the project are to provide adequate water quality treatment to compensate for this increase in impervious area and to minimize impacts to sensitive natural resources, including wetlands, tidal waterways and upland dune habitat. Stormwater management requirements are comprised of quality control and quantity control components. According to the criteria set forth in §3.2.B(2) of *Delaware Sediment and Stormwater Regulations*, quantity management will be waived if provisions are made for a non-erosive conveyance system to tidewater. The proposed project will provide stable conveyance to the tidally influenced Indian River Inlet by a combination of closed drainage systems and open channels, therefore quantity management will not be required.

DelDOT, in conjunction with DNREC, has developed several stormwater management concepts, such as shallow extended detention wetlands, bioretention<sup>1</sup>, retention/infiltration, and dry extended detention to provide stormwater quality management. The preferred treatment method is shallow extended detention wetlands, which will consist of shallow areas graded to provide saturated ground and wetland plantings that can survive the fluctuation in water levels resulting from the various storm events. Quality management will be provided by extended detention of the required runoff over a 24-hour period. Shallow extended detention wetlands are sensitive to water levels; therefore geotechnical borings have been conducted to ensure the feasibility of this type of facility.

Facility locations were identified based on maximizing the amount of impervious surface that can be directed there, and minimizing the amount of additional disturbance to the natural resources. The areas within loops of the proposed access roads are the primary locations for the four facilities designed for the roadway portion of the project. These sites will be disturbed during the construction of the access roads and will require minimal additional disturbance, which will occur during the construction of stable outfalls for each of the facilities. For the park portion of the project, the northern campground will be the primary location for stormwater management facilities, which will consist of a series of shallow retention/infiltration swales between the rows in the campground. The swales will allow for approximately six inches of ponding depth prior to providing conveyance to the northeast corner of the campground. A geotechnical investigation is currently underway in the northern campground to determine the compaction and infiltration rates of the existing soil. If the borings indicate inadequate infiltration rates, some measures will be taken to loosen the soil within the retention/infiltration areas.

The overall stormwater management approach for the project focuses on minimizing impacts while maximizing the amount of impervious surface treated. The shallow extended detention wetland design along with the retention/infiltration swales will provide the water quality treatment required and the landscaping of these facilities will be in harmony with the natural aesthetics of the surrounding area.

#### **IV.B.6 Wetlands**

**a. Existing Conditions:** U.S. Fish and Wildlife National Wetland Inventory (NWI), DNREC State-Wide Mapping Program (SWMP) and DNREC tidal wetland mapping indicates extensive tidal wetlands along the western half of the study area. These tidal wetlands are identified as estuarine emergent marsh with a few areas of estuarine scrub/shrub wetlands. The NWI and SWMP maps also indicate the presence of a few small, nontidal, palustrine wetlands east of SR 1.

Three wetland investigations were conducted for this project. Two investigations were conducted for the project area and one investigation was conducted for the mitigation sites. The original project area wetland investigation was conducted in February and March 2003 and covered 1.5 miles north and south of the Indian River Inlet along SR 1 from the ocean to 300 feet west of SR 1. A supplemental investigation, conducted in January 2004, was required to cover expanded project areas west of SR 1. This expanded area wetland investigation was conducted north of the Indian River Inlet around the marina and peninsula north and west of the Indian River Inlet and abutted the original wetland investigation study area. The third wetland investigation and delineation was conducted around the potential wetland mitigation sites located on the Fresh Pond Tract of the Delaware Seashore State Park. This investigation covered the Fresh Pond North and Fresh Pond South Mitigation sites and was conducted in August 2003.

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<sup>1</sup> Bioretention combines the use of plants and a filter bed to provide quality management. The amount of fall between the bottom of the facility and the required underdrain below the filter bed limits the location of this type of facility to areas in fill, due to the extremely flat nature of the site.

The original wetland investigation identified two large areas of tidal marsh wetlands, west of SR 1, associated with Rehoboth Bay and Indian River Bay. It also identified wetland areas consisting of roadside ditches and dune swale wetlands. The tidal marsh wetlands located west of SR 1 are a mix of smooth cordgrass (*Spartina alterniflora*) dominated salt marsh and tidal scrub/shrub wetlands dominated by the salt shrub community of marsh elder and groundsel tree (*Iva frutescens* and *Baccharis halimifolia*). Some areas of the tidal marsh located adjacent to the existing roadway south of the inlet and west of SR 1 appear to have been disturbed in the past. There are numerous roadside ditch wetlands on both sides of SR 1, both north and south of the Indian River Inlet. These ditches are dominated by common reed (*Phragmites australis*) and bayberry (*Myrica pennsylvanica* and *M. cerifera.*). The dune swale wetlands located north of the inlet and east of SR 1 were dominated by common reed and bayberry. The one swale wetland located south of the inlet and east of SR 1 is a small depression of dense shrubs, including bayberry and blueberry (*Vaccinium sp.*). There are also several fire-damaged pines within this swale wetland. The nontidal, palustrine wetlands are emergent wetlands dominated by three square rush (*Scirpus americanus*) and common reed, or shrub wetlands dominated by bayberry. *Investigation for Wetlands and Waters of the United States, Transportation Improvement Study, Replacement of the Bridge (3-156) State Route 1 Over the Indian River Inlet, March 2003.*

The extended area wetland investigation extended the boundary of the northern large tidal marsh identified in the original wetland investigation. This wetland investigation also identified one additional area of tidal wetlands located north of the marina, south of the land bridge to Burton Island adjacent to Balders Pond. This wetland is a tidal marsh dominated by smooth cordgrass (*Spartina alterniflora*) and salt meadow cordgrass (*Spartina patens*). *Investigation for Wetlands and Waters of the United States in the Extended Study Area, Transportation Improvement Study, Replacement of the Bridge (3-156) State Route 1 Over the Indian River Inlet, March 2004.*

The Fresh Pond Tract wetland delineation identified 15 potentially jurisdictional areas around the potential mitigation sites. Five of these areas were identified as wetlands. The largest area was located near the Fresh Pond North mitigation site and was comprised of a mix of smooth cordgrass (*Spartina alterniflora*) dominated salt marsh and tidal scrub/shrub wetlands dominated by the salt shrub community of marsh elder and groundsel tree (*Iva frutescens* and *Baccharis halimifolia*). Three of the other wetlands identified were located around the Fresh Pond South mitigation site. All three emergent wetlands surround irregularly tidally inundated open water areas and are dominated by the common reed (*Phragmites australis*). The final wetland identified in the Fresh Pond Tract wetland delineation is a wet forested ditch dominated by small red maples (*Acer rubrum*) along a potential haul road between the Fresh Pond North and Fresh Pond South sites. The other jurisdictional areas were identified as open water ditches, guts, or ponds. *Investigation for Wetlands and Waters of the United States, Fresh Pond Tract Delaware Seashore State Park, Potential Wetland Mitigation Sites, November 2003.*

The wetland delineation was conducted in accordance with the ACOE *Wetlands Delineation Manual*, Section 404 of the Clean Water Act (CWA), and other Federal provisions administered by the ACOE. Section 404 CWA covers all navigable waters, tributaries to navigable waters and all connected and adjacent wetlands. The wetland delineation identified 23 areas of potentially jurisdictional water and wetlands. The detailed results of the wetland delineation are contained in the following reports, which are summarized in **TABLE 5** below:

The ACOE confirmed the original investigation jurisdictional status and the delineated boundaries of the waters and wetland areas included in the original investigation in the jurisdictional determination (JD) field meeting in April 2003 and in the letter from the ACOE dated September 22, 2003. The ACOE has not confirmed the jurisdictional status and the delineated boundaries of the waters and wetland areas included in the extended area investigation, however, approval is anticipated in May 2004. The ACOE has confirmed the jurisdictional status and the delineated boundaries included in the Fresh Pond Tract investigation in the jurisdictional determination (JD) field meeting in October 2003 and in the letter from the ACOE dated February 18, 2004.

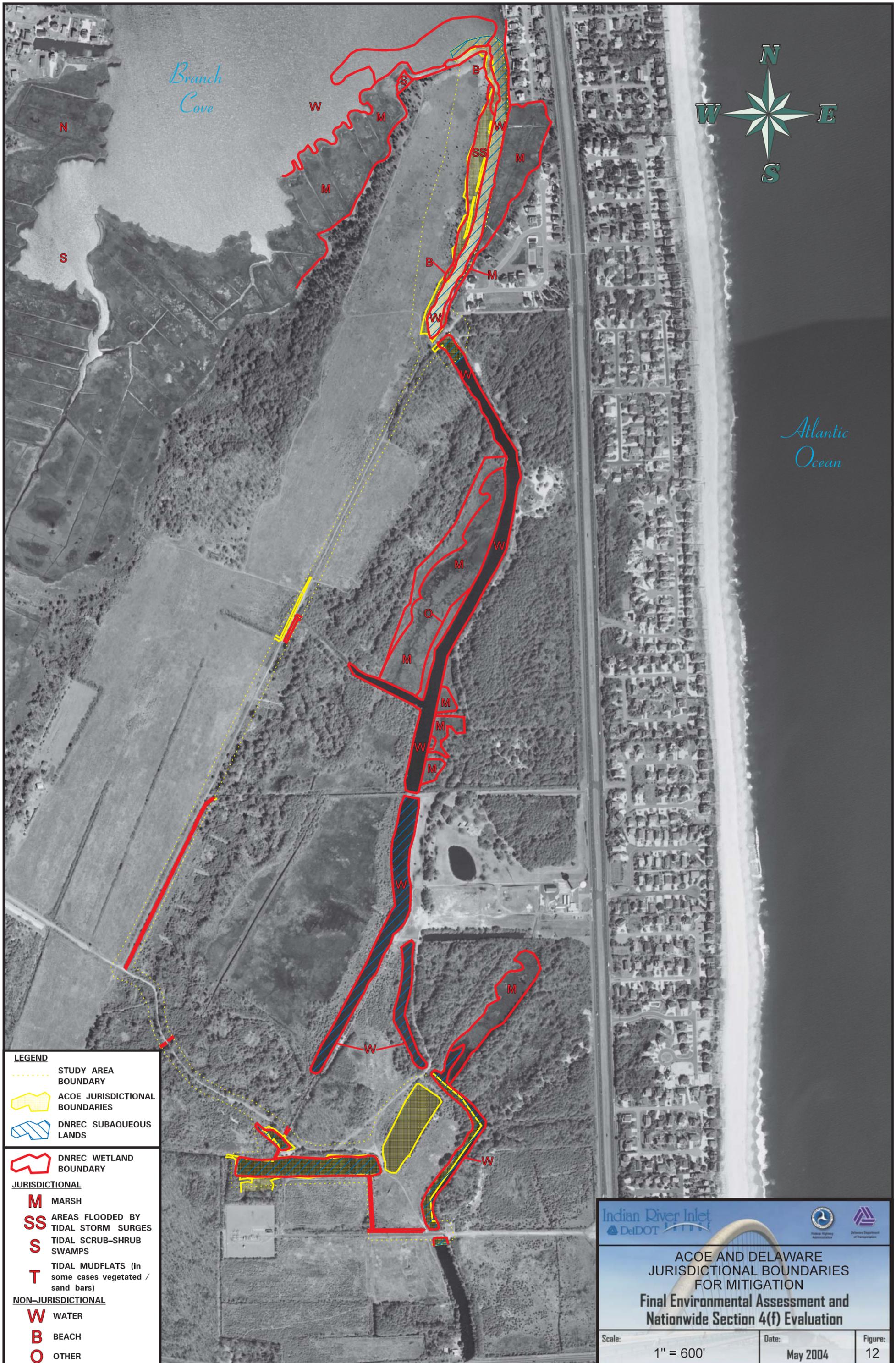
In accordance with Delaware's "The Wetlands Act" of 1973, the 1988 DNREC- Tidal Wetland maps were consulted to identify DNREC regulated wetlands within the original, extended, and Fresh Pond Tract study

areas. A field walks were conducted in the original study area in April 2003 and in the Fresh Pond Tract study area in October 2003 to confirm the jurisdictional status of the mapped wetland boundaries. Additionally, DNREC has jurisdiction over subaqueous land defined as submerged lands (lying below mean low water or ordinary high water) and tidelands (lying between mean high water and mean low water). The submerged lands in the study area were delineated based on detailed topography. The DNREC- Division of Water Resources, Wetlands and Subaqueous Lands confirmed the mapped boundaries of the tidal wetlands and submerged lands under DNREC jurisdiction included in the original study area in the JD letter dated November 21, 2003. DNREC has not confirmed the wetland and subaqueous lands boundaries included in the extended study area, however, confirmation is anticipated in May of 2004. DNREC has confirmed the wetland lines included in the Fresh Pond Tract around the Fresh Pond North mitigation site, however additional field reviews will be necessary to confirm the wetlands and subaqueous lands areas around the Fresh Ponds South Mitigation site. Maps indicating the limits of the ACOE jurisdictional wetlands and waters of the U.S., the DNREC jurisdictional tidal wetlands and the DNREC jurisdictional submerged lands are showed on **FIGURE 11** and **FIGURE 12**. The differentiation of wetland types within the project area are included in **TABLE 5**, below.



**LEGEND**

	ACOE JURISDICTIONAL BOUNDARIES		DNREC WETLAND BOUNDARY
	DNREC SUBAQUEOUS LAND AREA		MARSH } JURISDICTIONAL
			WATER } NON-JURISDICTIONAL
			OTHER } NON-JURISDICTIONAL
			WETLAND STUDY AREA BOUNDARY

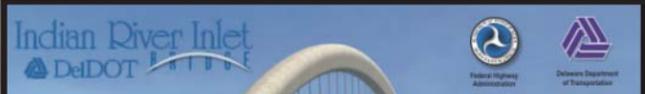


Branch Cove



Atlantic Ocean

LEGEND	
	STUDY AREA BOUNDARY
	ACOE JURISDICTIONAL BOUNDARIES
	DNREC SUBAQUEOUS LANDS
	DNREC WETLAND BOUNDARY
<b>JURISDICTIONAL</b>	
<b>M</b>	MARSH
<b>SS</b>	AREAS FLOODED BY TIDAL STORM SURGES
<b>S</b>	TIDAL SCRUB-SHRUB SWAMPS
<b>T</b>	TIDAL MUDFLATS (in some cases vegetated / sand bars)
<b>NON-JURISDICTIONAL</b>	
<b>W</b>	WATER
<b>B</b>	BEACH
<b>O</b>	OTHER



ACOE AND DELAWARE JURISDICTIONAL BOUNDARIES FOR MITIGATION  
 Final Environmental Assessment and Nationwide Section 4(f) Evaluation

Scale: 1" = 600'	Date: May 2004	Figure: 12
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**TABLE 5: Summary of Wetlands Located within Project Area**

Wetland ID <sup>1</sup>	Description	ACOE Jurisdiction	DNREC Jurisdiction	Comments
<b>IN-A/INE-C</b>	Salt Marsh Complex	YES	YES	Herbaceous Wetland Complex, Shrubby Wetland Complex, Roadside Ditch Wetlands, and Emergent Ditch Wetlands
<b>IN-B</b>	Low Swale	YES	NO	Shrubby Wetland Complex
<b>IN-C</b>	Low Swale	YES	NO	Shrubby Wetland Complex
<b>IN-D</b>	Low Swale	YES	NO	Shrubby Wetland Complex
<b>IN-E</b>	Low Swale	YES	NO	Herbaceous Wetland Complex
<b>IN-F</b>	Low Swale	YES	NO	Herbaceous Wetland Complex
<b>IN-G</b>	Low Swale	YES	NO	Shrubby Wetland Complex
<b>IN-H</b>	Low Swale	YES	NO	Herbaceous Wetland Complex
<b>IS-A</b>	Salt Marsh Complex	YES	YES	Herbaceous Wetland Complex, Shrubby Wetland Complex, Roadside Ditch Wetlands, and Emergent Ditch Wetlands
<b>IS-B</b>	Drainage Ditch	YES	YES	Roadside Ditch Wetlands
<b>IS-C</b>	Low Swale	YES	NO	Herbaceous Wetland Complex
<b>IE-A</b>	Drainage Ditch	YES	NO	Roadside Ditch Wetlands
<b>IE-B</b>	Drainage Ditch	YES	NO	Roadside Ditch Wetlands
<b>IE-C</b>	Drainage Ditch	YES	NO	Roadside Ditch Wetlands
<b>IE-D</b>	Drainage Ditch	YES	NO	Roadside Ditch Wetlands
<b>IE-E</b>	Drainage Ditch	YES	NO	Roadside Ditch Wetlands
<b>IE-F</b>	Drainage Ditch	YES	NO	Roadside Ditch Wetlands
<b>IE-G</b>	Inter-Dunal Swale	YES	NO	Shrubby Wetland Complex
<b>IE-H</b>	Drainage Ditch/Inter-Dunal Swale	YES	NO	Shrubby Wetland Complex
<b>IE-I</b>	Inter-Dunal Swale	YES	NO	Shrubby Wetland Complex
<b>IE-J</b>	Drainage Ditch/Inter-Dunal Swale	YES	NO	Shrubby Wetland Complex
<b>IE-K</b>	Inter-Dunal Swale	YES	NO	Shrubby Wetland Complex
<b>IE-L</b>	Drainage Ditch	YES	NO	Roadside Ditch Wetlands
<b>IE-M</b>	Drainage Ditch	YES	NO	Roadside Ditch Wetlands
<b>IE-N</b>	Drainage Ditch	YES	NO	Roadside Ditch Wetlands
<b>INE-A</b>	Open Water	YES	YES	Tidal Open Water
<b>INE-B</b>	Emergent Marsh	YES	YES	Herbaceous Wetland Complex
<b>WA</b>	Salt Marsh Complex	YES	YES	Herbaceous Wetland Complex, Shrubby Wetland Complex
<b>WF</b>	Open Water	YES	<i>Pending</i>	Open Water
<b>WG</b>	Forested Ditch	YES	<i>Pending</i>	Shrubby Wetland Complex
<b>WH</b>	Open Water	YES	<i>Pending</i>	Open Water
<b>WI</b>	Open Water	YES	<i>Pending</i>	Open Water
<b>WJ</b>	Open Water	YES	<i>Pending</i>	Open Water
<b>WK</b>	Open Water	YES	<i>Pending</i>	Open Water
<b>WL</b>	Open Water	YES	<i>Pending</i>	Open Water
<b>WM</b>	Open Water	YES	<i>Pending</i>	Open Water
<b>WN</b>	Open Water	YES	<i>Pending</i>	Open Water
<b>WN-A</b>	Emergent Fringe	YES	<i>Pending</i>	Herbaceous Wetland Complex
<b>WO</b>	Open Water	YES	<i>Pending</i>	Open Water
<b>WO-A</b>	Emergent Fringe	YES	<i>Pending</i>	Herbaceous Wetland Complex
<b>WP</b>	Forested Wetland	YES	<i>Pending</i>	Forested Wetland Complex
<b>WQ</b>	Open Water	YES	<i>Pending</i>	Open Water

**Note: Highlighted areas indicate potentially impacted areas**

**1. Descriptions and locations can be found in the project's Wetland Delineation Reports**

**b. Consequences:** The selected alternative will have permanent impacts on ACOE jurisdictional wetlands and waters, and DNREC jurisdictional wetlands and submerged lands. The selected alternative will permanently impact approximately 3.56 acres of ACOE jurisdictional wetlands and 0.50 acres of waters of the U.S. as well as approximately 2.75 acres of DNREC jurisdictional wetlands and 0.09 acres of DNREC jurisdictional submerged lands. These unavoidable wetland impacts are further differentiated by wetland type, which are summarized in **TABLE 6**

**TABLE 6: Summary of Total Unavoidable Tidal Wetland Impacts  
Associated with the Selected Alternative**

WETLAND RESOURCE		IMPACTS	
CLASSIFICATION	SUB-CLASSIFICATION	PERMANENT (Acres)	TEMPORARY (Acres)
MAIN WETLANDS	SHRUBBY WETLAND COMPLEX	1.31	0.32
	HERBACEOUS WETLAND COMPLEX	0.74	3.15
ROADSIDE DITCH WETLANDS	ROADSIDE DITCH WETLANDS	1.31	0.01
	EMERGENT DITCH WETLANDS	0.20	0.01
ACOE OPEN WATER WETLANDS*		0.50	0.29
<b>TOTAL ACOE WETLAND RESOURCE IMPACTS</b>		<b>4.06</b>	<b>3.78</b>
DNREC Subaqueous Lands and Wetlands **		2.84	3.75
<b>TOTAL PROJECT WETLAND IMPACTS</b>		<b>4.06</b>	<b>3.78</b>

\* ACOE Open Water Wetlands are those areas, which are within the jurisdictional boundaries of the ACOE but are permanently inundated. These areas are outside of the jurisdictional wetland boundary, but channel ward of the High Tide Line.

\*\* DNREC Subaqueous Lands and Wetlands impacts are provided as a comparison only. Since the ACOE wetland impacts are the most conservative impact assessment, mitigation requirement will be based on ACOE impacts.

**Note:** Temporary impacts as shown within the table all project related temporary impacts including utility construction.

**Source:** ACOE Individual Permit Application for Sections 401 and 404 Approval and DNREC Joint Subaqueous and Wetland Permit

The selected alternative was based on an analysis of impacts to aquatic and upland resources completed at the intermediate (60% complete) design stage and discussed with regulatory agency representatives at numerous coordination meetings. Efforts were and will continue to be made throughout the design process to avoid and minimize impacts to the greatest extent possible. However, wetland impacts associated with this project are unavoidable because of the extensive tidal wetland systems west the SR 1 and the sensitive habitat and dune ecosystems east of SR 1. The majority of the unavoidable wetland impacts will be located in the salt marsh south of the inlet and west of SR 1. Wetlands north of the inlet and west of SR 1 will also be impacted, although the majority of the impacted wetlands will be roadside ditches. An additional small area of roadside ditch wetland will be impacted north of the inlet and east of SR 1. No wetlands will be impacted south of the Indian River Inlet and east of SR 1 as this area is sensitive dune habitat. A small area of open water tidal ditch will be impacted in the southwest quadrant of the study area.

**c. Mitigation:** Mitigation will be provided to compensate for the unavoidable impacts to jurisdictional wetlands and waters. The ACOE and DNREC regulations indicate a preference for on-site, in-kind mitigation. However, due to the limited upland areas, the sensitive nature and habitat value of the surrounding upland areas, and coordination with the regulatory agency representatives it was decided to investigate off-site locations for wetland creation. Accordingly, DelDOT completed an Offsite Wetland Creation Site Search that identified potential tidal wetland creation sites in close proximity to the Project. These potential sites were coordinated with the owner, DNREC – Park and Recreation and the resource agency representatives to formulate a Compensatory Mitigation Plan (CMP) to offset unavoidable wetland impacts associated with the Project, which is included in **APPENDIX B** of this document and has been prepared with a focus on no net loss of wetland acreage and replacement of those functions unavoidably impacted by the project. Impacts will occur to existing wetlands to build the mitigation sites; however these impacts will be enhanced as part of the

overall mitigation construction. Mitigation at the Fresh Pond South Area will require modifications to the existing culvert crossing at the utility access road. These impacts will be minimized to the greatest extent possible but are unavoidable since the tidal connection needs to be made north of the access road to support the mitigation concept. These additional impacts, if any, will be included in the projects overall approval.

**d. Permits:** The construction of the project will involve the unavoidable impacts to the natural environment that would be authorized under various permits. In accordance with federal and state legislation, the following project permits have been submitted to the appropriate regulatory agency for review and approval:

- USCG Bridge Permit Approval under Section 9 of the Rivers and Harbors Act (covers any potential impacts to local navigation)
- ACOE Individual Permit Application for Section 404 of the Clean Water Act
- ACOE Approval under Section 10 of the Rivers and Harbors Act
- DNREC Joint Permit Application for Subaqueous Lands and Wetlands
- DNREC Water Quality Certification under Section 401 of the Clean Water Act
- DNREC Coastal Zone Management Permit
- Sediment and Erosion Control and Stormwater Management Approval from DelDOT in Accordance with Delaware Code.

DelDOT continues to work in concert with the Federal and State regulatory agency representatives towards final permit approval for the project. To this end the USCG, ACOE, and DNREC have placed the project permits on public notice requesting comments from the public on this project. DNREC Coastal Zone Management representatives have indicated that the project is generally consistent with program requirements and awaits completion of the environmental document and other project related permits to complete their evaluation.

DelDOT recognized earlier in the design development process that the new bridge foundations would conflict with several existing utilities, which will require relocation. These utility relocations (sewer, water, telecommunication, and electric) could adversely affect the project schedule and potentially service to the general public as a result of the project. To preserve the project schedule and limit potential disturbances to local residents and park users, DelDOT, in concert with DNREC, decided to proceed with an advance utility contract in an attempt to clear the existing utilities from the project area and facilitate timely construction of the new bridge. Permits associated with the Advanced Utility Contract have been obtained from the ACOE (Nationwide 12) and DNREC (Joint Application for Subaqueous Lands and Wetlands Permit) to facilitate construction of the utility relocations.

#### **IV.B.7. Habitats and Wildlife**

##### **a. Existing Conditions:**

**Terrestrial Habitat:** The habitat in the northwest quadrant of the project is a mosaic of uplands and wetlands. The uplands in this area, excluding the grassy road shoulders, are located on remnant dunes and sand flats. The densely vegetated upland areas are composed of bayberry and groundsel-tree shrub; and bayberry, common reed and red cedar (*Juniperus virginiana*) thickets; areas of dense Beach-heather (*Hudsonia tomentosa*) and some areas of dense grasses. The sparsely vegetated upland areas are either open Beach-heather dwarf shrub patches or sandy, open grassy areas. The wetlands in this quadrant include *Spartina* dominated salt marsh; fringe areas of salt shrubs (*B. halimifolia* and *I. frutescence*); tall-form *Spartina alterniflora* ditches; and roadside ditches of dense common reeds or reeds mixed with bayberry.

Further west of the existing alignment within the northwest quadrant is Bottom Hills Drain (BHD), an artificially deepened area of the Rehoboth Bay with an average depth of approximately 18 to 20 feet due to dredging operations in 1957, 1963 and again in 1982. Those dredging operations were conducted to supply sand for beach replenishment efforts north and adjacent to the Indian River Inlet. As a result of the dredging and its sheltered location, BHD is a hydraulically isolated and distinct area surrounded by tidal marsh and much

shallower waters. The disparity between the depths within BHD and the surrounding, shallow-water areas decreases the flushing and mixing of the waters and results in stratification and reduction of available DO. Preliminary studies suggest that during warmer months (July through September), the waters of BHD become hypoxic or anoxic in deeper areas. The hypoxic and anoxic conditions may persist throughout the summer, reducing available benthic habitat for organisms such as clams, crabs and bottom-dwelling fish species such as flounder.

The habitat in the northeast quadrant of the project is composed of upland habitats. These uplands consist of areas of open, shifting sand with sparse, dune grasses and areas of thick grasses and bayberry shrubs containing scattered pines and cedars. The wetlands in this quadrant are roadside ditches dominated by common reed or reed mixed with bayberry.

The habitat in the southeast quadrant of the project supports upland habitats, with the exception of one small swale wetland. This wetland is a small depression dominated by dense shrubs, including bayberry and blueberry (*Vaccinium sp.*). There are also several fire-damaged pines within this wetland. A mosaic of Japanese black pines (*Pinus thunbergii*), open sand, shrubs and dense grasses/forbs occupy the remainder of the southeast quadrant; however, there is one additional area covered by dense shrubland habitat, dominated by Beach Plum (*Prunus maritima*). Near the southern extent of the LOC is an area of Japanese black pine, which is an open forest with a significant cover of Beach-heather between the individual pines. Interspersed with these other habitats are open, sandy areas of sparse grasses and forbs.

Within the Southwest Quadrant the habitat consists mostly of wetlands and disturbed uplands, along with some open water and fringe uplands. The disturbed uplands consist of an abandoned road and the grassy road shoulder of SR 1. The wetland vegetation is primarily shrubs and common reed, with several locations of *Spartina*-dominated salt marsh. Three areas composed of *Spartina* and *Salicornia* appear to be separated from the main salt marsh system, and appear to be locations of previous disturbance. The uplands in this quadrant are dominated by bayberry and common reed with a scattering of red cedars. The abandoned road is periodically mowed, and has a cover of dense grasses. An excavated, open-water channel parallels this abandoned roadway. These man-made features, as well as the abundance of common reed suggest that this area has been significantly disturbed.

Several natural communities of conservation concern are located with the Indian River Inlet areas. Within the project LOC, three upland Natural Communities are ranked by the state of Delaware as extremely rare, very rare or rare to uncommon. The Delaware Natural Heritage and Endangered Species Program (DNHP) lists the Beach-heather dwarf shrubland as very rare, indicated with a state rank of S2. This community is found in the northwest and southeast quadrants. DNHP has assigned a rank of S2S3, indicating a very rare to uncommon status, to the Northern Bayberry (Beach Plum) shrubland located in the southeastern quadrant. DNHP assigned a rank of S2S3 (very rare to uncommon) to the Overwash Dune Grasslands located in the northeast quadrant. None of the wetlands within the LOC are communities of conservation concern.

Wildlife was observed on numerous occasions throughout the study area. Numerous bird species were present in the large wetlands west of SR 1. Species observed included both snowy and common egrets, great blue and green herons, willets, Canada geese and sandpipers, osprey, marsh hawks, red-winged blackbirds, boat-tailed grackles and various, unidentified species of sparrows, terns and gulls. The wading birds appeared to prefer the open-water edge of the marsh or the vegetated tidal channels, while the shorebirds prefers the sandy, intertidal edges and flats. The songbirds were seen mostly in the salt shrub wetlands, upland shrub thickets and the stands of common reed. Terrapins were also observed in these wetlands, and the remnants of their nests were observed in sparsely vegetated upland areas west of SR 1. No evidence of Terrapin nests was observed east of SR 1. While other fauna was observed in the sparsely vegetated uplands, their occurrence was infrequent enough that no habitat preference could be inferred. Many species or evidence of species usage were observed in the densely vegetated upland areas. These habitats include both the open pine forests of the southeast quadrant and the dense shrub and reed uplands throughout the study area. Songbirds and their nests were observed in many shrubs and trees. Mourning doves, robins grackles, catbirds, mockingbirds, kingbirds, and

unidentified sparrows and warblers were seen in these areas. Rabbits, foxes and evidences of deer, raccoon and mice were also observed in the upland areas of dense vegetation throughout the study area.

**Aquatic Habitat:** In accordance with the 1996 Amendments to the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), an Essential Fish Habitat (EFH) Assessment was conducted to identify, conserve and enhance EFH for those species regulated under a Federal Fisheries Management Plan (FMP) (USC 1853(a)(7)). Essential Fish Habitat is those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (16 U.S.C. 1802(10)). The Mid-Atlantic Fishery Management Council (MAFMC) is the regional fishery management council, created as a result of the Magnuson-Stevens Act, responsible for the development of the Fishery Management Plan (FMP) for Delaware. The EFH within the project area is described as, "Waters within the Delaware Inland Bay affecting the following: southern Rehoboth Bay and Indian River Bay, affecting White Neck and White Creek, Rehoboth March and Burton Island. Also these waters are within the Atlantic Ocean and affect east from Dewey Beach on the north, south past Rehoboth Marsh and the Indian River Inlet, to Bethany Beach, Miller Creek and Salt Pond."

The tidal wetlands and open water in the project study area also provide habitat for numerous invertebrate species, including fiddler crab (*Uca pugilator*), horseshoe crab (*Limulus polyphemus*), and ribbed mussel (*Arcuatula demissa*), which were observed during numerous field visits at the site. Fiddler crabs were ubiquitous throughout the cord grass salt marsh, while the horseshoe crabs and mussels were generally seen in vegetated or open-water tidal guts. During periods of high tidal inundation the herbaceous wetland complex could be productive feeding area for managed species.

Within the Delaware Inland Bays, NOAA has identified nine (9) specific species that are of special note and a management plan for these species have been prepared. A list of specific managed species, their habitat, and the life stages during which these species use the resource are included as **TABLE 7**. The significance of **TABLE 7** is contained in the habitat/notes column that indicates the portion of the resource (tidal wetlands or open waters), which is used by the individual species during the appropriate life stage for species. Of special note is that the managed species included in **TABLE 7** predominantly use the open waters portion of the resource mainly for food or as a forage base; however, tidal guts are used as nursery habitat for young as well as for foraging and food sources.

**TABLE 7: Summary of Managed Species with FMP in Delaware Inland Bays**

Species	Life Stage				Habitat/Notes
	Egg	Larvae	Juvenile	Adult	
Windowpane flounder	X				Open Waters: Bottom habitats with a substrate of sand, muddy sand, mud and gravel
		X			Open Waters: pelagic and bottom waters
			X	X	Open Waters: Bottom habitats with substrate of mud or fine grained sand
Winter flounder	X				Open Waters: Bottom habitats with a substrate of sand, muddy sand, mud and gravel
		X			Open waters: Pelagic and Bottom Waters
			X		Open Waters: Bottom habitats with a substrate of mud and fine grained sand
				X	Open Waters: Bottom habitats including estuaries with substrate of mud, sand, and gravel
Bluefish			X	X	Open waters: Pelagic and Bottom Waters
Atlantic butterflyfish			X	X	Open waters: Pelagic Waters
Summer Flounder			X	X	Open waters: Demersal waters and estuaries in flats, channels, salt marsh creeks, and eel grass beds Emergent wetlands: Habitat area of Particular Concern include native species of macroalgae, seagrasses, and fresh and tidal macrophytes
Scup			X	X	Open waters: Bottom habitats on sands, mud, mussel, and eelgrass bed type substrate
Black sea bass			X	X	Open waters: rough bottom/structured habitats Emergent wetlands: YOY use salt marsh edges and channels
Dusky shark		X			Open waters: neonate/early juveniles may use inlets and estuaries
Sandbar shark		X	X		Open waters: neonates/early juvenile nursery areas in shallow coastal areas

Source: Modified from [www.nero.noaa.gov/ro/STATES4/delaware/38307500.html](http://www.nero.noaa.gov/ro/STATES4/delaware/38307500.html) using data from [www.nero.noaa.gov/ro/doc/list.htm](http://www.nero.noaa.gov/ro/doc/list.htm)

**b. Consequences:**

**Terrestrial Habitat:** The selected alternative will impact both upland and wetland habitat. The selected alternative will potentially impact approximately 27.6 acres of total uplands (previously disturbed and previously undisturbed). Approximately 7.2 acres of valuable upland habitat (refer to **TABLE 8**) will be permanently and/or temporarily impacted by the selected alternative. The permanent impact is comprised of approximately 5.9 acres of densely vegetated uplands and 1.0 acre of sparsely vegetated uplands is anticipated by the selected alternative. The remaining 20.4 acres of upland impacts are to disturbed uplands such as grassy roadside shoulders and medians. The upland impacts to valuable habitat are located in the northwest and southeast quadrants. Some of the upland habitats impacted in the northwest quadrant are utilized by nesting Terrapins. The densely vegetated uplands in the southeast quadrant are used by mammal and songbird species. Approximately 0.6 acres of the upland habitat designated, as communities of conservation concern will be impacted. The impacts to upland habitat are addressed in greater detail within the Functional Assessment prepared for this project.

**Table 8: Summary of Upland Functions and Potential Impacts**

RESOURCE		FUNCTION	UNAVOIDABLE IMPACTS	
			PERMANENT (Acres)	TEMPORARY (Acres)
UPLANDS	<i>SPARSELY VEGETATED</i>	nesting/denning, foraging, cover, groundwater recharge, windscreen, communities of conservation concern	1.0	<0.1
	<i>DENSELY VEGETATED</i>	nesting/denning, foraging, cover, groundwater recharge, windscreen, communities of conservation concern	6.2	0.3
<b>TOTAL UPLAND IMPACTS</b>			<b>7.2</b>	<b>0.4</b>

Note: Temporary impacts, as included in this Table, do not include temporary impacts associated with utility construction  
 Source: ACOE Individual Permit Application for Sections 401 and 404 Approval

**Aquatic Habitat:**

The selected alternative (**FIGURE 2**) will have unavoidable permanent impacts to jurisdictional tidal wetlands of approximately 4.1 acres and permanent impacts to open waters approximately one-half (0.5) acres. The tidal wetland permanent impacts can be differentiated into the following functional classifications (*Indian River Inlet Functional Assessment, 2003*) roadside ditch wetlands (approximately 1.3 acres), emergent ditch wetlands (approximately 0.2 acres), shrubby wetland complex (approximately 1.3 acres) and herbaceous wetland complex (approximately 0.7 acres). The selected alternative will also result in temporary impacts to approximately 3.75 acres to tidal wetlands and temporary impact to open waters of approximately 0.29 acres, which will affect feeding, foraging, and nursery habitat to EFH species; however, these impacts will not adversely affect EFH species. All permanent and temporary impacts to tidal wetlands and open water are the basis of the ACOE Section 404 Individual Permit, the DNREC Joint Subaqueous and Wetland Permit and the DNREC Section 401 Water Quality Certification, which are currently under review by the appropriate regulatory agency.

The projects permanent and temporary impacts to tidal open waters and wetlands will affect feeding and foraging habitats of all nine (9) species listed in **TABLE 7** during the juvenile and adult life stages. However, these permanent impacts will only affect nursery habitat for Winter and Windowpane Flounder and Dusky and Sandbar Shark species during the critical egg and larval life stages. Of the wetland types described above, only the emergent ditch wetlands and herbaceous wetland complex (approximately one (1) acre of permanent impact) provide potential foraging or nursery habitat to some of the EFH species and their prey organisms as a primary wetland function (*Indian River Inlet Functional Assessment, 2003*).

**c. Mitigation:**

To offset for the unavoidable permanent impacts on the natural resources from this project, DelDOT in cooperation with the regulatory agencies has developed a CMP (**APPENDIX B**).

**Terrestrial Habitat:** As discussed during several regulatory agency coordination meetings, the restoration and/or enhancement of upland habitat area within and in close proximity to the project is of special concern. These discussions focused on the ability for DelDOT to restore upland habitats that are currently occupied by the existing SR 1 roadbed. The proposed Upland Habitat (Dune Restoration/Enhancement) site is located immediately north of existing Indian River Inlet Bridge within the roadbed of existing SR 1 and consists of the removal of approximately 6.0 acres of existing pavement, which will be restored to viable dune habitat. DelDOT owns the area since it exists within the DelDOT SR 1 right-of-way and the existing asphalt roadway can be converted to sparsely vegetated upland habitat. This area will provide habitat for resident and migratory species for purposes of nesting and foraging. Additionally, a vegetative screen along SR 1 up to approximately three miles north of the existing bridge is proposed to provide a break for wind blown sand from the dune areas. A third mitigation opportunity is the creation of approximately 0.2 acres of restored upland habitat at the Freshponds North wetland mitigation site.

**Aquatic Habitat:** DelDOT plans to provide for the creation of at least 4.1 acres of tidal wetlands and 0.5 acres of open waters at sites located in close proximity to the project (Fresh Pond North and Fresh Pond South), which are also located within the Inland Bays. This mitigation will occur on properties owned by DNREC and their location, in relation to the project site, refer to **APPENDIX B**. The design of these mitigation sites will provide the values and functions of the wetland systems impacted by the project with particular focus on replacing the specific characteristics of EFH lost at the project site.

To offset for the unavoidable temporary wetland impacts at the project site, DelDOT will require its contractor to replace the wetland system, in kind and in place, after completion of the specific construction activity, which is predominantly associated with utility line relocation and/or connections. DelDOT will require the contractor to minimize disturbance associated with these temporary impacts by:

- Placing protective matting within the wetland area to reduce vegetative impacts or subsoil consolidation, or

- Re-establish wetland systems after the impact is completed by removing any construction debris, scarifying the subsoil, and placing a native wetland seed mix for revegetation of the area.

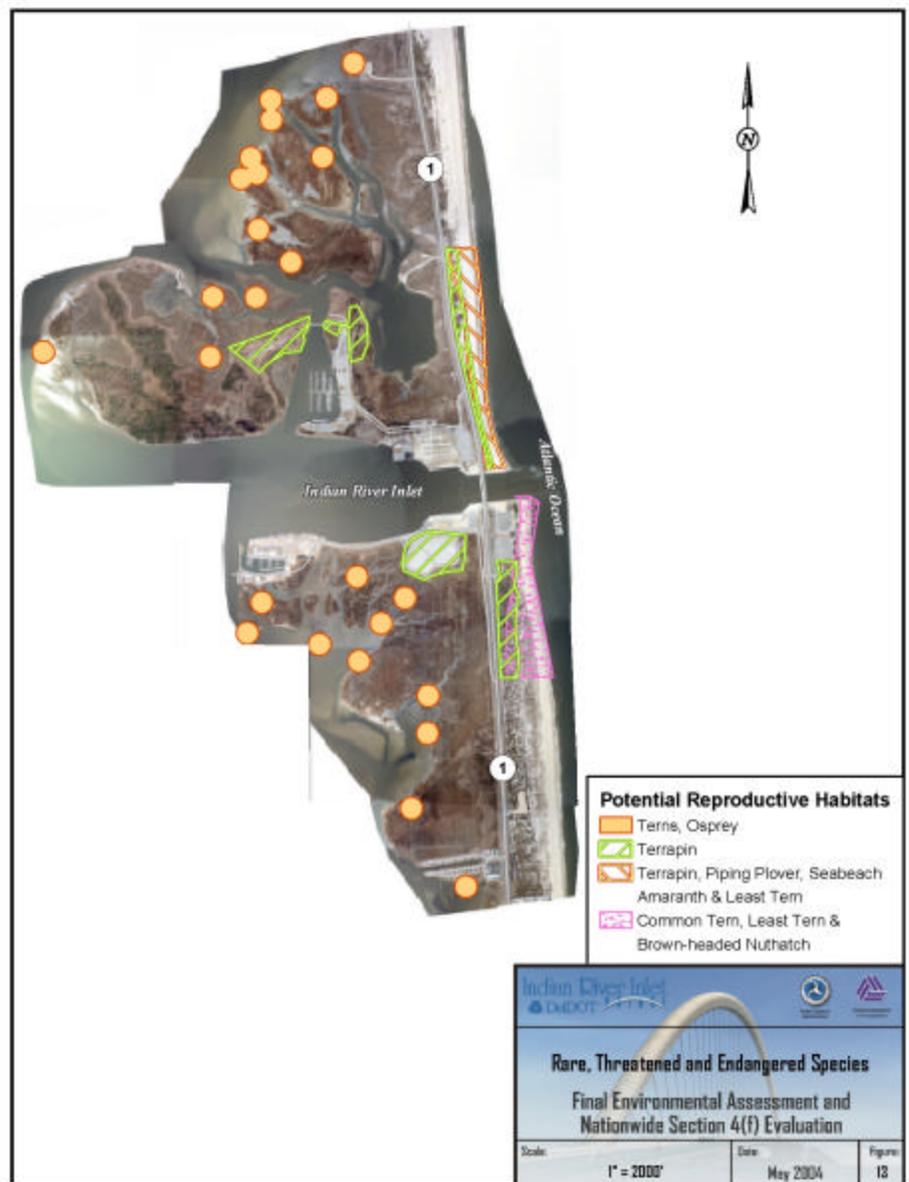
Through the utilization of these practices, the temporary impact areas will revert back to serving the values and functions they provided prior to the temporary impact.

#### IV.B.8. Rare, Threatened and Endangered Species

**a. Existing Conditions:** In accordance with Section 7 of the Endangered Species Act (ESA), both the U.S. Fish and Wildlife Service (USFWS) and the Delaware Natural Heritage and Endangered Species Program (DNHP) were contacted to obtain information on the presence or potential presence of rare, threatened and endangered species (RTEs) within the study area. USFWS indicated, in a letter dated April 23, 2003, that the federally threatened piping plover (*Charadrius melodus*), a shore bird, and the seabeach amaranth (*Amaranthus pumilus*), an annual plant, are both located within the boundary of the general study area. Critical habitat for both species includes beaches, foredunes, and over wash areas. The critical habitat for these species is believed to potentially exist east of SR 1 on the beachfront.

A formal letter of response was received from the DNHP on November 13, 2003, indicating the presence of twelve species of conservation concern. Additionally, DNHP provided a GIS data cover indicating the areal extent of the potential reproductive habitat of six of the twelve species of conservation concern within the general study area, as well as the potential nesting locations of osprey which is included in **FIGURE 13**. The twelve (12) identified species of conservation concern by DNHP include both federally listed species; the piping plover (bird); and the seabeach amaranth (plant); plus six additional bird species, one reptile and three insect species.

The remaining six bird species are listed as very rare to extremely rare breeders within Delaware. These species include the common nighthawk (*Chordeiles minor*), a very rare breeder (rank S2) in Delaware; the Brown-headed Nuthatch (*Sitta pusilla*); the common and least terns (*Sterna hirundo*



and *S. antillarum*); the black skimmer (*Rhynchops niger*); and the American Oystercatcher (*Haematopus palliatus*); all extremely rare breeders (rank S1) in the state. Both tern species, the black skimmer and the American oystercatcher utilize open, sandy nesting areas similar to the areas utilized by Piping Plover. The remaining two bird species of DNHP conservation concern, the common nighthawk and the brown-headed nuthatch, favor sparsely vegetated upland areas and open stands of pines, respectively. It was noted in conversations with DNHP biologists that although some of these species are commonly observed in Delaware, they are rare breeders in Delaware and all have documented declines in population levels throughout their ranges.

The insect species include the Bethany firefly (*Photunis bethaniensis*) and two tiger beetle species; *Cicindela lepida* and *C. marginata*. The Bethany firefly has a state ranking of S1, which indicates that this species is extremely rare within the state of Delaware. The Bethany firefly's selected habitat consists of interdune swale wetlands. Both tiger beetle species are ranked S1, or extremely rare in Delaware. These two species utilized open, sandy areas of sparse vegetation between the foredune and interdune swale wetlands. The selected habitat for *C. lepida* is the very dry, foredune habitat down onto the dry sand flats and splays. *Cicindela marginata* prefers the open, sandy areas near interdune swale wetlands.

The reptile species of conservation concern is the northern Diamondback Terrapin (*Malaclemys terrapin terrapin*), which has a conservation status of SU within the state of Delaware. A status of SU indicates that the population status of this species is unknown within Delaware. Evidence of this species has been observed within the study area, and DNHP monitors Terrapins mortality along SR 1 throughout the Delaware Seashore State Park. The primary terrestrial habitats utilized by the Terrapin are open, sandy uplands where they nest. Coordination with DNHP will continue to minimize impacts to habitats critical to these species of conservation concern.

**b. Consequences:** A complete response to the November 13, 2003 DNHP letter, detailing the assessment and potential affect the selected alternative may have on listed species is included in **APPENDIX C** of this Final EA/Nationwide Section 4(f) Evaluation. However, a summary of the projects affect, if any on the identified species is listed below.

The selected alternative will not impact any dynamic beachfront habitat identified as critical habitat for the two federally listed species, specifically the piping plover and the seabeach amaranth. Accordingly, no consultation with the USFWS in accordance with Section 7 of the Endangered Species Act is required for this project.

The selected alternative will not impact critical habitat utilized for breeding by the two tern species, the black skimmer, or the American oystercatcher, all of which utilize beachfront habitat similar to critical plover habitat. Similarly, there will be no impacts to the habitats selected by the three insect species of conservation concern. There will be impacts to habitat potentially utilized for breeding by the common nighthawk, the brown-headed nuthatch and the Diamondback Terrapin. These impacts to potential nesting habitat are expected to be located in the sparsely vegetated uplands north and west of the inlet and SR 1, and also in the shrubby uplands south of the inlet and east of SR 1.

Most impacts to selected species habitat were limited by excluding selected habitats from within the LOC. Potential impacts to areas utilized as nesting locations by the Terrapin, the common nighthawk and the brown-headed nuthatch will be offset by the creation of upland habitat at the mitigation sites.

In consultation with DNHP, the USF&WS and the other regulatory agency representative, DeIDOT has agreed to investigate potential habitat restoration opportunities for the Diamondback Terrapin. DeIDOT has initiated a search of available literature sources and spoken to researchers in the field to identify potential protection measures as well as conducted several site investigations with DNREC to identify potential restoration elements to reduce turtle mortality, especially during the breeding season.

As included in **APPENDIX C** of this Final Environmental Assessment/Nationwide Section 4(f) Evaluation DeIDOT, work closely with DNREC and the USFWS has identified a three pronged approach to address

Terrapin habitat restoration efforts by (1) increasing the size of two SR 1 culvert crossings so DNREC can study the habits of the Diamondback Terrapin and their potential use of these culvert crossings, (2) placement of fill material within the existing Haven Road roadbed (portions of Haven Road to be closed to park users) to encourage Terrapin use during the breeding season, and (3) work closely with DNREC to assist in the permitting of several minor efforts to assist Terrapins in their transition from deeply incised channels (Savage Ditch and the like) to adjacent breeding areas. This plan addresses several ways to decrease Diamondback Terrapin mortality rates along SR 1 as well as provide viable nesting and breeding habitat along the upland areas adjacent to and west of SR 1.

#### **IV. C. CULTURAL RESOURCES**

NEPA, the National Historic Preservation Act of 1966, as amended, and Section 4(f) of the Department of Transportation Act require the identification of historic resources – cultural resources listed on or eligible for the National Register of Historic Places (36 CFR 60.4) – and consideration of those historic resources during the planning for federal projects. The efforts to identify the historic resources potentially affected by the proposed project have been documented in two draft Management Reports, dated May 2003 and December 2003. An additional Management Summary, dated March 31, 2004, reported the results of additional archeological survey at Fresh Pond South mitigation area, the haul road, and Fresh Pond North mitigation area. A final Management Report, addressing all the cultural resources efforts for the project and addressing the comments and concerns of the State Historic Preservation Office (SHPO) (see letters dated January 29, 2004, and March 17, 2004, in **APPENDIX C**) will be submitted to the SHPO after the circulation of this Final EA/Nationwide Section 4(f) Evaluation. A letter stating a finding on no historic properties affected was submitted to the SHPO on April 2, 2004; as of the date of this publication DelDOT was waiting for a determination from the SHPO

##### **IV.C. 1. Archeological Resources**

###### **a. Existing Conditions:**

**i. Project Site:** The collection of data regarding known archeological sites in the five-mile study area for the project identified the existence of 35 resources. Of these resources, one is listed (the Wilgus Site (S-686)) on the National Register of Historic Places and the eligibility of the remaining 34 sites has not been determined.

In addition to the collection of data regarding known sites, various investigations were undertaken within the proposed limit of construction (LOC) for the proposed bridge replacement as well as the mitigation components of the project, the Area of Potential Effect (APE) for archeological resources. These various investigations are described below.

A review of historic geologic data, maps, and aerial photographs indicated locations that have been disturbed and therefore are unlikely to yield significant information. No further analysis of these disturbed areas was undertaken.

A pedestrian survey to locate surface evidence of historic or prehistoric archeological resources was conducted within the limits of disturbance for the proposed bridge replacement and mitigation components of the project, excluding the areas indicated as disturbed. No artifacts were identified or collected related to historic and prehistoric periods during the survey.

Extensive analyses of geotechnical borings and subsurface conditions within the project limits is provided in the final Geotechnical Report (January 16, 2004) and the draft Management Report (December 2003). The findings of those analyses are presented here in summary. At the request of the SHPO, two geotechnical borings were monitored by archeologists. Three (3) horizons within BI-6 were notable as having potential to represent stable landscapes that could have supported human occupation and use and five (5) horizons within BI-7 were notable as having that same potential. However, no cultural materials

were recovered from either boring. While the borings indicated that stable landscapes are present at depths greater than 25 meters below ground surface (and also below mean sea level), the potential for intact prehistoric archeological is low based on the unknown paleotopographic position of the identified landscapes. Further, because of limitations of standard archeological methods, local groundwater conditions, physical surface improvements, and fiscal considerations, it would be not practical or possible to extract additional archeological and geomorphic information from these deeply buried potential landscapes. Review of 38 additional boring logs by qualified archeologists did not add to the information related to the potential stable landscapes identified in the analyses of borings BI-6 and BI-7. Based on this information, DeIDOT and FHWA have concluded that there is no evidence for buried archeological sites, that the buried potential landscapes have low potential for archeological sites, and that no additional archeological investigations of these potential landscape is justifiable.

**ii. Fresh Pond Sites:** Because the wetland mitigation area at Fresh Pond North was located within a previously identified archeological site (7S-K-13), a more intensive investigation (Phase I) was undertaken to refine the definition of the site. Shovel test units and auger test units recovered approximately 1200 artifacts. Most (98%) of the artifacts were from the historic period, the remainder being prehistoric artifacts. The investigation confirmed two primary loci of artifact concentration (loci A and S). These loci were indicated on project mapping so that their locations could be considered in the design of the wetland mitigation area.

Additional archeological survey utilizing shovel test units, reported in the Management Summary dated March 19, 2004, confirmed that locus A continues to extend to the west of the Fresh Pond North mitigation area. On the other hand, the additional survey found no archeological deposits at the south end of the Fresh Pond North mitigation area, which may be used for construction staging.

Shovel test units were placed at Fresh Pond South mitigation area. Historic materials were recovered from a disturbed context. Subsequently, the Fresh Pond South area was redefined, and additional shovel test units were undertaken (see Management Summary dated March 31, 2004). Again, no archeological materials were recovered, confirming that no avoidance measures are required here.

Shovel test units were conducted along the haul road between the two potential Fresh Pond mitigation areas. The haul road extends through site 7S-K-13. The tests were conducted in five potential turn-out locations. The tests confirmed the location of the previously identified artifact locus K and identified a new artifact locus T. Because locus K is co-located with turn-out 3, use of this location will be avoided by the project. Similarly, because locus T is co-located with turn-out 2, use of this location will also be avoided.

**b. Consequences:** The identification efforts for the project indicate that the only archeological resource within the APE for the project is the site (7S-K-13) at Fresh Pond North. Because the locations of loci A, K, S and T were confirmed during the Phase I investigations, the design of the Fresh Pond North wetlands mitigation site and the haul road was developed so as to avoid these loci. The conditions for avoidance will be included on the contract documents and specifications, which designate the loci as Avoidance Areas 1 through 4, with the following statement:

No construction activity of any kind, including clearing, grubbing, grading, excavation, borrow, fill, equipment storage, vehicular traffic, or any other ground disturbing activity is allowed within Avoidance Areas 1, 2, 3 and 4 at any time before, during or after construction. Neither DeIDOT, its designated contractor, nor its subcontractors is permitted to enter into any agreement with the owner of the property that would result in any activity being conducted within the Avoidance Areas.

The contractor will be required to establish protective fencing around the Avoidance Areas to be described in the contract documents and specifications. An Environmental Monitor will be present on the project site and will assure that all cultural resources protection provisions are employed. In addition, the Project's Environmental Monitor will work closely with the contractor(s) and

subcontractor(s) to reinforce the conditions for cultural resource avoidance during the construction process.

With these avoidance considerations, DelDOT and FHWA have found that no further study of archeological resources is required and that no historic properties will be affected by the proposed project.

#### IV.C.2. Architectural Resources

**a. Existing Conditions:** The collection of data regarding known architectural resources (buildings, structures, objects, and districts) in the five-mile APE for architectural resources for the project identified the existence of 292 resources. Of these resources, one is listed in the National Register of Historic Places (the Indian River Life Saving Service Station (S-453)) and four are treated as eligible (the Fire Station Control Tower #2 (S-6049.2), the North Jetty of the Indian River Inlet, the Bethany Beach Training Site (S-9142), and the White House Farm (S-202)). The Fire Station Control Tower #2 (S-6049.2) is treated as eligible because it was identified previously as a contributing component of a forthcoming National Register nomination of World War II coastal defense fortifications in Sussex County. The North Jetty, Indian River Inlet is treated as eligible because it was treated in this manner by the ACOE in its emergency jetty stabilization project in 1998-1999. The Bethany Beach Training Site (S-9142) is treated as eligible because SHPO files indicate that it was determined eligible. The White House Farm (S-202) is treated as eligible because a nomination for the property was submitted to the Keeper of the National Register of Historic Places in the late 1970s. After several rounds of comments from the Keeper and the SHPO's attempt to address them, the nomination was eventually withdrawn in 1982. However, the SHPO states (see letter of March 17, 2004, in **APPENDIX C**) that "it is possible that, if the property were to be reevaluated in consideration of historic contexts that have been developed since the initial review, the property *could be* determined eligible" [emphasis original]. The eligibility of the remaining 287 resources has not been determined. No further efforts to identify architectural resources were requested by the SHPO for the current project.

**b. Consequences:** In general, architectural resources can be affected by transportation projects when they incur direct, visual, atmospheric, or audible impacts.

No architectural resources will be directly affected by the current project because no architectural resources are located within the LOC for the proposed bridge replacement and the mitigation components of the project.

Numerous architectural resources may be able to view the proposed new bridge because it will be approximately 319 feet tall and will be visible from considerable distances, pending specific angles, property locations, clear weather, and other natural or man-made impediments (such as vegetation and modern development). In order to understand the potential visibility of the new bridge, photographs were taken from six representative locations within the 5-mile APE. The locations were selected in consultation with the SHPO. The first location represents the view of the new bridge from the Indian River Life Saving Station (S-453). The second location represents the view from Quillens Point, including resources S-2564 and S-2569 as well as the Fire Station Control Tower #2 (S-6049.2). The third location represents the views from Bethany Beach and its resources including the Bethany Beach Training Site (S-9142) and resources S-9923 and S-9925. The fourth location, on the south shore of Indian River Bay at Holts Landing State Park, represents the potential view from any resources located in the south and west extremes of the 5-mile APE. The fifth location, on the north shore of Indian River Bay at Indian Landing Marina, represents the potential view from any resources located in the north and west extremes of the 5-mile APE. Finally, the sixth location represents the view from White House Farm (S-202) and other resources in the western extreme of the 5-mile APE.

The photographs of existing conditions were overlaid with scaled graphic representations of the proposed bridge. Generalizations about visual effects were extrapolated from these visualizations and presented in the Management Report (December 2003). In summary, two of the camera locations were in close enough proximity of historic properties to suggest the appearance of the new bridge from these properties. However, in each case, views toward the bridge would be obscured by intervening residential development and/or vegetation, and the new bridge would be so far removed from the properties that the bridge is not likely to

obstruct views of the properties. Based on these analyses, no architectural resources will be visually affected by the proposed project.

No architectural resources will experience atmospheric or audible impacts because of the proposed project. The project will not add roadway capacity and is not expected to increase traffic volumes. Therefore, it is not expected that particulate matter – the atmospheric element which may damage architectural resources – in the atmosphere will increase. Similarly, it is not expected that traffic noise will increase. (See additional discussion in Section IV.A.4. of this Environmental Assessment)

In conclusion, DelDOT and FHWA have found that no architectural resources will be directly, visually, atmospherically, or audibly impacted by the proposed project, and, therefore, no historic properties will be affected by the proposed project.

#### **IV.D CONCLUSION**

The selection process for DelDOT's selected alternative was presented in Sections I through III of this Final Environmental Assessment. The selection of the selected alternative was based on in-depth analysis of potential environmental impacts on the retained alternatives; agency review of the Purpose and Need and Alternatives Documents; results of detailed environmental studies on the alternatives retained for detail study; additional engineering design to minimize impacts; and further coordination with the Agencies.

Throughout the planning process efforts were made to avoid and minimize impacts in the study area. However, some impacts were unavoidable. **TABLE 8** below summarizes the environmental impacts associated with the selected alternative.

The development of mitigation efforts is underway to mitigate for the unavoidable impacts for this project. (Refer to the Compensatory Mitigation Plan in **APPENDIX B**.) Environmental compliance sheets will be developed to ensure the environmental commitments are adhered to during construction of the project. Agency coordination will continue through the remaining steps of the planning process into final design to ensure agency concerns are appropriately addressed and concurrence is achieved.

**Table 8: Summary of Environmental Impacts Associated with the Selected Alternative**

Environmental Factor	Potential Impact
<b>Social Environment</b>	
Residential Relocations	No
Environmental Justice	No
Business Relocations	No
Public Lands/ Section 4(f) (permanent for SR 1 and park access roads)	Yes (8.8 acres)
Noise and Air Quality	No
Hazardous Materials	No
<b>Natural Environment</b>	
Geology and Topography	No
Floodplain	No
Water Quality	No
Coastal Zone Management	No
Stormwater Management	No
ACOE Wetlands (including open water)	Yes (4.1 acres) - Permanent
Habitats and Wildlife (upland habitat)	Yes (7.2 acres) – Permanent and Temporary
Federally Listed Rare, Threatened & Endangered Species	No
<b>Cultural Resources</b>	
Adverse Effects to Historic Structures	No
Adverse Effects to Archeological Resources	No