

3. Hydrology and Stormwater Management

a. Existing Conditions

The topography of the mainline project area is relatively flat with the roadway elevated above the surrounding area, although it varies near the crossing of Churchmans Road. Steep cut slopes exist on either side of the mainline in this area. Drainage from the roadway is collected in a closed drainage system and conveyed to swales paralleling the roadway. These swales consist of channels ranging from concrete lined ditches to approximately 15-foot wide channels with emergent vegetation. The drainage swales are connected to the Christina River via culverts.

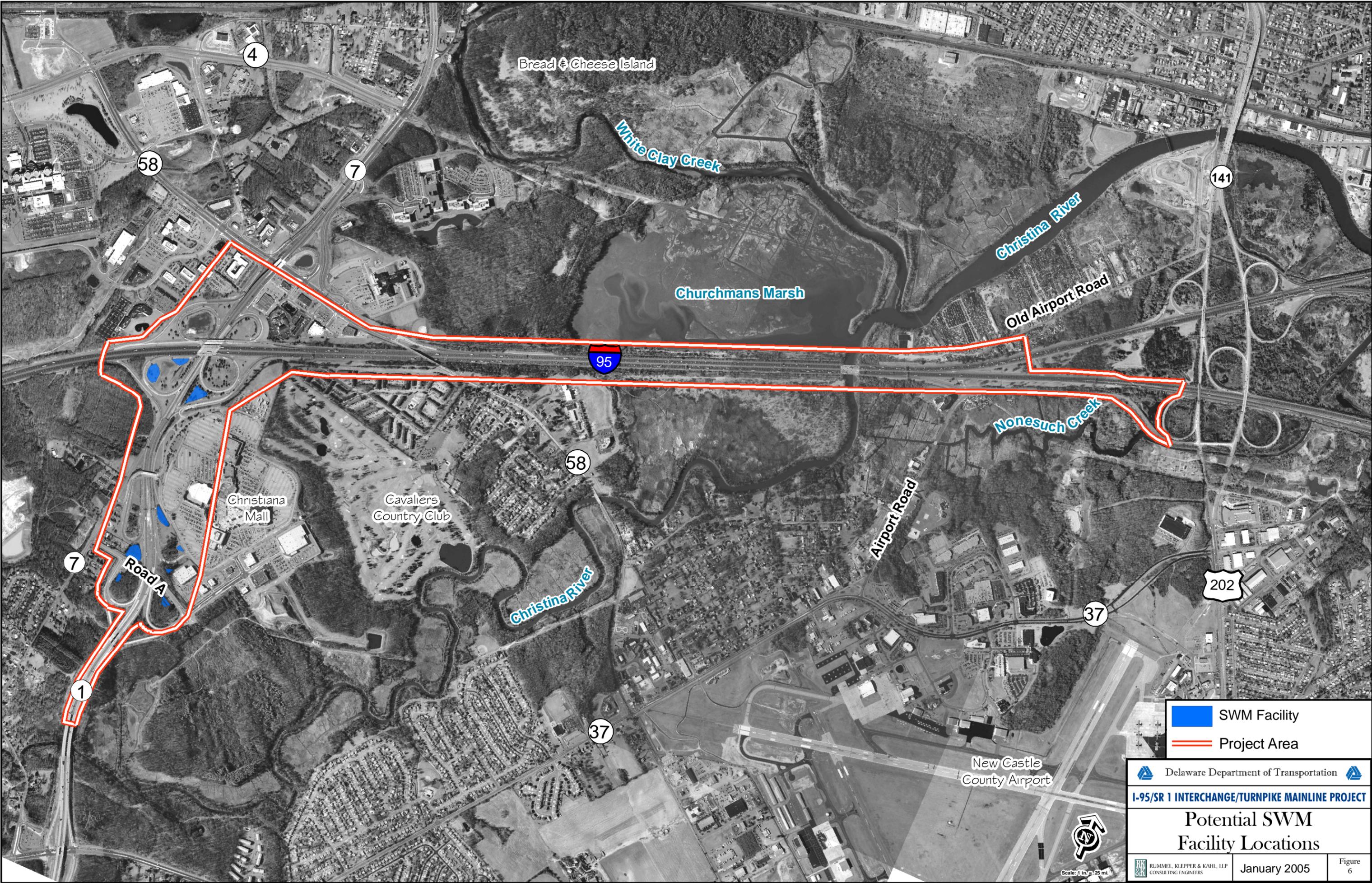
Within the limits of the interchange project area, a single stormwater management facility is located just south of Mall Ring Road and west of the ramp from Mall Ring Road to northbound SR 7. This facility serves the Mall parking lot. The topography within the interchange and SR 7 corridor has moderate slopes. The drainage is collected in roadside ditches and conveyed to several outfall locations. The flow is collected into a channel that flows south adjacent to but offset from the SR 7 alignment to Eagle Run.

b. Consequences

The project has been analyzed to determine the stormwater management requirements that result from the project. The Preferred Alternative will introduce an estimated total of 26.36 acres of new impervious area. The I-95 mainline portion of the project will result in a net increase of approximately 7.11 acres, while the I-95/SR1 interchange portion of the project will result in a net increase of approximately 19.25 acres of new impervious surface.

The stormwater management goals of the project are to provide adequate treatment to compensate for this increase in impervious area and to minimize impacts to sensitive natural resources, including wetlands and waterways. Stormwater management requirements are generally 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 Christina River, where feasible, by a combination of closed drainage systems and open channels, therefore quantity management requirements shall be reduced.

Several potential stormwater management facility locations have been identified and are shown along the corridor in **Figure 16**. These locations are carefully selected based on site topography, total avoidance or minimization of impacts to sensitive natural resources, available existing right of way, location of existing established floodplains, and the extent of impervious surface area that can be directed to each facility. A limited number of potential facilities have been identified along the I-95 mainline portion of the project, due to the proximity of Artesian and Churchmans Marsh, as well as the steep cut slopes adjacent to I-95. Additional facility locations have been identified within the I-95/SR1 Interchange, to offset the lack of treatment area adjacent the mainline. These new facility locations within the interchange avoid existing wetland areas and utilize areas to be disturbed during construction. All facilities will provide treatment for water quality, either as stand-alone facilities, or work in conjunction with the quantity management facilities, where needed. The SWM facilities shall utilize native plant species, where feasible, assisting in the water quality management as well as enhancing the aesthetics of the facilities.



Bread & Cheese Island

White Clay Creek

Christina River

Churchmans Marsh

Old Airport Road

Nonesuch Creek

Christiana Mall

Cavaliers Country Club

Christina River

Airport Road

New Castle County Airport

-  SWM Facility
-  Project Area

Delaware Department of Transportation

I-95/SR 1 INTERCHANGE/TURNDPIKE MAINLINE PROJECT

Potential SWM Facility Locations

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January 2005

Figure 6

Scale: 1 in. = 25 mi.

All proposed quantity and quality management facilities will collectively treat 32.29 acres of pavement, exceeding the overall stormwater management requirements for 26.36 acres of net increase of impervious area within the project. Treatment compliance can be accomplished by treating the proposed new impervious area and/or treating existing impervious area in-lieu-of the proposed.

Of the total 32.29 acres of potential proposed treatment sites that presently drain to the public right of way drainage system, 6.35 acres is privately owned. The facilities will preferably be designed as wet pond facilities, following the overall stormwater management approach for the project, focusing on minimizing impacts while maximizing the amount of impervious surface treated to achieve the stormwater management goals of the project. These extended detention facilities will capture the first one (1) inch of storm runoff, holding a half inch in wet storage and releasing the other half inch of runoff over a 24 hour draw down period. This method of treatment removes 80 percent of the suspended solids in accordance with the Delaware Sediment and Stormwater Regulations.

Additionally, within the project corridor, 42.15 acres of treatable private pavement exists from the mall area. Treatment of this area could be negotiated, if the need should arise for additional treatment area.

Although every effort will be made to minimize impacts, small impacts are anticipated in areas where the potential stormwater management facilities are located adjacent to wetlands or waters of the US. In order to provide stable conveyance from the outfalls of these facilities to the receiving waters of the US, riprap will be used to dissipate outlet velocities and to protect the outfalls against erosion. These impacts are quantified and accounted for in **Table 12**. Additionally, approval for the stormwater management design will be sought from DeIDOT, which has been delegated the authority from DNREC.

Table 12: Preliminary Stormwater Management Summary

Treatment Required		
Project Section	Net increase of Impervious Area	Description
Mainline I-95	7.11 acres	
I-95/SR 1 Interchange	19.25 acres	
TOTAL TREATMENT REQUIRED	26.36 acres	
Proposed Treatment Provided		
Facility Location	Impervious Area Treated	Description
Adjacent I-95 in Loop SR 7 to I-95	3.63 acres	
Inside Loop SR 7 to I-95	2.50 acres	Flow splitter required
Between Ramps A and B	8.62 acres	
Between Road A and Ramp R	11.00 acres	Expandable to treat private runoff
Inside Ramp G2	0.75 acre	
Adjacent Road A	2.44 acres	Expanded to treat private runoff
	6.35 acres (Existing Private)	
TOTAL	35.29 acres	
Additional Treatment Options (if private Mall Area runoff can be treated)		
Facility Location	Impervious Area Treated	Description
Existing Mall Facility	24.00 acres	Expandable, existing treatment to be verified
Mall Area inside Ramp U1	12.30 acres	
Mall Area outside Ramp U1	5.85 acres	
TOTAL	42.15 acres	

4. Floodplains

a. Existing Conditions

Executive Order 11988, *Floodplain Management*, as implemented through 23 CFR 650.111, *Location and Hydraulic Design of Encroachment on Floodplains*, requires that Federal actions, to the extent possible, avoid long and short-term adverse impacts associated with the modification of and development in floodplains and to avoid direct and indirect support of floodplain development where there is a practicable alternative. The Federal Emergency Management Agency (FEMA) delineates 100-year (Zone A) and 500-year (Zone B) floodplains on flood boundary maps as part of the Flood Insurance Program. The 100-year floodplain refers to the area along or adjacent to a stream or body of water that is capable of storing or conveying floodwaters during a 100-year frequency storm. An encroachment is defined as an action within the limits of the 100-year floodplain boundary. The criteria used to evaluate the environmental effects of floodplain encroachment from project alternatives include:

- risk of flooding to highways and/or adjacent properties attributable to the increased encroachment,
- impacts on natural and beneficial floodplain values,
- support of incompatible floodplain development,
- measures designed to minimize floodplain impacts of the alternative, and
- measures designed to restore and preserve natural and beneficial floodplain values affected by an alternative.

According to the New Castle County Comprehensive Development Plan Update, the County has been regulating development in the 100-year floodplain since the early 1970s. Floodplain regulations not only help preserve a sensitive environmental resource, but also allow the County to participate in the National Flood Insurance Program administered by the FEMA. Floodplain regulations are administered as an overlay zone in addition to the regulations associated with the underlying base zone.

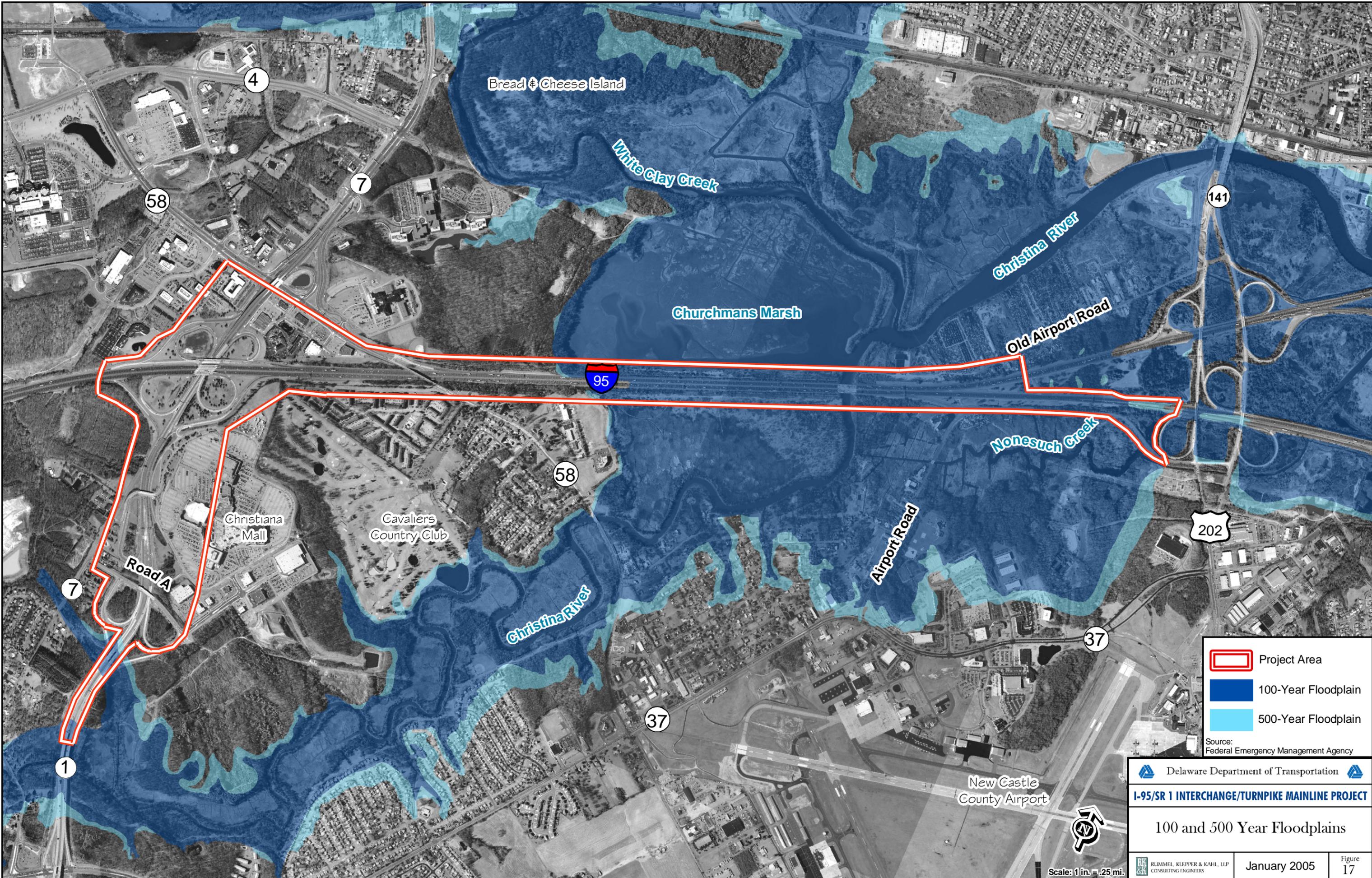
Within the project area, the 100-year floodplain covers a broad overbank area of the Christina River (**Figure 17**). The floodplain area is characterized by low-lying wetlands including the Churchmans Marsh, commercial and industrial buildings. Within the project area, drainage swales adjacent to the northbound and southbound lanes of I-95 convey stormwater to the Christina River. According to the existing conditions floodplain model, the existing I-95 bridge over the Christina River is overtopped during the 100-year storm event. The 100-year floodplain ranges from 5,000 to 7,500 feet in width within the project area.

b. Consequences

Widening of the Delaware Turnpike (I-95) would include the placement of fill within the 100-year floodplain and lengthening of the I-95 bridge piers located within the active channel of the Christina River. However, no substantial impacts to the floodplain from any of the alternatives considered are anticipated. The fill associated with the widening of the roadway embankment will be less than 0.7% of the storage volume associated with floodplain. Additionally, the orientation of the fill parallel to water conveyance would minimize impact to the hydraulic capacity of the floodplain. Bridge alternatives, including lengthening of their piers, would be designed to ensure that there would be no adverse increase in the 100-year water surface elevation. Accordingly, water movement and accommodations of flood flow will be maintained at pre-construction conditions.

c. Mitigation

In accordance with Section 10.311 through 10.316 of the New Castle County Unified Development Code, in order to maintain a no net decrease in flood storage capacity, an equal volume of excavation must offset any placement of fill within the floodplain. Since the volume of fill proposed is insignificant compared to the overall volume of the floodplain, no mitigation is required. Application will be made to the New Castle County Department of Land Use for floodplain permit approval. Permits will be applied for and approval received prior to construction.



- Project Area
- 100-Year Floodplain
- 500-Year Floodplain

Source:
Federal Emergency Management Agency

Delaware Department of Transportation

I-95/SR 1 INTERCHANGE/TURMPIKE MAINLINE PROJECT

100 and 500 Year Floodplains

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Figure
17

Scale: 1 in. = .25 mi.

5. Navigable Waterways

a. Existing Conditions

Coordination with the US Army Corps of Engineers (ACOE) was conducted in July 2002 regarding the navigability of the Christina River. The ACOE indicated that the Christina River is considered navigable extending from the mouth of the river 16 miles to the upstream side of a fixed bridge at Christiana. The navigable portion of the Christina River lies within the study area. The ACOE regulates all activities in the Christina River in accordance with Section 10 of the Rivers and Harbors Act of 1899. Section 10 states that any obstruction, excavation or filling, altering or modifying the course, location, condition, or capacity of navigable waters of the US must be approved by the ACOE.

Coordination with the U.S. Coast Guard (USCG) was completed in May 2004. In a letter dated May 25, 2004, the USCG stated that since the proposed rehabilitation/improvements to the I-95 bridge across the Christina River will not significantly or materially alter the effect on navigation or the general configuration of the bridge, a Coast Guard permit will not be required. However, the following stipulations are still required for the project:

- Provide the USCG with a schedule of dates and times the work will take place in the waterway and notification of any phase of the work which may create an obstruction or safety hazard to navigation. The schedule must be submitted 30 days in advance of the first working day.
- Barges that will be in the waterway during the rehabilitation/improvements of the bridge must be marked in accordance with Title 33 Code of Federal Regulations, Section 118.95 that outlines temporary markings and lighting requirements. If barge anchors are used, they must be marked by anchor buoys, which should be lighted.
- There shall be no change to the approved horizontal and vertical clearances of the I-95 bridge across the Christina River.

b. Consequences

Construction will be required within the Christina River during widening of the roadway on the Christina River Bridge. It is anticipated that the work will consist of installation of the piles, forming and pouring the concrete pile caps, and setting the structural steel. This work will probably be performed with a crane set on a flexi-float (modular barge) which can be easily assembled as necessary.

c. Mitigation

No impacts are anticipated to navigable waters. All permit requirements will be fulfilled and all USCG stipulations adhered to. No mitigation is required.

6. Coastal Zones

a. Existing Conditions

Title 7 of the Delaware Code, Chapter 7, also known as the Coastal Zone Act 1971, was enacted to protect Delaware's fragile coastal areas from potential pollution associated with heavy industrialization and offshore bulk product transfer facilities. In addition, the Act is intended to protect the natural environment of the coastal areas and safeguard their use primarily for recreation and tourism. The Coastal Zone Act and its currently promulgated regulations acts as additional requirements to local land use regulations. In 1972, the federal government enacted a similar law known as the Coastal Zone Management Act.

The project area is located within the Delaware Coastal Zone Management Area and a permit will be required from DNREC.

b. Consequences

The Preferred Alternative will be designed and constructed in a manner that remains consistent with the policies of Delaware's Coastal Zone Management Program. Therefore, no impacts to the coastal zone are anticipated.

c. Mitigation

No mitigation required. Permits from DNREC will be applied for and approved prior to construction.

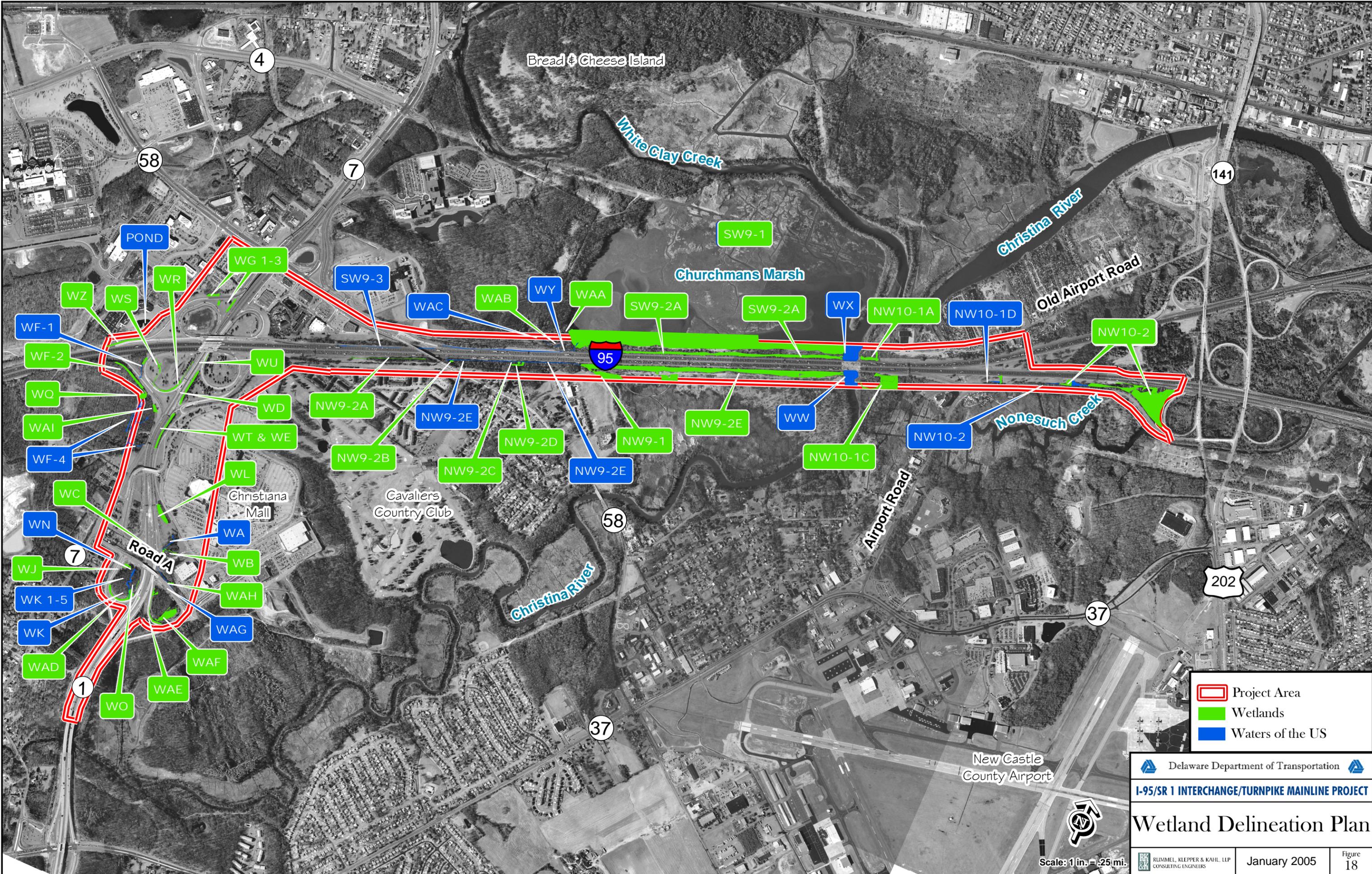
7. Waters of the United States including Wetlands

a. Existing Conditions

Activities affecting waters of the United States (US) are regulated by the ACOE in accordance with Section 404 of the Clean Water Act. The term "Waters of the United States" incorporates deepwater habitat, vegetated wetlands, and special aquatic sites as defined by 33 CFR 328.3. Activities affecting subaqueous lands are regulated by DNREC in accordance with the provisions of 7 Del. C. §7212.

In 1992, a draft Environmental Impact Statement (EIS) and Section 4(f) Evaluation was prepared for proposed improvements to the Delaware Turnpike (I-95) in New Castle County, Delaware from the State Route (SR) 896 interchange to the SR 141 interchange. In support of the EIS and Section 4(f) Evaluation, a waters of the U.S. including wetlands delineation was performed to establish the extent and boundaries of aquatic resources within the project area.

In August and October 2001, a re-verification of the wetlands and waterways identified in 1992 was conducted. In August 2003, additional field verifications were performed. The limits of the area of review are included in **Figure 18**. A Jurisdictional Determination for the areas listed below was conducted with the Army Corps of Engineers - Philadelphia District on September 10-12, October 17, December 18, 2003, and on February 27, 2004. A Jurisdictional Determination for the areas listed below was conducted with DNREC in March 2004. The current determinations are provided in the summary **Table 13** below. More details can be found in the Final Wetland Delineation Maps submitted to the ACOE in September 2004 for final approval.



Bread & Cheese Island

White Clay Creek

Christina River

Churchmans Marsh

Old Airport Road

Nonesuch Creek

Christiana Mall

Cavaliers Country Club

New Castle County Airport

- Project Area
- Wetlands
- Waters of the US

Delaware Department of Transportation

I-95/SR 1 INTERCHANGE/TURNDPIKE MAINLINE PROJECT

Wetland Delineation Plan

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January 2005

Figure 18

Scale: 1 in. = .25 mi.



Table 13: Waters of the US including Wetlands

Area	Description	Jurisdiction	Tidal/Nontidal DNREC Mapping	Comments
WA	Channel	Yes	Nontidal	Waters of the US
WB	Elongated wet area	Yes	Nontidal	PEM/FO Wetland
WC	Wet area	Yes	Nontidal	PEM/SS Wetland
WD	Drainage ditch	Yes	Nontidal	PEM/OW Wetland
WE	Drainage ditch	Yes	Nontidal	PEM/OW Wetland
WF-1	Drainage ditch	Yes	Nontidal	Waters of the US PEM/OW Wetland
WF-2	Drainage ditch	Yes	Nontidal	PEM/OW Wetland
WF-4	System of Channels	Yes	Nontidal	Waters of the US PEM/FO Wetland
WG-1	Northern depression	Yes	Nontidal	PEM/SS Wetland
WG-2	Southern depression	Yes	Nontidal	PEM Wetland
WG-3	Drainage ditch	Yes	Nontidal	PEM Wetland
WJ	Wet area	Yes	Nontidal	PEM Wetland
WK	Channel	Yes	Nontidal	Waters of the US
WK-1	Channel	Yes	Nontidal	Waters of the US
WK-2	Channel	Yes	Nontidal	Waters of the US
WK-3	Channel	Yes	Nontidal	Waters of the US
WK-4	Channel	Yes	Nontidal	Waters of the US
WK-5	Channel	Yes	Nontidal	Waters of the US
WL	Depression	Yes	Nontidal	PEM Wetland
WN	Wet area	Yes	Nontidal	PEM Wetland
WO	Drainage swale	Yes	Nontidal	PEM/OW Wetland
WQ	Wet area	Yes	Nontidal	PEM Wetland
WR	Drainage ditch	Yes	Nontidal	PEM/OW Wetland
WS	Wet area	Yes	Nontidal	PEM Wetland
WT	Wet area	Yes	Nontidal	PEM Wetland
WU	Drainage ditch	Yes	Nontidal	PEM/OW Wetland
WW*	Christina River	Yes	Tidal	Waters of the US
WX*	Christina River	Yes	Tidal	Waters of the US
WY	Channel	Yes	Nontidal	Waters of the US
WZ	Drainage swale	Yes	Nontidal	PEM/OW Wetland
WAA*	Wet area	Yes	Tidal	PFO Wetland
WAB	Wet area	Yes	Nontidal	PEM Wetland

Table 13: Waters of the US including Wetlands

Area	Description	Jurisdiction	Tidal/Nontidal DNREC Mapping	Comments
WAC	Channel	Yes	Nontidal	Waters of the US
WAD	Wet area and drainage ditch	Yes	Nontidal	PFO/EM Wetland
WAE	Wet area and drainage ditch	Yes	Nontidal	PFO/EM Wetland
WAF	Wet area	Yes	Nontidal	PFO Wetland
WAG	Channel	Yes	Nontidal	Waters of the US
WAH	Drainpipe outfall	Yes	Nontidal	PEM Wetland
WAI	Wet area	Yes	Nontidal	PEM/SS Wetland
NW9-1*	Wet area	Yes	Tidal	PEM Wetland
NW9-2A	Drainage ditch	Yes	Nontidal	PEM Wetland
NW9-2B	Groundwater seep	Yes	Nontidal	PFO Wetland
NW9-2C	Hillside seep	Yes	Nontidal	PFO Wetland
NW9-2D	Seep	Yes	Nontidal	PFO Wetland
NW9-2E	Wet area and drainage ditch	Yes	Nontidal	Waters of the US PEM/FO Wetland
NW10-1A	Wet area	Yes	Nontidal	PEM/SS Wetland Vegetation recently cleared
NW10-1C	Wet Area	Yes	Nontidal	PFO Wetland
NW10-1D	Drainage ditch	Yes	Nontidal	Waters of the US PEM/OW Wetland
NW10-2*	Wet area and channel	Yes	Tidal	Waters of the US and PEM/FO/OW Wetland
SW9-1*	Churchmans Marsh	Yes	Tidal	PFO, E2EM, E2FL Wetland
SW9-2A	Wet area	Yes	Nontidal	PSS/EM Wetland
SW9-3	Drainage ditch	Yes	Nontidal	Waters of the US
POND	Open water	Yes	Nontidal	Waters of the US

Shaded areas indicate potentially impacted areas.

* Jurisdictional by DNREC as well as ACOE

b. Consequences

Avoidance of waters of the US including wetlands was not achievable in any of the build alternatives considered. Unavoidable impacts to waters of the US for the turnpike were minimized by circumventing resources to the extent possible by maximizing slopes and constructing retaining walls (Preferred Alternative), thereby reducing fill. The Preferred Alternative results in the least amount of impacts to both tidal and nontidal waters of the US, including wetlands.

Table 14 shows the impacts of the Preferred Alternative to Waters of the U.S.

Table 14: Waters of the US including Wetlands Preferred Alternative Impacts

I-95 SR1 to SR141 Mainline						
Total Waters of the US including Wetlands Impacts						
Location	Nontidal Wetlands (acres)	Nontidal Waters (drainage ditches)		Tidal Wetlands (acres)	Tidal Waters	
		acres	LF		acres	LF
Alternative 2: Additional 5th Lane: Widening N&S sides	0.47	0.93	5,420	0	0.26	54

I-95 SR1 Interchange						
Total Waters of the US including Wetland Impacts						
Location	Nontidal Wetlands (acres)	Nontidal Waters (channels)		Tidal Wetlands (acres)	Tidal Waters	
		acres	LF		acres	LF
Alternative 3	0.40	0.11	743	0	0	0

c. Mitigation

The tables below provide mitigation requirements for each resource impacted.

Table 15: Nontidal Wetland Mitigation Requirements

I-95 SR1 to SR141 Mainline and I-95 SR1 Interchange						
	PFO/PEM	PEM/PSS	PFO	PEM	PEM/POW	Totals
Impacts, SF	13,207	7,655	2,996	8,026	6,121	37,975 SF (0.87 acre)
Mitigation Ratios	2:1	2:1	2:1	1:1	1:1	
Mitigation Required, SF	26,414	15,310	5,992	8,026	6,121	62,817 SF (1.44 acres)

Table 16: Nontidal Waters of the US Mitigation Requirements

I-95 SR1 to SR141 Mainline and I-95 SR1 Interchange			
	Drainage Ditches	Channels	Totals
Impacts	40,727 SF 0.93 acre/5,420 LF	4,968 SF 0.11 acre/743 LF	47,454 SF 1.09 acre/6,469 LF
Mitigation Ratios	1:1	1:1	
Mitigation Required	40,727 SF 0.93 acre/5,420 LF	4,968 SF 0.11 acre/743 LF	45,695 SF 1.04 acre/6,163 LF

Table 17: Tidal Waters of the US Mitigation Requirements

I-95 SR1 to SR141 Mainline and I-95 SR1 Interchange	
Christina River	
Impacts	11,309 SF/0.26 acre/54 LF
Mitigation Ratios	1:1
Mitigation Required	11,309 SF/0.26 acre/54 LF

Regulatory Requirements

Section 404 of the Clean Water Act (CWA) provides regulatory authority to the ACOE to issue or deny permits for the discharge of dredged or fill material into waters of the US, including special aquatic sites (i.e., wetlands, mud flats, riffle pool complexes, and vegetated shallows). Under requirements of Section 404 a permit is required for any impacts to nontidal and tidal waters resulting from this project.

Under requirements of the Subaqueous Lands Act, a permit is required for any impacts to tidal waters of the US resulting from this project. In accordance with federal and state regulations, efforts to avoid and minimize impacts to wetlands and other waters of the U.S. will continue through the design process.

Wetlands

Appropriate and practicable compensatory mitigation is required for unavoidable adverse impacts to wetlands. In determining compensatory mitigation, the functional values lost by the affected resource must be considered in developing the goals of the mitigation plan. Mitigation requirements are typically determined by the ratio of wetland acres replaced to wetland acres lost.

Compensatory mitigation is preferred, when practicable, in areas adjacent or contiguous (i.e., on-site compensatory mitigation) to the study area. If on-site compensatory mitigation is not practicable, off-site mitigation should be undertaken in the watershed, if possible. The following are compensation measures in order of preference:

- restoration of wetlands that have been converted to uplands
- creation of new wetlands from uplands
- high-ratio enhancement of degraded wetlands
- high-ratio preservation of existing wetlands and adjacent upland buffers
- restoration of degraded stream channels where applicable.

A mitigation site search was conducted from March to July 2004.

Since the impacts to nontidal waters and wetlands and tidal waters will occur in the Christina River and White Clay Creek watersheds, potential locations in both watersheds were included in the search area. The objective of the mitigation site search was to compensate for impacts to tidal waters through the creation of tidal wetlands and the creation of nontidal wetlands for impacts to nontidal wetlands and waters. Eleven (11) tidal sites were evaluated. All 11 tidal sites were located adjacent to portions of the Christina River or White Clay Creek that convey regular tidal flow to the areas. Eleven (11) nontidal sites were also evaluated. Of the twenty-two sites evaluated, five were deemed potentially feasible. An agency meeting was conducted on July 22, 2004 to evaluate the five potential sites and obtain agency input. The meeting

resulted in the retention of two sites (Sites 1 and 7) that were recommended for detail study. Refer to **Table 18** below for a summary of the sites investigated.

Table 18: Tidal and Nontidal Wetland Mitigation Sites

Site ID	Potential Acreage	Retained?	Nontidal/Tidal	Issue
1	5.41	Yes	Tidal	None
2	1.80	No	Tidal	Existing vegetation, access issues and large amount of excavation required
3N	0	No	Tidal	Access issues, existing forest and large amount of excavation required
3S	1.20	No	Tidal	Potential impact to existing wetlands, small potential yield and large amount of excavation required
4	0	No	Tidal	Entire site is a landfill
5	0	No	Tidal	Existing wetland mitigation site
6	2.33	No	Tidal	Utility right of way conflict
7	3.18	Yes	Tidal	None
8	0	No	Tidal	Impacted by future CD roads
9	0	No	Nontidal	Utility right of way and land use conflict
10	0	No	Nontidal	Site already developed
11A	35.03	No	Nontidal	Active farm field and located within historic district
11B	29.28	No	Nontidal	Active farm field and located within historic district
12 A&B	31.86	No	Nontidal	Existing forested wetlands and active farm field, cultural resources issues
13	38.51	No	Nontidal	Existing forested wetlands, active farm field and adjacent to hazardous material storage facility
14 A&B	42.52	No	Nontidal	Uncertainty of a hydrology source, large amount of excavation, access issues and impacts to high quality riparian buffer.
15	5.10	No	Nontidal	Existing forest in early successional stage and isolated
16	3.0-7.5	No	Nontidal	Site is isolated from other jurisdictional resources
17	1.60	No	Tidal	Uncertainty of tidal influence because of sporadic opening of tidal gate by others, difficult to prevent invasion of invasive species do to its location
18	0.61	No	Tidal	Uncertainty of tidal influence because of sporadic opening of tidal gate by others, difficult to prevent invasion of invasive species do to its location, not large enough to accommodate mitigation required

The following investigations are being conducted at Sites 1 and 7:

- Cultural resources investigations
- Hazardous materials investigations
- Wetland delineations

- Topographic surveys
- Tide gage monitoring
- Property owner information and interest determination

A site will be selected upon completion of these investigations.

8. Woodlands, Wildlife and Habitat

A forest evaluation was conducted in May 2002 at the Delaware Turnpike SR1/I-95 Interchange project area. Identified forest resource areas are shown on **Figure 19**.

a. Woodlands Identified in the SR1 Interchange Area

One forest stand and one wooded area were identified and are described below. In addition, mowed/maintained right-of-way habitats and pioneer forests are the main types of vegetation that were observed in the field.

Forest Stand 1

This stand is located on the south side of the northbound lanes of I-95 just before the exit to SR1. This stand consists of forest interspersed with open patches. The open patches seem to be remnants left over from a former residential or agricultural area. The former open areas are reverting to pioneer forests, primarily consisting of *Acer rubrum* (Red maple) with ground cover consisting of *Lonicera japonica* (Japanese honeysuckle), *Phragmites australis* (Common reed), *Parthenocissus quinquefolia* (Virginia creeper), and *Duchesnea indica* (Indian strawberry). It is likely that the open canopy areas help provide good habitat for edge species. The forest is mid-successional, approximately 40 years of age. Dominant canopy species include *Quercus spp.* (Oak), *Liquidambar styraciflua* (Sweetgum), *Prunus serotina* (Black cherry), and *A. rubrum*. Canopy cover is approximately 50%. Extensive ground cover is present consisting of *P. quinquefolia*, *L. japonica*, *Toxicodendron radicans* (Poison ivy), and *Hedera helix* (English ivy). Downed woody debris is present on the forest floor. This area could potentially provide good habitat for Forest Interior Dwelling Species.

Forest Stand 2

A wooded buffer area surrounding a drainage ditch is located adjacent to Mall Ring Road on the southwestern side of the Christiana Mall. Vegetation in this area includes *L. styraciflua*, *A. rubrum*, *Robinia pseudoacacia* (Black locust), and *Rosa multiflora* (Multiflora rose). This area is relatively small and can support moving flocks of birds and provide habitat for a number of small animals. This area, however, is part of a fragmented woodlot that extends south.

b. Woodlands Identified in the Mainline Project Area

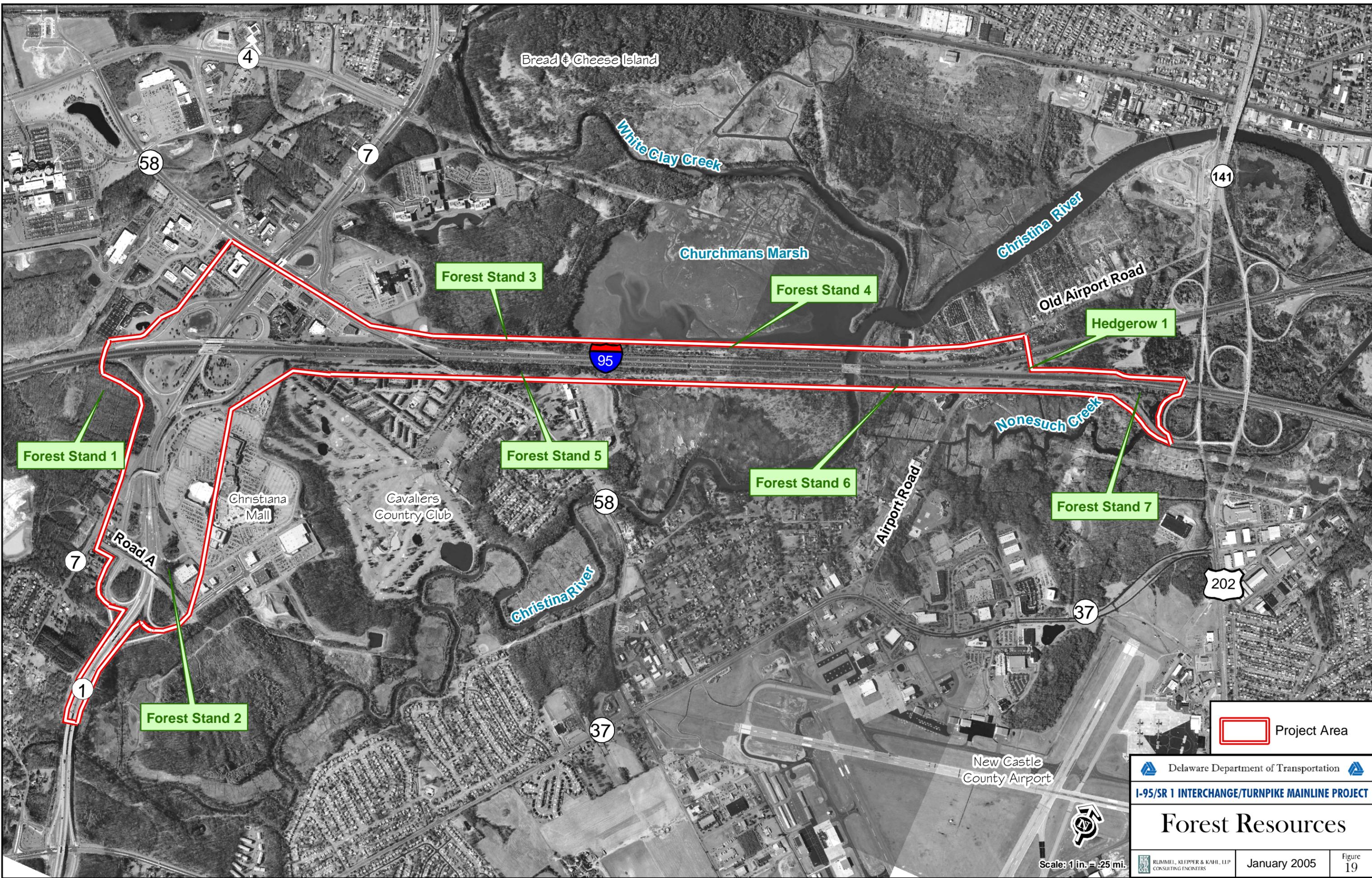
Mowed/maintained right-of-way habitats and pioneer forests are the two main types of habitat that exist in the project area. Descriptions are below.

Woodlands on the Southbound Side

The southbound side of the project area consists mainly of pioneer forests. These forests have been previously disturbed and maintained and are presently sparsely wooded with shade-intolerant species.

Forest Stand 3

Forest Stand 3 is located on the top of a slope east of Churchmans Road, and represents the western edge of Churchmans Marsh. Slope stabilization is in progress for the slope. This stand consists mainly of *Rosa multiflora* (Multiflora rose), *Prunus serotina* (Black cherry), *Liquidambar styraciflua* (Sweetgum), *Salix nigra* (Black willow), and *Acer rubrum* (Red maple).



 Project Area

 Delaware Department of Transportation 
I-95/SR 1 INTERCHANGE/TURNTPIKE MAINLINE PROJECT

Forest Resources

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 Figure 19

Scale: 1 in. = .25 mi.

Forest Stand 4

Forest Stand 4 is located in the area between the southbound lanes of I-95 and Churchmans Marsh. The species in this stand are similar to the ones found in Forest Stand 1 and include *R. multiflora*, *P. serotina*, *L. styraciflua*, *S. nigra*, and *A. rubrum*. Because of the proximity to the marsh, *Phragmites australis* (Common reed) is also found in this area. This stand may provide a slightly higher quality habitat than Forest Stand 1 due to the nearby marsh's ability to support wetland-dependent species.

Woodlands on the Northbound Side

The northbound section of the project area consists of one forest stand, one wooded area and numerous mowed/maintained right-of-ways.

Forest Stand 5

This stand is a narrow, wooded upland band of vegetation located between developed areas on Churchmans Road and the I-95 Mainline. Canopy vegetation includes *A. rubrum*, *S. nigra*, and *L. styraciflua*. Ground cover includes *Pontederia cordata* (Pickerel weed), *Peltandra spp.* (Arrow arum), and *Toxicodendron radicans* (Poison ivy). As habitat, it is limited in terms of the quality of wildlife habitat it provides as compared to other forested parcels in the project area.

Forest Stand 6

A wooded riparian buffer exists directly south of the 295/495 split. Vegetation includes *P. serotina*, *Quercus palustris* (Pin Oak), *R. multiflora*, *Lonicera japonica* (Japanese honeysuckle), and *Rubus spp.* (Raspberry). This area may improve local water quality by filtering highway runoff. This stand is adjacent to the Christina River, which enhances its wildlife support value by providing a riparian buffer.

Median Areas

Several wooded areas exist within the highway median of the project area. Because these areas are surrounded by highway on all sides, high wildlife diversity is not expected.

Hedgerow 1

This area is located close to the DelDOT depot building in the median. It is mowed and maintained with woody vegetation including *Q. palustris*, *Pinus strobus* (White pine), and *Sassafras albidum* (Sassafras). The canopy cover varies from 0-80%.

Forest Stand 7

Forest Stand 7 is located south of the I-295/I-495 split. It is partially maintained and partially wooded with groundcover. Vegetation includes *P. serotina*, *Q. palustris*, *S. nigra*, and *Pinus virginiana* (Virginia Pine).

c. Consequences

No impacts are anticipated from the mainline widening, and construction of the SR1 Interchange improvements will impact 1.60 acres of forest resource (Forest Stands 1 and 2).

d. Mitigation

DelDOT is required to incorporate landscaping and reforestation into the design of road construction and improvement projects in accordance with Senate Bill 324. The Delaware Code sets forth minimum standards for reforestation required, how the activities must be planned, and the amount of money that must be allocated to ensure landscaping and reforestation activities take place.

Before construction begins, an analysis is required to determine the total area of trees that will be cut, removed, or cleared in order to complete the project. Reasonable efforts must be made by DelDOT to preserve large, mature trees. Clearing and cutting of trees/shrubs must be kept to the minimum number necessary to complete the project and remain consistent with safe design practices.

Landscape improvements can be restricted to the right-of-way within the project area if no trees are cut or removed. If trees are removed, the following mitigation is required:

- A 1:1 replanting ratio is required if 10 or fewer trees are cut or removed.
- A 2:1 replanting ratio is required if cutting or removing between 10 and 50 trees.
- An acre for acre replanting ratio is required if more than 50 trees are cut or removed.

Since this project will impact more than 50 trees, DelDOT will plant 1.60 acres of forest to account for the impact of the Preferred Alternative. DelDOT will pursue opportunities for forest mitigation adjacent to the wetland mitigation sites or within cleared areas within the interchange, if available. The landscape plan will be prepared by a Delaware licensed and registered landscape design professional. After mitigation is complete, development of any kind will not be permitted except for the establishment of local, state, or federal parks, natural areas or preserves.

9 Rare, Threatened and Endangered Species

a. Existing Conditions

Letters requesting information on rare, threatened or endangered (RTE) species in the project area were sent to the U.S. Fish and Wildlife Service (FWS) and the Delaware Natural Resources and Environmental Controls Division of Fish and Wildlife Natural Heritage Program (DNHP) on November 6, 2001 (see Appendix A).

In a letter dated November 29, 2001, DNHP indicated there were currently no records of federal RTE species and unique or critical habitats within the I-95/SR 1 Interchange project area.

In the same letter, DNHP indicated that the review of the Biological and Conservation Database identified the presence of three rare bird species within the I-95 mainline project area; *Haliaeetus leucocephalus* (Bald Eagle), *Riparia riparia* (Bank Swallow), and *Vireo gilvus* (Warbling Vireo), and one rare reptile species, *Regina septemvittata* (Queen snake).

In addition, the letter stated the following:

- A Bald eagle nest site is located approximately 1300 feet from the proposed project area near Churchmans Marsh. This nest has been monitored since 1996 and there has been activity at this nest each year since that time. During the 2001 breeding season, adult eagles were seen at the nest but the nest was presumed unused. Though no nesting activity occurred this year, the nesting area retains federal protection. This project could introduce disturbance to the nesting site simply from the presence of humans and machinery. Bald Eagle nesting activity is most susceptible to human disturbance during the time period from December 15 to July 1. The proximity of the project site to the nest may put the project under this time of year restriction. To avoid possible disturbance, work should be conducted from July 2 to December 14. However, because the Bald Eagle is a federally listed species, the FWS should be contacted.
- The population of Bald Eagles uses the entire Churchmans Marsh area and the forested area to the east to Route 1 and north of I-95 as a foraging area and potential nest site. The other species in the above list could be found anywhere up to 1.5 miles from the project site. The Bank Swallow population would use the marsh and open water areas

for feeding on flying insects. Warbling Vireos are neotropical migrant songbirds that would use any forested area around this project site for foraging during spring and autumn migrations and possibly as a nesting area during the summer. Queen snakes prefer forested stream and river habitats and could be found on the tributaries flowing into Churchmans Marsh.

- Based on the occurrences of these species in the area of the project, measures should be taken to minimize the impacts to the forested areas around Churchmans Marsh by not removing the trees that provide critical habitat. According to a conversation between representatives of RK&K and DNREC on November 16, 2001, it was stated that Churchmans Marsh would not be impacted leading to the conclusion that the Bank Swallow and Queen Snake would not likely be affected.

In letters dated January 16, 2002 and January 30, 2002, the FWS indicated that except for the occasional transient individuals, no proposed or federally listed endangered or threatened species are known to exist within the project impact area.

A letter was sent to DNHP on July 8, 2002, requesting survey information on the species identified in the November 29, 2001 response letter. DNHP provided the following response to the request in a letter dated August 26, 2002:

- Bald Eagle – eagles have sporadically nested, or attempted to nest, at Churchman's Marsh since the early to mid 1990s.
- Warbling vireo – individuals were observed during breeding season several times in 1980 around Churchmans Marsh. Appropriate habitat is still extant, although recent surveys for the vireo have not been conducted. After further analysis, we have concluded that this project would probably not have any impact on this species, and further surveys are not warranted.

A letter was sent to FWS on July 8, 2002, requesting guidance regarding necessary steps needed to address the potential Bald Eagle habitat in the project area. FWS provided the following response to the request in a letter dated September 27, 2002:

- The Service normally recommends that a year round buffer of 750 feet remain undisturbed around an eagle's nest to avoid "take" of the eagles. In addition, a "Time of Year" restriction has been established from December 15 through June 15 during which construction activities are restricted within a quarter mile of an eagle nest to avoid disturbing nesting eagles and to ensure successful incubation and rearing of young. However, the Service reviews proposed development near nest sites on a case-by-case basis and looks for reasonable measures to provide protection for the eagles, while allowing projects to proceed.
- Any clearing or modification within a distance of 750 feet from the nest tree would be subject to additional permitting requirements to comply with the "take" prohibitions set forth by Section 9 of the ESA.
- Although the project does not involve clearing activities within the eagle protection buffer of Churchman's Marsh, a limited portion of the proposed project, specifically the northwest portion of the highway, will involve activity just under a quarter-mile, thereby triggering the time of year restriction.
- After reviewing the proposal and biological history of this pair, the service believes that the project can be completed without adversely affecting the eagle pair.

Since the agency responses were received approximately two years ago, new letters requesting updated information on RTE species in the project area were sent to the FWS and the DNHP on April 2, 2004. In an updated response dated July 13, 2004, DNHP indicated the following:

- A review of our database indicates that the following species and/or communities are at or adjacent to the project site:

Scientific Name	Common Name	Taxon	State Rank	State Status	Global Rank	Federal Status
<i>Riparia riparia</i>	Bank Swallow	Bird	S2B		G5	
<i>Regina septemvittata</i>	Queen Snake	Reptile	S1		G5	
<i>Vireo gilvus</i>	Warbling Vireo	Bird	S2B		G5	

State Rank: S 1- extremely rare within the state (typically 5 or fewer occurrences); S2- very rare within the state (6 to 20 occurrences); B - Breeding; N - Nonbreeding; State Status: E - endangered, i.e. designated by the Delaware Division of Fish and Wildlife as seriously threatened with extinction in the state; Global Rank: G1 - imperiled globally because of extreme rarity (5 or fewer occurrences worldwide); G2 - imperiled globally because of great rarity (6 to 20 occurrences); G3 - either very rare and local throughout its range (21 to 100 occurrences) or found only locally in a restricted range; G4 - apparently secure globally but uncommon in parts of its range; G5 - secure on a global basis but may be uncommon locally; T - variety or subspecies rank; Q - questionable taxonomy; Federal Status: LE - endangered, i.e. designated by the U.S. Fish and Wildlife Service as being in danger of extinction throughout its range; LT- threatened, i.e. designated by USFWS as being likely to become endangered in the foreseeable future throughout all or a significant portion of its range; PS - proposed status.

- Records of the species listed in the table are from the portion of Churchmans Marsh bisected by I-95 (south of Red Clay Creek and West of Christina River). Warbling Vireos were observed during breeding season several times in 1980 around Churchmans Marsh. Appropriate habitat is still extant, although more recent surveys for the vireo have not been conducted. After further analysis, we have concluded that this project will probably not have any impact on this species, and further surveys are not warranted. Bank Swallows were present in this area of Churchmans Marsh from 1965 to 1980. The most recent survey was conducted in 1996 and no birds were reported, although their present status is unknown. Records of Queen Snake are from the early 1990s and further surveys to confirm the presence of and to avoid impacts to Queen Snake may be warranted.
- In addition, Bald Eagle have sporadically nested, or attempted to nest, at Churchmans Marsh since the early to mid-1990s. A nest was located in 2004 during mid-winter surveys in the wooded area just west of the marsh. The project area indicated in the map sent with the request appears to be outside of the 1,320 foot protective buffer zone and there should be no impact to Bald Eagle.

In an updated letter dated July 13, 2004 FWS indicated the following:

- The federally threatened Bald Eagle (*Haliaeetus leucocephalus*) nests within the vicinity of the project. A nest is located north of I-95, east of Rt. 7 and south of White Clay Creek. Any construction or forest clearing activities within one-quarter mile of an active nest may impact bald eagles. If such impacts may occur, further section 7 consultation with the FWS may be required.
- The federally threatened Bog Turtle (*Clemmys muhlenbergii*) may be present within the project area. Bog turtles primarily inhabit palustrine wetlands comprised of a muddy bottom or shallow water, and tussocks of vegetation. A survey for bog turtle habitat and bog turtles may be appropriate. These surveys should be conducted at any location where the Delaware Natural Heritage and Endangered Species Program recommend. Upon completion, survey reports should be forwarded to both the Service and the Delaware Natural Heritage and Endangered Species Program for review.

Following further inquiries, Edna Stetzer of DNREC, in a letter dated December 6, 2004, stated that the Turnpike Mainline project limit of disturbance was outside of the protection zones for two bald eagle nests and, therefore, there should be no issues with the nests and the project.

b. Consequences

No impacts to rare, threatened or endangered species are anticipated under the Preferred Alternative. However, continued coordination with DNHP and FWS is warranted for the Bog Turtle and Queen Snake.

c. Mitigation

According to the DNREC and FWS response letters, a work restriction will be required for this project. Coordination with DNREC and FWS will be conducted during the design phase to verify what restrictions are appropriate for this project. All time of year restrictions required by the regulatory agencies will be strictly adhered to during construction.

10. Birds

a. Existing Conditions

The project area is used as habitat for numerous species of birds and is located within the Atlantic Flyway. The Migratory Bird Treaty Act makes it unlawful to pursue, kill, capture, possess, buy, sell, purchase, or barter any migratory bird, including the feathers or other parts, nests, eggs, or migratory bird products. Surveys of swallow nests will be conducted in mid April under the Christina River Bridge to determine if nesting habitat exists and determine if time of year restrictions or protective measures are appropriate. This survey will be coordinated with DNREC.

b. Consequences

No impacts to birds are anticipated under the Preferred Alternative.

c. Mitigation

Protective netting should be placed under the bridge prior to the start of the nesting season, which typically begins around April 15th.

11. Aquatic Resources

a. Existing Conditions

A letter requesting information on aquatic resources within the project site was sent to DNREC on July 15, 2002. In a letter dated January 23, 2003 the DNREC Division of Fish and Wildlife provided the following fisheries information:

- The DNREC Division of Fish and Wildlife surveyed the fish community of the Christina River in 1988. Surveys indicated a total of 17 fish species in the vicinity of the bridge over the Christina River.
- Dominant resident species recorded throughout the tidal portion included Eastern silvery minnow and banded killfish.
- Other species included white sucker, spottail shiner, channel catfish, brown bullhead catfish, black crappie, tessellated darter, common carp, golden shiner, yellow perch, spotfin shiner, gizzard shad, white perch, Atlantic menhaden, and hogsucker.
- No rare or threatened species were identified during the survey.

- The Christina River does have a spawning run of anadromous species such as alewife and blueback herring, and the potential for spawning activities of American shad.
- Most of the herring spawning grounds are probably located upstream of the construction area in the smaller tributary streams, making this particular section of the river an important corridor for migrating fish.

b. Consequences

Impacts to anadromous fish species are not anticipated for the Preferred Alternative.

c. Mitigation

According to the DNREC response letter, a work restriction is typically placed on projects that have the potential of interfering with fish migration during spawning season. For construction activities, this restriction will begin in late March and continue through May, which will cover the spawning seasons for a variety of important fish species including yellow perch, alewife, blueback herring, and white perch. It is assumed that this time of year restriction will be implemented for the project. Coordination with DNREC Fisheries Division will be conducted to confirm the restriction dates. All time of year restrictions required by the regulatory agencies will be strictly adhered to during construction.

DeIDOT is currently coordinating with the National Marine Fisheries Service (NMFS) to verify that DNREC's restrictions are inclusive of federal restrictions that may also be required.

12. Permits Required

The design and construction of SR 1 Interchange and the I-95 mainline between SR 1 and SR 141 will involve natural environmental impacts that are authorized under various permits. These permits are described below.

Construction activities will occur within the 100-year floodplain, wetlands and waters of the US. During construction of the bridge superstructure, a cofferdam within the waterway may be necessary to construct pier footings. These activities would require a Section 404 Clean Water Act (CWA) individual permit from the ACOE and a Section 10 Rivers and Harbors Act permit from the ACOE, a Subaqueous Lands permit from DNREC, a Water Quality Certification (Section 401 CWA) from DNREC and a floodplain permit from New Castle County.

The project area is located in the coastal zone. The project would require a coastal zone consistency certification from DNREC.

Approval of a sediment and stormwater plan will be required from DeIDOT. In accordance with Delaware Code, DNREC has delegated the review of DeIDOT projects to DeIDOT.

The Coast Guard does not consider this section of the Christina River a navigable waterway; therefore, a Rivers and Harbors Act Section 9 permit or a general bridge permit is not required.

DeIDOT is exempt from the permitting process for Water Resource Protection Areas; therefore, no permit is required for roadway construction in the Groundwater Recharge Protection Area identified.

Approval of forest impacts and landscaping will be required from DeIDOT, in accordance with Senate Bill 324, which delegated the review of DeIDOT projects to DeIDOT.

C. Cultural Resources

Cultural resources are defined as patterned physical remains of human activity distributed over the landscape through time. Specifically, cultural resources are classified as architectural resources (buildings, structures, objects, and districts) and archeological sites as defined by the

National Register of Historic Places (36 CFR 60.4). Historic resources – cultural resources listed on or eligible for the National Register of Historic Places – are human environmental resources to be considered in the planning of federal projects under NEPA, the National Historic Preservation Act of 1966, as amended, and Section 4(f) of the Department of Transportation Act of 1966. The existing conditions of and consequences of the Preferred Alternative on archeological and architectural resources are presented below.

In order to comply with Section 106 of the National Historic Preservation Act, coordination with the State Historic Preservation office (SHPO) was initiated in April 2003. At a meeting on April 15, 2003, the Area of Potential Effect (APE) was determined based on preliminary analyses of previously documented resources in the project area, and the scope of the continuing cultural resource effort was outlined for later documentation. The final APE is shown in **Figure 20**.

1. Architectural Resources

Existing architectural resources have been reviewed and field studies have been conducted to document additional potential resources within the APE. Twelve resources were identified within the APE. Each of these resources was evaluated for National Register eligibility according to the criteria set forth in the *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation* (National Park Service, 1997). One property, the Henry L. Churchman House (CRS No. N-1603; Number 20 on Figure 18), was recommended eligible for listing in the National Register. Located on Churchmans road south and east of I-95, there are no direct impacts anticipated with the implementation of the Preferred Alternative. There will be no change in indirect audible impacts or indirect visual impacts.

2. Archaeological Resources

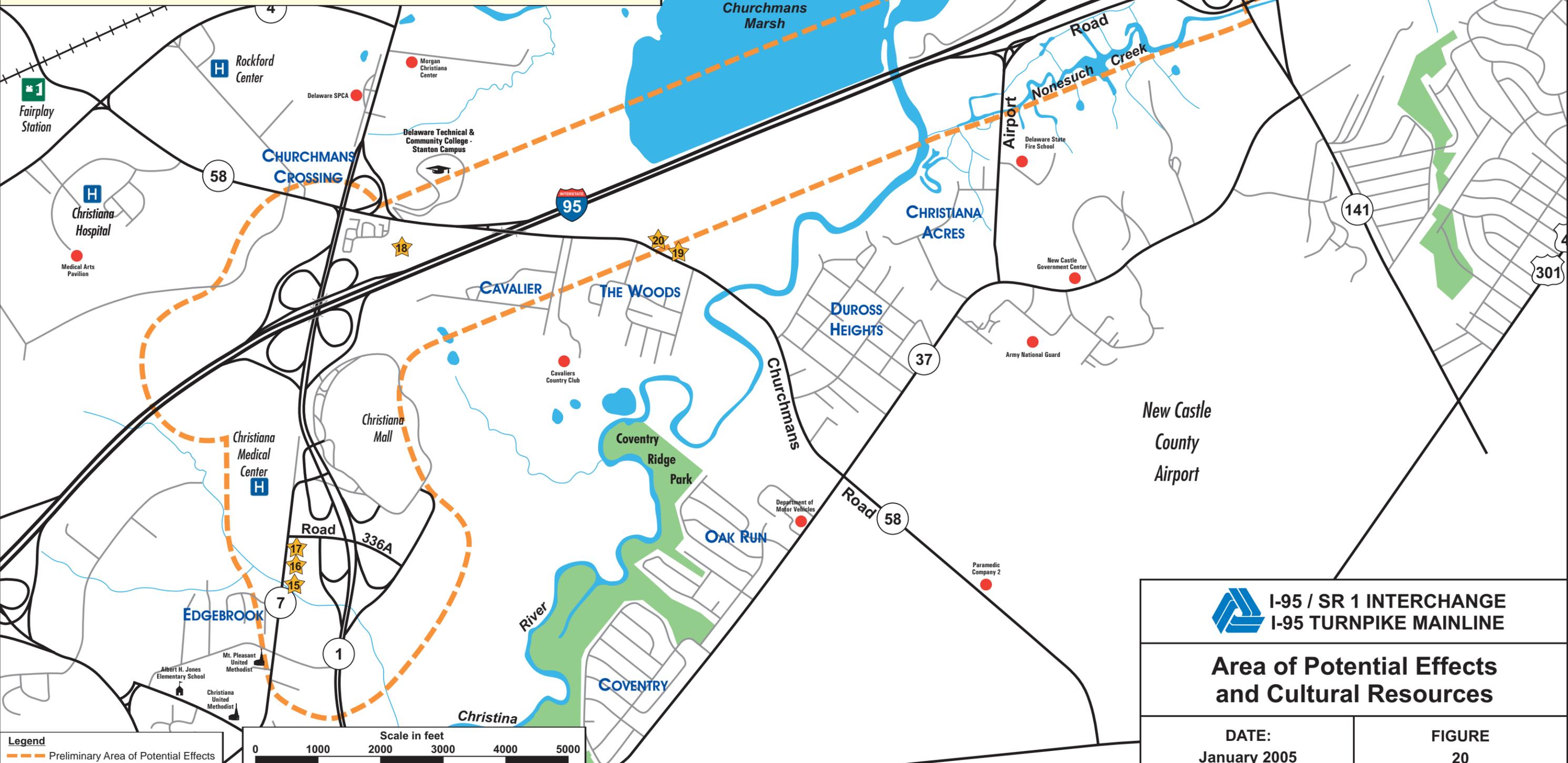
Three locations within the APE were identified as having moderate to high archeological sensitivity. Phase IB testing was conducted in order to document the presence or absence of potentially significant archeological resources. The results of the Phase IB testing found that the majority of the APE was previously disturbed and the testing at the three sites found no evidence of potentially significant archeological resources. Refer to the *Management Summary, Phase IB Archeological Testing, I-95/SR 1 Interchange Mainline Project letter to Joseph Wutka*, dated February 23, 2004.

3. Consequences

In a letter dated December 29, 2004, the SHPO concurred that there will be no direct or indirect impacts to cultural resources from implementation of the Preferred Alternative. As there will be no effects on historic properties, no mitigation is required.

Architectural Resources Identified within the APE			
Map #	CRS #	Resource	Status/Recommendation
15	N-14166	Dwelling, 104 Stanton Christiana Road	Recommended Not Eligible
16	N-14167	Dwelling, 120 Stanton Christiana Road	Recommended Not Eligible
17	N-14168	Dwelling, 128 Stanton Christiana Road	Recommended Not Eligible
18	N-6783	Former Stafford Farm, 857 Churchmans Road	Recommended No Longer Eligible
19	N-12904	Dwelling, Churchmans Road	Recommended Not Eligible
20	N-1603	Henry L. Churchman House, 648 Churchmans Road	Recommended Eligible
21	N-14173	Dwelling, 423 Airport Road	Recommended Not Eligible
22	N-14172	Dwelling, 424 Airport Road	Recommended Not Eligible
23	N-14171	Dwelling, 431 Airport Road	Recommended Not Eligible
24	N-14170	Dwelling, 433 Airport Road	Recommended Not Eligible
25	N-14169	Dwelling, 467 Airport Road	Recommended Not Eligible
26	N-12907	Dwelling, 491-495 Airport Road	Not Eligible

N-6783, Stafford Farm, no longer retains integrity. Only the silo remains standing.



I-95 / SR 1 INTERCHANGE

I-95 TURNPIKE MAINLINE

**Area of Potential Effects
and Cultural Resources**

DATE:
January 2005

FIGURE
20

Legend
- - - Preliminary Area of Potential Effects



D. Conclusion

The selection of DelDOT's Preferred Alternative for the I-95 Mainline and I-95/SR1 Interchange was based on in-depth analysis of potential environmental impacts of the retained alternatives; agency review of the Purpose and Need and Alternatives Documents; and 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. The development of mitigation efforts is underway to mitigate the unavoidable impacts for this project. Environmental compliance sheets will be developed to ensure the environmental commitments are adhered to during construction of the project. The draft Section 404 permit application and the draft Section 401 Water Quality Certification will be developed in accordance with the Clean Water Act. Agency coordination will continue through the remaining steps of the planning process and into final design to ensure agency concerns are appropriately addressed and concurrence is achieved.