Indian River Inlet
DelDOT BRIDGE

Appendix B
Compensatory Mitigation Plan

Final Environmental Assessment and Nationwide Section 4(f) Evaluation

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INTRODUCTION

The proposed project will result in unavoidable impacts to US Army Corps of Engineers (ACOE) regulated tidal wetlands and open waters and Delaware Department of Natural Resources and Environmental Control (DNREC) regulated wetlands and subaqueous lands. The ACOE regulates the placement of fill in wetlands under Section 404 of the Clean Water Act, as amended in 1977. DNREC regulates wetlands under Section 6607 of the Wetlands Act of 1973 (Title 7 Delaware Code, Chapter 66) and subaqueous lands under Section 7212 of Title 7 Delaware Code.

To compensate for unavoidable impacts to regulated resources, the Delaware Department of Transportation (DelDOT) has prepared the Compensatory Mitigation Plan (CMP) to provide in-kind replacement and out-of-kind enhancement for unavoidable aquatic resources and upland habitats. The CMP have been discussed with the regulatory agency representatives and approved in concept on April 8, 2004. This document reveals DelDOT's commitment to providing a holistic and comprehensive approach to replacing unavoidable resource impacts associated with the project. Specifically, this document provides detailed information and data that (1) quantifies the resources, including function and value, within the project limits, (2) assesses unavoidable impacts to those resources by the preferred alternative, and (3) provides mitigation for replacing, restoring, and/or enhancing the resource, and (4) the function and value those resources impacted by the project serve to ensure that DelDOT adheres to the policy of no net loss of wetlands.

NATURAL RESOURCE IDENTIFICATION AND ASSESSMENT:

In order to understand the potential affect of the proposed project on the surrounding resource, an accurate depiction and assessment of the natural resources, which exist within the project limits, was required. Accordingly, DelDOT undertook a comprehensive field investigation effort to delineate the tidal wetlands within the project area using both ACOE and DNREC criteria (assisted by DNREC Tidal Wetland Mapping) for these assessments, which are described within **Section IV.B.6** of this Final Environmental Assessment/Nationwide Section 4(f) Evaluation.

At the request of the regulatory agencies on June 12, 2003, DelDOT undertook a study to assess the functions and values of the wetland and upland ecosystems within the project limits. The study was completed by a specialized regulatory subgroup that included DelDOT, EPA, ACOE, and DNREC representatives and focused on the evaluation of wetland and upland habitat functions and values within the project limits. The report entitled, *Transportation Improvement Study, Replacement of the Bridges (3-156) on State Route 1 over the Indian River Inlet, Functional Assessment, Sussex County, Delaware, November 2003*, clearly outlines the range of functions and values provided by the wetland and upland habitats within the project limits.

The functional assessment criteria established by the specialty subgroup resulted in the definition of six (6) specific wetland types providing various functions and values as shown in **TABLE 1**. Because of the sensitivity of the uplands habitat (Diamondback Terrapin and bird nesting), the group recommended that an additional habitat type (Densely & Sparsely Vegetated Uplands), be included in the functional assessment due its importance to the barrier island ecosystem. Based on the results of the functional assessment, DelDOT is able to characterize which functions and values of the natural resource will be affected by the unavoidable resource impacts associated with the preferred alternative as well as provide the ability to replace these values and functions at potential mitigation sites.

SELECTED ALTERNATIVE AND ANTICIPATED NATURAL RESOURCE IMPACTS:

Subsequent to the collection of environmental inventories, the process of developing and evaluating potential alternatives for the proposed project was initiated. This effort, which is detailed in **Section III** of this Final EA/Nationwide Section 4(f) Evaluation, evaluated several configurations for the main bridge, reconnected SR 1,

and the reconfigured/improved park access roads, including a no-build alternative. The selected alternative was a result of months of preliminary design efforts and active coordination with the regulatory agencies. Through these efforts a balance of environmental resource impacts of varying functions were assessed. The resultant selected alternative balanced the Purpose and Need (**Section II** of this Final Environmental Assessment/Nationwide Section 4(f) Evaluation) of the project and the safety concerns of the traveling public with the affect on the natural and cultural environment.

TABLE 1 – WETLAND AND UPLAND HABITAT FUNCTIONS, VALUES & UNAVOIDABLE IMPACTS

RESOURCE		FUNCTION	UNAVOIDABLE IMPACTS	
			PERMANENT (Acres)	TEMPORARY (Acres)
MAIN WETLANDS	*SHRUBBY COMPLEX*	Nesting/denning, cover, shoreline stabilization, nutrient & sediment removal	1.3	0.3
	HERBACEOUS COMPLEX	Nesting/denning, nursery/refuge, foraging, cover, shoreline stabilization, production export	0.7	3.1
ROADSIDE WETLANDS	*ROADSIDE DITCH*	Nesting/denning, nutrient & sediment removal	1.3	<0.1
	EMERGENT DITCH	Foraging	0.2	<0.1
ACOE OPEN WATER WETLANDS*		Foraging	0.2	0.3
OPEN WATER (SUBAQUEOUS LANDS) **		Foraging	0.3	<0.1
TOTAL WETLAND IMPACTS			**4.06**	**3.78**

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

Note: (1) Impacts included within this Table are based on refined design information from March 12, 2004 and are based on ACOE jurisdictional wetland limits (not DNREC jurisdictional wetland limits) since ACOE wetland limits are more conservative than DNREC limits for this project.
(2) Temporary impacts included utility construction activities

Source: ACOE Individual Permit Application for Sections 401 and 404 Approval

* Open Water Wetlands are those areas, which are within the jurisdictional boundaries of the ACOE and are therefore considered wetlands, but are permanently inundated.

** Open Water (Subaqueous Lands) are those areas outside of the jurisdictional wetland boundary, but channel ward of the High Tide Line.

Avoidance and minimization measures continue as the selected alternative development process continues, DelDOT's selected alternative will result in unavoidable impacts to state and federal jurisdictional wetlands. Unavoidable impacts to ACOE jurisdictional wetlands are shown within **TABLE 1.** All impact assessments are based on the environmental compliance plans that are part of the ACOE and DNREC individual wetland permit applications. Impacts to DNREC jurisdictional wetlands are not included since the ACOE wetlands are more conservative and result in impacts that exceed those for DNREC wetlands. Specifically, unavoidable wetland impacts to DNREC jurisdictional wetlands are approximately 2.84 acres (permanent) and 3.78 acres (temporary) and are based on impact assessments completed for the DNREC individual wetlands permit. The amount and

extent of unavoidable impacts, both ACOE and DNREC, are based on design efforts at the intermediate (60% complete) design stage of the project.

Due to the sensitive nature of the environment in which the project is proposed, DelDOT is in agreement with the regulatory agencies that a qualified on-site environmental compliance monitor who is familiar with the project should be present at the mainline and mitigation sites during construction. DelDOT will determine the roles and responsibilities of this individual with input and advice from the regulatory agency representatives during the permit process. This extra measure by DelDOT will ensure protection and further minimization of the natural resources affected and in close proximity to the construction of the proposed project. Additionally, this measure will assure the highest likelihood of success for the mitigation sites since an on-site qualified monitor will be able to gage site conditions in the field and compare them to the design assumptions and recommend modifications to the construction documents as needed.

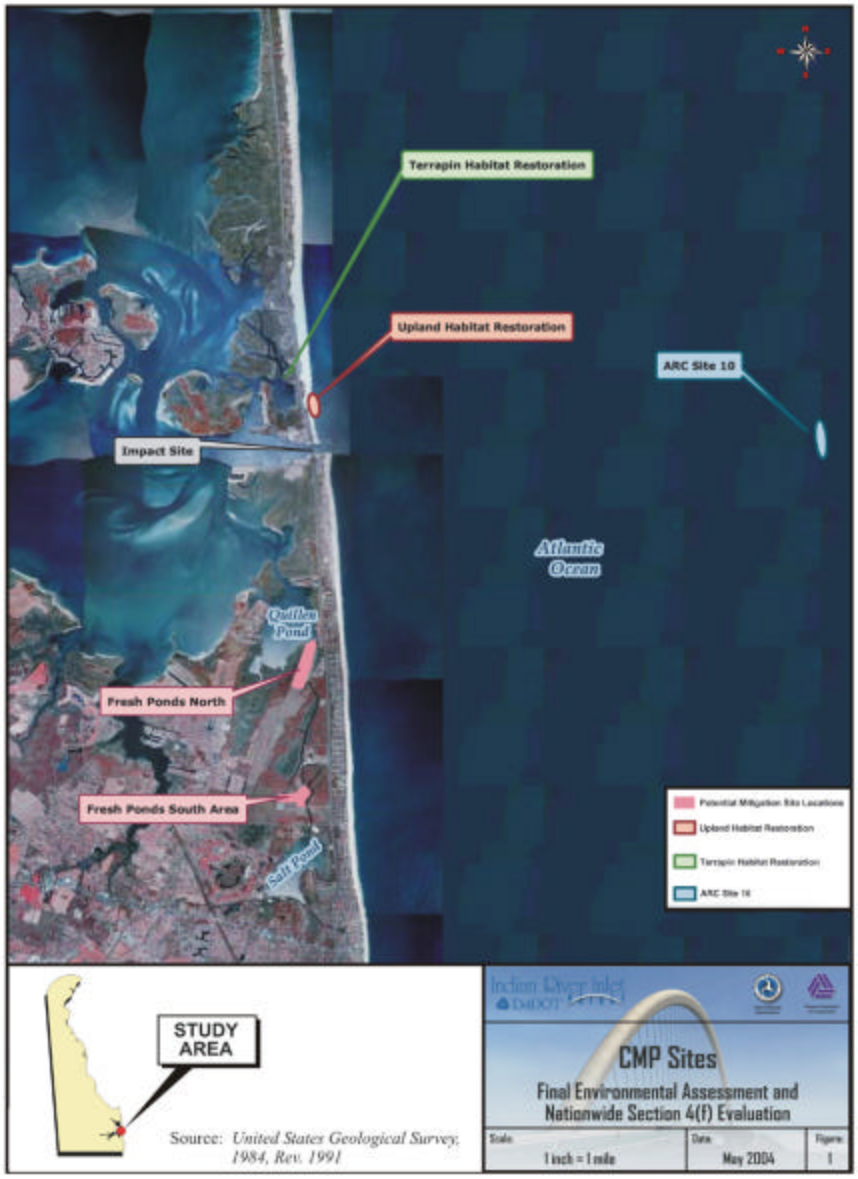
WETLAND MITIGATION OBJECTIVES AND OPPORTUNITIES

DelDOT's approach to identifying suitable mitigation opportunities in preparing the CMP has two principal goals:

- Achieve no net loss of regulated resources in closest feasible proximity to the impact area, and
- Replace or enhance the function and value of those regulated resources affected by the project.

To meet these goals and at the request of the regulatory agency representatives, DelDOT undertook a wetland mitigation site search effort to identify potential tidal wetland mitigation creation sites. This effort was initiated since it was agreed that there were no potential on-site tidal wetland mitigation creation sites within the project limits. The off-site wetland creation site search focused on the following criteria:

- Landscape position,
- Hydrologic connection to tidal waters,
- Proximity of the mitigation area to impact site,
- Size of the site to meet the mitigation requirements, and
- Assess sites currently within public ownership.



Fourteen sites within a three-mile radius of the project were identified and evaluated and the results of this off-site wetland creation site search indicated that there are several tidal wetland creation opportunities that currently exist

within close proximity of the project site. A summary of the proposed mitigation opportunities associated with the Indian River Inlet Bridge project area included below and shown in **FIGURE 1**.

Fresh Pond North Tidal Wetland Creation and Wetland Restoration Opportunity: The Fresh Pond North (MS-S1A) site is located adjacent to Branch Cove in the southeastern portion of Indian River Bay and approximately 1.9 miles south from the Indian River Inlet. The area is currently owned by DNREC and is part of the Delaware Seashore State Park.

- **Existing Conditions:** Historically this site was comprised of uplands adjacent to a tidal marsh and waters. By 1938, ditches had been excavated in the marsh, the tidal ditch was expanded, and some of the potential creation area was being farmed. By 1960 the adjacent tidal wetlands had been completely excavated and turned into a wide tidal gut, and a portion of the potential creation area was still being actively farmed. By 1997 and which persist today, the tidal gut had not changed, but the farm had been abandoned and had started to re-vegetate. The site consists of abandoned farmland, uplands and fringe tidal wetlands adjacent to a tidal gut, which connects to Branch Cove (portion of Indian River Bay).

- **Potential Wetland Type and Function:** Tidal wetlands and connected uplands are proposed for this site. A *Spartina alterniflora* salt marsh will make up the bulk of the wetland area created at this site. A fringe of shrubby tidal wetlands will surround the *Spartina* marsh at the transition to uplands. Stable, back dune upland habitat will be created inland of this shrubby fringe. The tidal marsh complex created at this site will provide the opportunity to compensate for wetland functions associated with the impacted tidal wetlands.

- **Wetland Creation and Restoration Concept:** At this site approximately 3.1 acres of robust form *Spartina alterniflora* tidal wetlands can be created, approximately 2.5 acres of tidal wetlands can be enhanced to more closely resemble the historic tidal or salt marsh, and approximately 0.2 acres of upland habitat can be enhanced. Associated with the *S. alterniflora*, marsh will be a transitional high tidal marsh fringe and some stable, dry upland habitat. Daily tidal fluctuations will provide the hydrology needed to establish a salt marsh at this site. Direct connection to the tidal gut, combined with the narrow nature of this site ensures adequate hydrology will be maintained at this site. A reference marsh directly across the tidal gut has been identified, and bio-benchmarks will be located to ensure the correct grading elevations are established throughout the marsh.

- **Earthwork:** The existing uplands can be graded down to the elevations indicated by the bio-benchmark transects requiring grading and material removal. Suitable excavated material may be used at the main project site to assist in the soil consolidation program or transported to Fresh Pond South for use in filling the existing borrow pits to the lines and grades indicated on the design plans.

Fresh Pond South Tidal Wetland Creation and Open Water Enhancement Opportunity: The Fresh Pond South Area site (MS-S1B) is located approximately 1.0 mile south of the Fresh Pond North site, reference **FIGURE 1**, and is currently owned by DNREC and is part of the Delaware Seashore State Park.

- **Existing Site Conditions:** This site consists of approximately 3.5 acre previously disturbed uplands and two man-made, excavated borrow pits, one an infrequently tidal inundated system (borrow pit west) and the other a fresh water system. Sometime between 1970 and 1984 and prior to DNREC ownership the borrow pits were excavated. The borrow pits consist of deep (approximately 10 feet) open water with steep banks and as noted by DNREC pose a significant safety hazard to park users. Preliminary water quality data indicate hypoxic conditions exist in borrow pit west; however, borrow pit east supports some viable habitat. The hypoxic condition within borrow pit west indicates that the open waters are a degraded aquatic habitat and wetland creation and open water enhancement through modifications of the pit bottom is practical. The site is bordered to the east by an existing gut; however, it is not tidally

influenced since an existing Conectiv access road traverses the gut and the access road culvert was constructed above the tidal range.

- **Potential Wetland Type and Function:** The proposed wetland habitat will include emergent salt marsh, areas of tidal salt shrub and open water tidal guts. This tidal wetland habitat complex could provide nesting, forage and cover habitat functions as well as potential recreational (wildlife viewing) functions.

- **Wetland Creation and Open Water Enhancement Concept:** Tidal wetland creation at this site will consist of grading the uplands down to facilitate tidal interaction that will be created once the existing Conectiv access road culvert is reconstructed. This grading will create approximately 3.5 acres of a diverse tidal wetland ecosystem consisting of tidal open waters, emergent tidal marsh, and salt shrub wetlands. Additionally, the existing east and west borrow pits will be filled to an appropriate elevation to address the DNREC safety concerns and enhanced to provide a diverse non-tidal (borrow pit west) and tidal (borrow pit east) ecosystem. Borrow pit west will be enhanced to create approximately 3.4 acres of a deep fresh/brackish marsh, shallow fresh/brackish marsh, and shrub fringe system, while borrow pit east will be enhanced to create approximately 2.8 acres of a tidal open waters, deep emergent tidal marsh, and salt shrub system.

- **Earthwork:** Material generated from the Fresh Pond South Area wetland creation site will be used either at the main project site to assist in the soil consolidation program or used to fill borrow pits east or west.

As discussed during several regulatory agency coordination meeting, 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. It was expressed that if the new bridge and reconfigured SR 1 will be located west of the existing bridge then removal of the existing roadbed to restore the historic dune system that once occurred within the area should be encouraged.

Upland Habitat Restoration Opportunity: The Upland Habitat (Dune Restoration/Enhancement) site is located immediately north of existing Indian River Inlet Bridge within the roadbed of existing SR 1 as well as planting a vegetative screen along SR 1 for up to approximately three miles north of the existing bridge that will act as a windscreen to protect SR 1 from wind blown sand across the dune areas.

- **Existing Conditions:** This site consists of existing asphalt roadway of SR1 north of the existing bridge.

- **Potential Restoration Type and Function:** The existing asphalt roadway will be converted to pervious sparsely vegetated upland habitat. This area will provide habitat for resident and migratory species for purposes of nesting and foraging.

- **Upland Habitat Restoration Proposal:** The area is currently asphalt roadway of the SR1 mainline. The roadway and associated bedding will be removed to the underlying strata (sand) to create an area similar to the sparsely vegetated washout areas found north and south of the inlet and east of the roadway. Within this area approximately 6.0 acres of upland habitat restoration through the removal and scarification of the existing SR 1 roadbed can be established. Additionally, DelDOT proposes to plant a windscreen composed of upland, native vegetation across existing blow out areas along SR 1. This windscreen will help windblown sand remain within the back dune areas, stabilize sensitive habitat within the back dune, and establish physical screen between SR 1 and the sensate back dune habitat. The planting plan also calls for the removal of existing, invasive black pines, which will be replaced with American beach grasses.

- **Earthwork:** Minimal earthwork is proposed for the area. Beyond the removal of the asphalt and associated bedding, it is proposed that little or no grading be performed. As stated above, this removal is

proposed to create a sparsely vegetated upland area. Earthwork for the windscreen north of the dune restoration will also be minimized.

The earthwork for the upland habitat restoration occurs within the LOC for the project. The LOC was established to avoid the identified archeological remains of a ship's keel.

Additionally, the regulatory agencies have expressed interest in assessing whether the materials that result from the demolition of the existing bridge were available for beneficial use. Specifically, using the bridge deck, concrete from the existing abutments, and piers as fill material to create off shore reef habitat for fish and invertebrate populations.

Out-of-Kind Deep Water Enhancement Opportunity: The project includes the demolition of the existing Indian River Inlet Bridge once the new bridge is constructed and traffic has been diverted to this structure. DelDOT, in coordination with DNREC and NOAA Fisheries, is proposing to donate certain non-toxic durable materials from the existing bridge, to DNREC, which will be placed at the existing offshore Artificial Reef Creation Site #10 (ARC Site 10). The placement of this material at ARC Site 10 will benefit finfish (especially those species that will be impacted by the unavoidable impacts to tidal wetlands and open waters at the project site) beyond the benefits realized through the creation of tidal wetlands and open waters at the proposed Fresh Pond mitigation sites mentioned above. Specific data concerning the Delaware Reef Restoration Program can be easily found on the Internet (www.dnrec.state.de.us/fw/artrf.htm).

- **Existing Conditions:** The reef restoration program began in 1995 and Artificial Reef Site (ARC) Site 10 is a 0.69 square nautical mile artificial reef consisting of a barge, concrete and tires (stabilized tire units) that has been administered by DNREC – Division of Fish and Wildlife with primary funding through the Federal Aid to Sport Fishing Restoration Program and the USFWS. The Delaware Reef Program is one part of a comprehensive fisheries management effort and is designed to enhance fisheries habitat, benefit structure-oriented fish and provide fishing opportunities for anglers.

- **Potential Creation Function and Type:** Invertebrate colonization and deep water fish habitat. Reef construction is especially important in the Mid-Atlantic Region, where near shore bottom is usually featureless sand or mud. Neither the natural rocky outcrops common in New England nor the coral reefs of our Southeastern Atlantic Coast are found in the Mid-Atlantic Region. Durable, stable, non-toxic reef materials can develop an invertebrate community which is hundreds of times richer than adjacent bottom, providing food and physical protection for reef fish such as tautog, sea bass, scup, spadefish and triggerfish. In addition, game fish such as bluefish, striped bass and weakfish are attracted to baitfish, which congregate around reef structure.

- **Potential Creation Proposal:** ARC Site 10 is located approximately five (5) nautical miles east of the Indian River Inlet (**FIGURE 1**) and was identified by NOAA Fisheries as a potential beneficial use site for the disposal of existing bridge materials removed from the project. Specifically, DelDOT and/or it's designated contractor will deliver to ARC Site 10 portions of the existing bridge superstructure and substructure for disposition at the site. This mitigation component will benefit fisheries and fisheries habitat thus continuing to provide beneficial Essential Fish Habitat at ARC Site 10. The preferred method for placement of demolished bridge material at the site includes the transport of materials to the site using a tug and barge. Specific coordinates will be provided by DNREC for a transect within ARC Site 10 along which material will be pushed off the barge and settle to the ocean floor. DNREC will monitor disposal of the approved materials to ensure that the proper location and orientation of predetermined transect is maintained.

- **Earthwork:** Concrete from the existing bridge deck and abutments would be processed (i.e. asphalt removed, rebar cut/removed, crushed) and transported to the site via barge. The barge will move along a predetermined transect and the reef material will be dumped from the barge.

Cultural resource investigations at all eleven (11) potential DNREC reef creation sites were completed in 1994 as part of the original project permitting effort, including ARC Site 10. Each site was surveyed using side-scan sonar and magnetometers to detect the presence or absence of shipwrecks or artifacts of historical significance. The initial selection of the eleven (11) sites was, in part, predicated on the absence of wrecks or the ability to provide a buffer zone between wrecks and reef structure (recommendation of the Delaware State Historic Preservation Office). No excavation occurs during the reef development; therefore, any detected or undetected submerged archaeological resources will not be impacted by the project. Additionally, since ARC Site 10 is a pre-approved reef creation site (*1994 and 1999 Generic Environmental Assessment*, Delaware Reef Program), the disposal of material from the Indian River Inlet Bridge will not result in any impacts to known cultural resources.

COMPENSATORY MITIGATION PLAN

This CMP has been formulated as a diverse and holistic mitigation package that will replace the tidal wetlands impacts by the project and restore and enhance existing tidal wetlands and upland habitat. At this time, DelDOT has developed a CMP that addresses the no net loss of wetlands policy as well as replaces wetland functions and values of wetlands unavoidable affected by the project. A summary of the potential projects mitigation plan is included in **TABLE 2**; however, this plan clearly exceeds the project requirements for mitigation. DelDOT, in consultation with the regulatory agency representatives recognize that the sum total of mitigation and enhancement at the Fresh Pond South Area site clearly exceeds the projects mitigation requirement. Accordingly, DelDOT will allocate approximately 0.5 acres of tidal creation and 0.5 acres of open water enhancement towards the mitigation requirements of this project and hold the balance for use on other DelDOT projects.

TABLE 2 – PROPOSED COMPENSATORY MITIGATION PLAN

SITE NAME	SITE DESIGNATION	COMPENSATORY MITIGATION OPPORTUNITY				
		CREATION	RESTORATION		ENHANCEMENT	
		Wetlands (Acres)	Wetlands (Acres)	Uplands (Acres)	Wetlands (Acres)	Open Water (Acres)
Fresh Pond North	MS-S1A	3.1	2.5	0.2	---	---
Fresh Pond South Area	MS-S1B *	3.5	---	---	5.0	1.2
Upland Habitat Restoration	SR 1 Pavement Removal	---	---	6.0	---	---
Artificial Reef Creation	DNREC #10	---	---	---	---	TBD
Terrapin Habitat Restoration	Haven Road	---	---	0.2	---	---
Total Mitigation Opportunities		***6.6***	***2.5***	***6.4***	***6.2***	***TBD***

Note: * The Fresh Pond South Area site provides more mitigation opportunities than currently required for this project. DelDOT will allocate approximately 0.5 acres of wetland creation and 0.5 acres of open water habitat towards this project with the balance of the mitigation opportunity at the site reserved for other DelDOT projects.

As noted previously, temporary wetland impacts associated with utility construction and other project related activities have been identified and included in the project permits. To ensure that these temporary impacts do not result in permanent harm to the resource, DelDOT will either require the contractor to use matting while working within these wetland areas. Additionally, DelDOT will require the contractor to restore, the line, grade, and material composition to pre-construction conditions as well as require the contractor to seed the area with a native seed mix appropriate for the area impacted.

Another area of concern of the regulatory agencies is associated with the significant mortality of the Diamondback Terrapin (*Malaclemys terrapin terrapin*) seeking breading habitat and crossing SR 1. (The DNREC- Natural Heritage Program did not identify any other species of concern or unique natural communities within the Fresh Pond mitigation sites.) Although the Diamondback Terrapin species is ranked SU in Delaware (may be a species of conservation concern but there is inadequate data to determine degree of rarity) DelDOT has agreed, in principle, to investigate habitat enhancement opportunities along the western edge of SR 1 as well as means to discourage these species from crossing SR 1 in search of viable breeding habitat. DelDOT, working 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.

Throughout DelDOT's and the regulatory agencies discussions on mitigation opportunities associated with the project, the regulatory agencies continuously expressed interest in restoring and/or enhancing Bottom Hills Drain (BHD), an artificially created deep hole in Rehoboth Bay with degraded deep-water quality. Previous dredging activities for emergency beach replenishments in 1957, 1963 and again in 1982 deepened this site. The deep areas in BHD are believed to exhibit degraded water quality and poor habitat value and at the request of the regulatory agency representatives, DelDOT conducted water quality studies during the summer 2003. This testing revealed hypoxic conditions within BHD during the summer months, which agreed with a study conducted by DNREC (2002), which showed that the deep areas of BHD did not support significant populations of benthic organisms. The depth of this site favors the development of stratification and physical barriers to the mixing of the water column (thermo cline and pycnocline), which results in stratification of the water column thus encouraging hypoxia and anoxia.

Although Bottom Hills Drain appears suitable for enhancement opportunities, DelDOT's evaluation of the mitigation concept reveals that this site cannot provide the requisite wetland creation needed for the project. Additionally, the project will not generate the magnitude of material needed to fill Bottom Hills Drain to an elevation that will address both the water quality issues with the Drain and provide the wetland enhancement benefits needed by the project. Accordingly, DelDOT firmly believes and the regulatory agencies agree that the restoration and enhancement of BHD, although potentially beneficial, is beyond the scope of this project.