

III. Environmental Resources and Consequences

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

A compilation of quantified impacts associated with the Preferred Alternative is presented below.

Table 5: Summary of Environmental Impacts Associated with the Preferred Alternative

Environmental Factor	Alternative 2 Option 2 Potential Impact I-95 Mainline	Alternative 3 Potential Impact I-95/SR 1 Interchange	Combined Potential Impact
Social Environment			
Residential Relocations	No	No	No
Business Relocations	No	No	No
Property Acquisition	No	9.41 acres	9.41 acres
Environmental Justice	No	No	No
Public Lands/ Section 4(f) (permanent)	No	No	No
Noise and Air Quality Impacts	No	No	No
Hazardous Materials Impacts	No	No	No
Natural Environment			
Geology and Topography	No	No	No
Farmland	No	No	No
Floodplain (includes Mainline and Interchange)	Yes (<0.7% fill)	Yes (<0.7% fill)	Yes (<0.7% fill)
Water Quality	No	No	No
Stormwater Management	Yes – 7.11 acres new impervious surface	Yes - 19.25 acres new impervious surface	26.36 acres new impervious surface
Coastal Zone	No	No	No
Nontidal Wetlands	Yes (0.47 acre)	Yes (0.40 acre)	0.87 acre
Nontidal Waters of the US (stream channels and drainage ditches)	Yes (0.93 acre/ 5,420 LF)	Yes (0.11 acre/ 743 LF)	1.04 acre/ 6,163 LF
Tidal Wetlands	No	No	No
Tidal Waters of the US (Christina River)	Yes (0.26 acre/ 54 LF)	No	0.26 acre (54 LF)
Habitats and Wildlife (Forest)	No	Yes (1.60 acres)	1.60 acres
Federally Listed Rare, Threatened & Endangered Species	No	No	No
Cultural Resources			
Direct Adverse Effects to Historic Structures	No	No	No
Indirect Effects to Historic Resources	No	No	No
Adverse Effects to Archeological Resources	No	No	No

A. Social Environment

The National Environmental Policy Act (NEPA) requires identifying the social and economic impacts within the study area, including right-of-way acquisitions and displacements, land use and zoning, population and housing, communities, community facilities, parklands and recreation areas, regional and project area employment and Environmental Justice. For each resource, the existing conditions and consequences of implementing the Preferred Alternative are presented. If applicable, the proposed mitigation strategies are presented.

1. Land Use and Zoning

a. Existing Conditions

The 2002 Land Use and Land Cover Data from the Delaware Office of State Planning Coordination were utilized to understand the existing development patterns around the project area. As shown in **Figure 10**, the project area is characterized as a mixture of industrial, commercial, and residential development with forested and wetland tracts adjacent to the Christina River.

I-95/SR 1 Interchange:

Zoning immediately surrounding the SR 1 Interchange area is a mixture of regional commercial, business park, and regional office. Both the northeast and southeast quadrants are zoned regional commercial (CR), which includes the Christiana Mall. The northwest quadrant is zoned regional office (OR), and the southwest quadrant is zoned business park (BP). In the southeast quadrant, suburban (S) and neighborhood conservation (NC) zones can be located, which includes an apartment complex. Additional residential development is zoned as suburban transition (ST) zone and is found to the south and east along the SR 7 corridor.

Turnpike Mainline:

Zoning was reviewed within a 2,000-foot corridor (1,000 feet on either side of I-95) parallel to the proposed improvement area. From the I-95/SR 1 interchange eastward, zoning on the north side of I-95 is regional commercial (CR), regional office (OR), and suburban reserve (SR) to the Churchman's Marsh area. East of the Christina River, zoning is heavy industrial (HI). On the south side of I-95, again from west to east, zoning is regional commercial (CR) and suburban (S) and neighborhood conservation (NCga [garden apartments], NC10 and NC5) in the Cavalier/The Woods area. A small area of industrial (I) zoning borders the Churchman's Marsh area, which is zoned suburban reserve (SR). East of the Marsh, industrial (I) zoning is maintained to the I-95/I-295/I-495 Interchange area.

b. Consequences

The right-of-way requirements for the Preferred Alternative include:

Mainline (SR 1 to SR 141):

The improvements for the Preferred Alternative (Alternative 2, Option 2) for the mainline widening will be constructed inside the existing DelDOT right-of-way for the length of the project. It is anticipated that all construction activities will remain within the existing right-of-way and will not require any additional property acquisition.

SR 1 Interchange – Alternative 3:

Construction of the Preferred Alternative 3 will require 9.41 acres of additional right-of-way (no relocations). The right-of-way impacts are shown on **Figure 11**.



	Project Area
	Residential/Urban
	Commercial
	Industrial
	Institutional
	Cropland
	Forest
	Recreational
	Water
	Wetlands
	Utility/Transportation
	Industrial

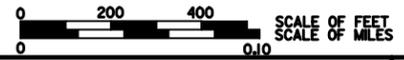
Delaware Department of Transportation
I-95/SR 1 INTERCHANGE/TURNPIKE MAINLINE PROJECT
Land Use
 Source: Delaware Office of State Planning Coordination, 2002
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 January 2005 Figure 10



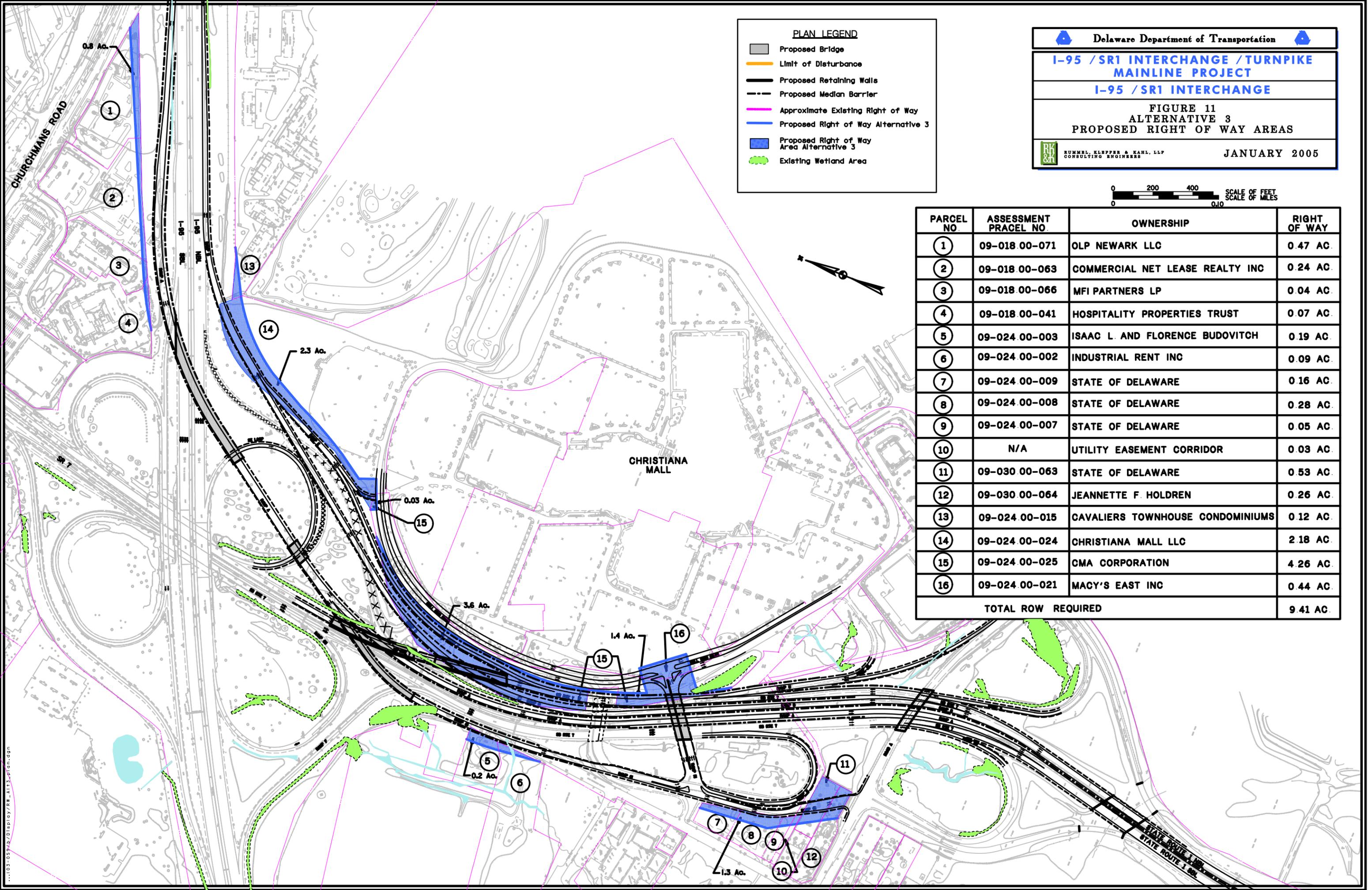
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PLAN LEGEND

- Proposed Bridge
- Limit of Disturbance
- Proposed Retaining Walls
- Proposed Median Barrier
- Approximate Existing Right of Way
- Proposed Right of Way Alternative 3
- Proposed Right of Way Area Alternative 3
- Existing Wetland Area



PARCEL NO	ASSESSMENT PRCEL NO.	OWNERSHIP	RIGHT OF WAY
1	09-018 00-071	OLP NEWARK LLC	0.47 AC.
2	09-018 00-063	COMMERCIAL NET LEASE REALTY INC	0.24 AC.
3	09-018 00-066	MFI PARTNERS LP	0.04 AC.
4	09-018 00-041	HOSPITALITY PROPERTIES TRUST	0.07 AC.
5	09-024 00-003	ISAAC L. AND FLORENCE BUDOVITCH	0.19 AC.
6	09-024 00-002	INDUSTRIAL RENT INC	0.09 AC.
7	09-024 00-009	STATE OF DELAWARE	0.16 AC.
8	09-024 00-008	STATE OF DELAWARE	0.28 AC.
9	09-024 00-007	STATE OF DELAWARE	0.05 AC.
10	N/A	UTILITY EASEMENT CORRIDOR	0.03 AC.
11	09-030 00-063	STATE OF DELAWARE	0.53 AC.
12	09-030 00-064	JEANNETTE F. HOLDREN	0.26 AC.
13	09-024 00-015	CAVALIERS TOWNHOUSE CONDOMINIUMS	0.12 AC.
14	09-024 00-024	CHRISTIANA MALL LLC	2.18 AC.
15	09-024 00-025	CMA CORPORATION	4.26 AC.
16	09-024 00-021	MACY'S EAST INC	0.44 AC.
TOTAL ROW REQUIRED			9.41 AC.



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2. Consistency with Local Plans

Transportation improvements in the project area are guided by a number of state, regional and local plans and strategies. These plans were reviewed to determine whether modifications to the I-95/SR 1 Interchange and the addition of a fifth lane on I-95 between the SR 1 and SR 141 Interchanges are consistent with the goals and objectives of these plans. These improvements were found to be consistent with the following State, regional and local plans:

- DeIDOT's Statewide Long-Range Transportation Plan
- WILMAPCO's Regional Transportation Plan 2025
- WILMAPCO's Transportation Improvement Plan 2005 - 2007
- Office of State Planning-Shaping Delaware's Future
- New Castle County Comprehensive Development Plan

DeIDOT's Statewide Long-Range Transportation Plan

DeIDOT's Statewide Long-Range Transportation Plan, adopted in January 1997 and updated in September 2002, shows the project area to be located within a Multimodal Investment Area, an area where growth is planned, including existing communities, and where DeIDOT must provide a more comprehensive solution to satisfy mobility and access needs. As part of an on-going program of multimodal improvements in the Turnpike corridor, the proposed improvements are consistent with DeIDOT's LRTP.

WILMAPCO's Regional Transportation Plan 2025

The project area is located within a Transportation Investment Area (TIA) as identified in the *2025 Metropolitan Transportation Plan*, adopted in January 2000 by the Wilmington Area Planning Council (WILMAPCO). TIAs are areas identified for future investment in transportation that will match investments in land use. The project corridor lies within an area designated as a Community TIA. Community TIAs are areas with well-established land uses and development patterns where growth and development are expected to be moderate. Transportation objectives for these areas include expanding and improving transportation facilities and services and to make each as safe and efficient as possible. The proposed improvements are consistent with this plan.

WILMAPCO's Transportation Improvement Plan 2005 - 2007

WILMAPCO's Transportation Improvement Plan (TIP) for Fiscal Years 2005-2007 (adopted on March 4, 2004; revised September 2, 2004) proposes the authorization of \$170.2M in funds for I-95, the Turnpike corridor, from the Maryland State Line to the SR 141 Interchange.

Office of State Planning-Shaping Delaware's Future

As indicated in the *Delaware Strategies for State Policies and Spending* 5-year update, July 2004, the project area lies within two areas categorized as Investment Levels 1 and 2 (formerly, Communities and Developing Areas, respectively). Level 1, Communities, are defined as areas where population is concentrated, commerce is bustling and a wide range of housing types already exists. State policies will encourage redevelopment and reinvestment. Level 2, Developing Areas, are defined as areas where state investments and policies will be targeted to accommodate existing development and orderly growth. In Investment Level 1 areas, typical transportation projects will include new or expanded facilities and services for all modes of transportation. In Investment Level 2 areas, transportation projects will typically expand or provide roadways, public transportation, pedestrian walkways, bicycle paths and other transportation modes. In both areas, projects will also include those that manage traffic flow and congestion, support economic development and redevelopment efforts, promote local street

networks and make existing infrastructure and planned improvements as safe and efficient as possible. The proposed improvements to the Turnpike are consistent with the goals of *Shaping Delaware's Future*, through consistency with the *Delaware Strategies for State Policies and Spending*.

New Castle County Comprehensive Development Plan

The County Council of New Castle County adopted a *Comprehensive Development Plan Update* on April 3, 1997. That plan was subsequently updated in 2002. In Section 6.2, Mobility, Objective 1 identifies the need to manage congestion by adding capacity, making operational improvements or providing other travel routes, times or modes. Objective 4 identifies the need to keep the transportation system functioning while building for the future. The proposed improvements to the Turnpike are consistent with these objectives.

3. Population and Housing

a. Existing Conditions

Population and housing within the project area were determined using data extracted from US Census Bureau 2000 Census. Because of the long, linear nature of the project area, the two Census tracts wherein the project area lies cover a greater extent of the surrounding area than the actual project area. Total population and housing of the two census tracts wherein the project area is located is presented in **Table 6** and shown on **Figure 12**.

Table 6: Population and Housing, 2000

Location	Population	Housing Units
Census Tract 138.00	5,561	2,334
Census Tract 150.00	5,670	2,152
Total	11,231	4,486

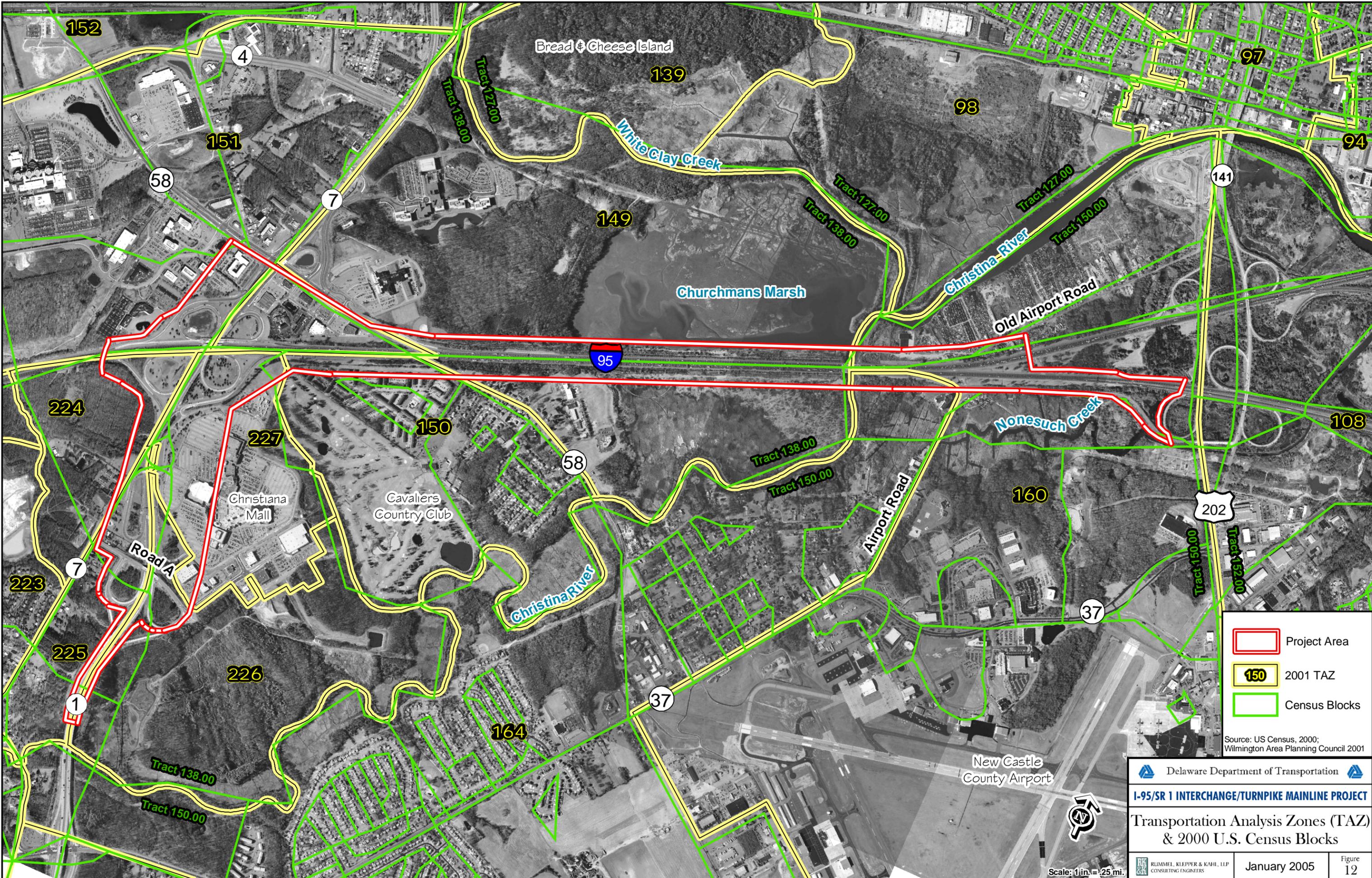
Source: 2000 Census, US Census Bureau

b. Consequences

As a result of the implementation of the Preferred Alternative, it is anticipated that there will be no changes in housing or population in the project area.

4. Environmental Justice

Executive Order 12898 (issued February 11, 1994) requires federal agencies to identify and address any disproportionately high and adverse human health or environmental effects on minority and low-income populations resulting from the project. The US EPA's Environmental Justice guidelines further define it as "The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic group should bear a disproportionate share of the negative environmental consequences..."



- Project Area
- 150 2001 TAZ
- Census Blocks

Source: US Census, 2000;
Wilmington Area Planning Council 2001

Delaware Department of Transportation

I-95/SR 1 INTERCHANGE/TURNDPIKE MAINLINE PROJECT

**Transportation Analysis Zones (TAZ)
& 2000 U.S. Census Blocks**

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January 2005

Figure 12

Scale: 1 in. = .25 mi.

In order to determine those impacts and the populations affected, demographic data are retrieved from the US Census Bureau and other sources. These demographic data for the project area are then compared to the area population as a whole to determine whether the anticipated impacts are disproportionate on minority or low-income populations. Minority populations are defined as members of the following population groups: Native American (American Indian or Alaskan Native), Asian, Hawaiian or Pacific Islander, Black (African-American), Hispanic (regardless of race), and others not of the White population. Low-income populations are based on the proportion of persons whose income falls below the Department of Health and Human Services poverty guidelines for individuals.

a. Existing Conditions

Socioeconomic and racial profiles were determined based on US Census Bureau files and data collected from the 2000 Census. The project area includes the land areas to the north and south of I-95 and to the east and west of the SR1/SR7 corridor. Data were extracted from the associated census tracts, compiled and compared with the county and state demographics for minority populations and low-income populations. The results are detailed in **Table 7**.

Table 7: Demographic Profile of the Project Area

Area	Total Persons	% White	% Minority	Minority Profile					
				% Black	% Native American ¹	% Asian or Pacific Islander	% Other	% Two or More Races	% Hispanic ²
Tract 138.00	5,561	78.5	21.5	10.4	0.3	7.8	1.1	1.8	3.8
Tract 150.00	5,670	70.8	29.2	22.2	0.0	1.1	3.2	2.7	8.4
New Castle County	500,265	73.1	26.9	20.2	0.2	2.6	2.2	1.6	5.3
Delaware	783,600	74.6	25.4	19.2	0.3	2.1	2.0	1.7	4.8

Source: US Census Bureau, 2000 Census

¹ Native American population includes American Indian and Alaskan Native.

² Persons of Hispanic origin are considered a minority population but are not within a designated racial group.

The percentage of persons with low incomes within the project area is shown in **Table 8**.

Table 8: Income Profile of the Project Area

Area	Per Capita Income, \$	% Below Poverty Level
Tract 138.00	25,766	5.5%
Tract 150.00	19,674	6.3%
New Castle County	25,413	8.4%
Delaware	23,305	9.2%

Based on the above data, comparisons show that there are not a disproportionate number of persons of minority or low-income populations living within the project area. Neighborhoods within the project area were canvassed to ensure their involvement in the process, to make residents aware of the potential effects of the project and to assure the fair treatment of all affected persons.

b. Consequences

Based on the demographic profiles, comparisons with area and state characteristics, public involvement and outreach, and the benefits of this project, it is determined that the project will not adversely impact any minority or low income populations.

5. Communities and Facilities within the Project Area

a. Existing Conditions

There are several neighborhood communities surrounding the project area. These neighborhoods are primarily concentrated around the I-95/SR1 interchange, as shown on **Figure 13**. South of the I-95/SR1 interchange are the communities of Edgebrook and Christiana. The Landings is located to the northwest of the I-95/SR 1 Interchange near the Delaware Park Race Track. The communities of Cavalier and The Woods are located east of the interchange and south of I-95. Two Planned Unit Developments (PUDs) were identified north of I-95 to the east and west of the interchange.

Within a one-mile radius of the I-95/SR 1 interchange are a variety of community facilities. These facilities are listed below by quadrant. There are no facilities identified along I-95.

Northwest Quadrant:

- Christiana Hospital
- Christiana Medical Arts Pavilion
- Rockford Center Hospital

Northeast Quadrant:

- Morgan Christiana Center
- Delaware Technical & Community College

Southeast Quadrant:

- Christiana Mall

Southwest Quadrant:

- Faith City
- Christiana Medical Center

b. Consequences

There will be no adverse impacts to facilities in the project area as a result of the project. No potential impacts to these communities are anticipated as a result of the project's implementation.

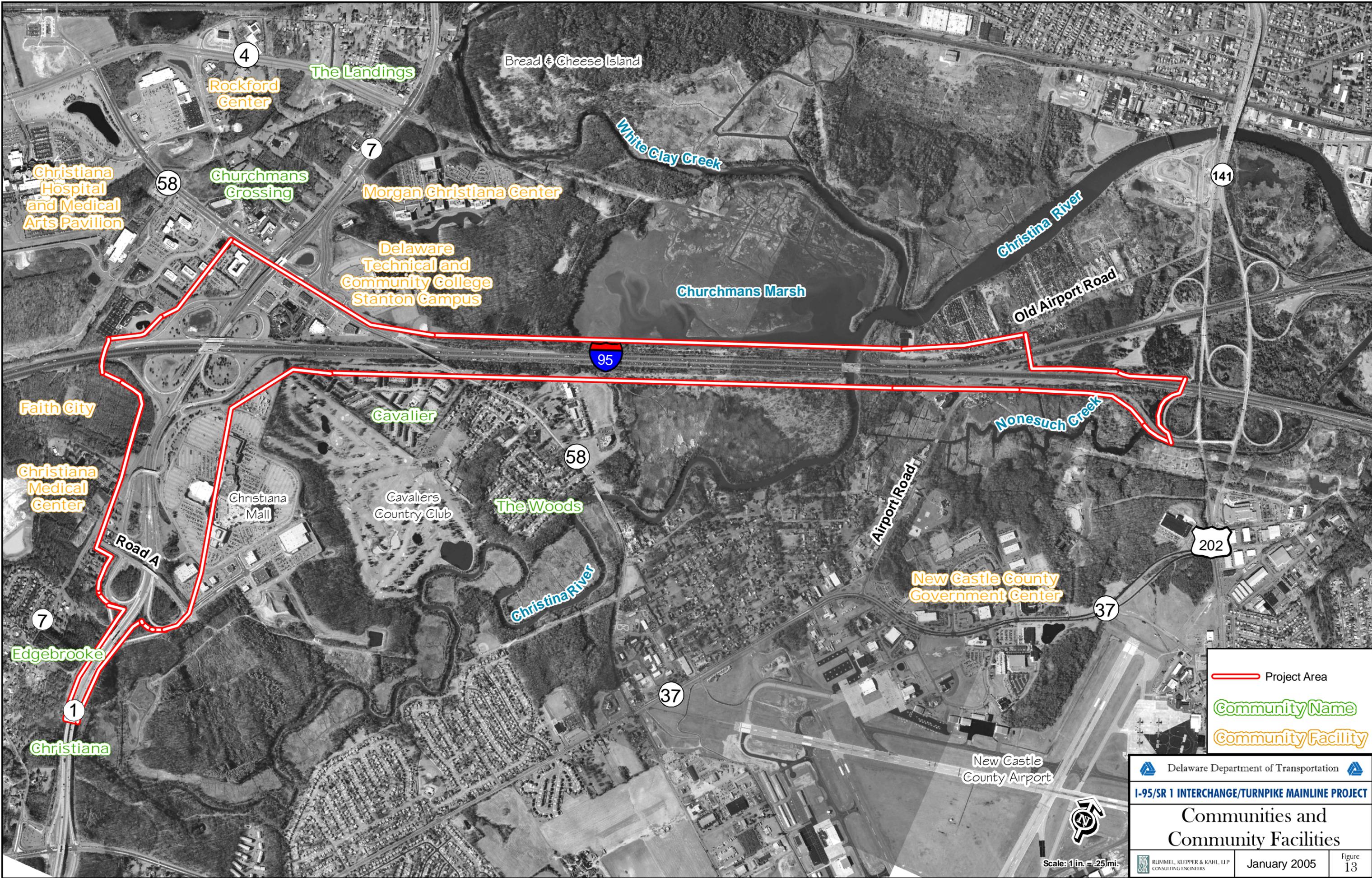
6. Parks and Recreation Areas

a. Existing Conditions

There are no public parks or recreation facilities within the project area or surrounding area. The Cavalier Country Club, east of I-95, is within 500 feet of the project area limits at its western edge, but the Country Club will not be directly impacted by the project.

b. Consequences

The implementation of the Preferred Alternative will not adversely impact any public lands or Section 4(f) resources.



— Project Area
Community Name
Community Facility

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Communities and Community Facilities
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 Figure 13

Scale: 1 in. = .25 mi.



7. Noise

a. Existing Conditions

Existing noise sources in the study area include I-95 traffic and SR-1 traffic. With regards to noise sources in this study area, noise from the Christiana Mall and other localized noise sources is negligible in comparison to highway traffic noise from the Turnpike and SR 1. Sensitive noise receptors, in the form of housing units, are centralized in the Cavalier Country Club Apartments south of I-95 and south of Churchmans Road.

b. Noise Criteria, Field Measurements and Modeling Results

For exterior-use areas of residential properties, noise is considered annoying if the equivalent noise level, L_{eq} , is greater than 66 A-weighted decibels (dBA). To obtain a representative sample of ambient noise and in compliance with Delaware Department of Transportation Noise Policy §IV.2.B and §IV.2.C, sound levels were monitored and classified traffic counts were made (from digital video tape recording) over two 20-minute monitoring sessions throughout the noise-sensitive study area on Wednesday, February 11, 2004 and at one 24-hour monitoring session from Wednesday, February 11 to Thursday, February 12, 2004. Using Federal Highway Administration Traffic Noise Model software, version 2.1 (FHWA TNM v2.1), a calibrated computer noise model was created for the noise-sensitive study area¹.

Impacts

As determined by the field measurements and noise modeling, noise impacts throughout the study area are homogeneous, in that all are first-row residences facing I-95 and no I-95 traffic noise impacts are predicted for any residences within the study area that have an obstructed view of I-95.

Widening the I-95 Turnpike Mainline, as per Alternative 2, will result in an imperceptible change to noise levels throughout the Cavalier Country Club Apartments, and will cause no additional noise impacts to the rental units². Although the approved alternatives for the I-95/SR-1 Interchange/Turnpike Mainline Project will facilitate greater traffic volumes, these volumes will not increase sufficiently so as to result in perceptible increases in surrounding area noise levels. However, since the proposed improvements will be a Type I project, Delaware Department of Transportation Noise Policy §III, in compliance with Federal Highway Administration criteria, dictates that noise mitigation be considered for the ninety seven (97) residences within the study area for which predicted noise levels will equal or exceed 66 dBA.

c. Consequences

A noise wall sound barrier was modeled at the slope hinge point within the I-95 right-of-way. The modeled noise wall sound barrier alignment was selected so as to provide at least a 20' access easement on both sides of the wall and the greatest potential for noise reduction by a noise wall sound barrier. The modeled noise wall sound barrier was analyzed with barrier segment heights of 20', 16', 12' and 8' (Delaware Department of Transportation Noise Policy §VII.1 stipulates that minimum noise wall sound barrier height be at least eight feet from ground level to top of barrier). Analysis of the predicted future noise condition showed that a noise wall sound barrier would provide perceptible sound level reductions to only first-row receptors, the apartments that directly face I-95. The minimum requisite noise wall sound barrier (the

¹ Per FHWA guidelines and Delaware Department of Transportation Noise Policy §IV.3.C, receiver sound levels in the TNM computer model must be calculated to within ± 3 A-weighted decibels (dBA) of measured sound levels to be considered calibrated.

² The buildings at the Cavalier Country Club Apartments provide significant acoustic shielding – approximately 10dBA - to rental units and exterior use areas that do not have direct exposure to I-95 traffic noise.

“optimized” noise wall sound barrier) between Cavalier Country Club Apartments and I-95, located within the I-95 right-of-way, providing at least 5-decibel noise level reduction at impacted receptors, and meeting the minimum height requirements, would be 8’ in height, 2,600 feet in length, and would cost approximately \$550,000.

Considering a maximum 2:1 slope, 10’ flat surface top, and 10’ flat maintenance access/recovery zone on either side, the maximum height earth berm sound barrier was modeled between the proposed edge of pavement on I-95 and the proposed right-of-way limits. Predicted sound levels, with the maximum height earth berm sound barrier at critical sensitive receptors, were calculated to be approximately one decibel higher than with the “optimized” noise wall sound barrier. Three iterations of progressively shorter earth berm sound barriers were modeled, the third of which would not meet the minimum sound barrier height requirement, but would provide a minimum of 5-decibel sound level reduction at noise-impacted receptors. To meet both sound reduction and minimum height requirements, the “optimized” earth berm sound barrier would be 3,000 feet in length, 32,000 cubic yards in volume, and would cost approximately \$300,000 at an estimated \$9.00 per cubic yard of fill material.

Conclusion

Either a noise wall sound barrier or an earth berm sound barrier, completely within Delaware Department of Transportation right-of-way, would reasonably mitigate I-95 traffic noise for the Cavalier Country Club Apartments pursuant to the I-95/SR-1 Interchange – Turnpike Mainline Project and in conformance with the DeIDOT Noise Policy. However, DeIDOT’s consistent position for apartment residents is to consider these residents transient individuals who choose to dwell in a noise-impacted location and have the option to relocate with comparative ease, as opposed to homeowners with a substantial property investment. Moreover, the apartments have air conditioning, which provides noise mitigation (closed windows) for those affected residents. DeIDOT is not considering noise barrier mitigation for this site.

8. Air Quality

a. Existing Conditions

The project area is located in New Castle County, Delaware, which is not designated as non-attainment for carbon monoxide (CO), Nitrogen Dioxide (NO₂), Sulfur Dioxide (SO₂), Lead (Pb) or particulate matter (PM₁₀), but is designated as a non-attainment area for ozone (O₃). Since the project area is designated non-attainment for ozone, the region is subject to transportation control measures, such as the Vehicle Emissions Inspections Program.

Transportation projects involving highway systems improvements are typically subject to two types of air quality analyses: “transportation conformity (mesoscale analysis)” and “project level emissions analysis (microscale analysis).”

Macroscale/Regional Air Quality Analysis

Transportation conformity analysis (i.e., macroscale analysis) was performed to determine the extent to which the I-95/SR 1 Interchange/Turnpike Mainline project would add or subtract to regional emission levels. The analysis was performed at the system level, which means the improvement is included in a regional travel demand model from which the “total emissions” for a county are estimated. The product of this analysis is an estimate referring to the total emissions generated from highway and transit systems, and a determination of whether those estimates, at the regional level, follow mandated Federal reductions in regional emissions as reported in State Implementation Plans (SIPs).

The I-95/SR 1 Interchange/Turnpike Mainline project is included in the *WILMAPCO Regional Transportation Plan 2025* (RTP 2025), "Opening the Door for Change" and is included in the *Transportation Improvements Program (TIP) Fiscal Years 2004 – 2006*. WILMAPCO's Air Quality Conformity Determination for the FY 2004 – 2006 TIP and the 2025 Regional Transportation Plan demonstrated conformity with the Revised New Castle County Air Quality Conformity Determination.

Microscale/Project Level Emissions Analysis

A project level emissions analysis (i.e., microscale analysis) was performed to estimate the extent to which the I-95/SR 1 Interchange/Turnpike Mainline project adds or subtracts to "project area" emission levels. The study was performed within the area directly adjacent to the I-95 roadway between the SR 141 Interchange and the SR 1 Interchange, and in the area surrounding the SR 1 Interchange. The study evaluated local levels of carbon monoxide (CO) and how the project may affect air quality levels next to or in the immediate area.

The microscale air quality analysis indicates that CO impacts resulting from the implementation of the project would not result in a violation of the State/National Air Quality Standards (S/NAAQS) 1-hour concentration or the 8-hour concentration, at any air quality receptor location, in any analysis year. The air quality analysis also indicates that the CO impacts from the Preferred Alternative result in no violations of the 1-hour concentration or the 8-hour concentration in any analysis year. For more information refer to the *Draft Air Quality Analysis: I-95 Delaware Turnpike from MD/DE Line to SR 141, January 2004*.

b. Consequences

There is no violation of state or national ambient air quality standards. No mitigation measures are required.

9. Hazardous Waste Investigation

a. Existing Conditions

An inventory of known and potential hazardous substances and hazardous waste generators was undertaken for the I-95/SR 1 Interchange/Mainline project area in New Castle County, Delaware. The inventory effort was completed for the area along I-95 from south of the SR 1 interchange to north of the SR 141 interchange in Delaware, and along the SR 1 corridor from south of the Christiana Mall to north of SR 141. The coverage area extended for approximately one mile in all directions beyond the limit of construction for the alternatives considered, in order to account for potential underground pollutant migration.

The database search identified 18 locations within one-quarter mile of the project limit of disturbance where hazardous materials are present. None of these 18 sites were located within the project area. The site most immediate to the project area was the Christiana Mall and Christiana Mall Road.

b. Consequences

The Preferred Alternative will not result in adverse impacts to hazardous wastes or known contamination sources.

10. Utilities and Construction

Utility impacts associated with the build alternatives have not been fully evaluated at this time. It is anticipated that impacts to existing public and private utilities will be comparable to those found for similar projects and would not be outside the anticipated scope for a project of this type. As the build alternatives are further developed additional details regarding potential utility

impacts will be refined and additional details provided for consideration.

11. Traffic

a. Existing Conditions

The following section summarizes the existing traffic volumes and levels of service for the I-95 corridor within the study area.

Volumes

Due to the large amount of additional traffic generated at the SR 273 and SR 1/SR 7 interchanges, existing traffic volumes on northbound I-95 double between the Service Plaza and Churchmans Marsh during the AM peak period (from about 5,000 to 10,000 vehicles per hour). Despite this large volume increase, the same number of mainline lanes (4) are provided on I-95 at both locations. The heavy ramp volumes at SR 273 and SR 1/SR 7 also generate congestion at the merge junctions. Beyond the Marsh, approximately 75% of the mainline traffic continues on northbound I-95 beyond the I-295 split. This traffic volume (about 7,500 vehicles per hour) exceeds the three-lane capacity of the highway at this location. An additional 1,800 vehicles per hour is added to the mainline along with a lane addition at SR 141. Traffic splits approximately 50-50 at the I-95/ I-495 split.

In the southbound direction, existing traffic volumes on I-95 nearly triple beyond the junctions with I-495 and I-295 during the PM peak period (from about 3,500 to over 9,000 vehicles per hour). This section of I-95 includes large volumes of weaving traffic, with multiple lane drops and access ramps present within close proximity of one another. The two right lanes on I-95 drop to form the CD road for the SR 141 interchange. Downstream, when the SR 141 CD road rejoins the mainline, no lane addition is currently provided, resulting in congestion at the merge junction. Only one (1) continuous lane of traffic is provided on I-95 southbound for through vehicles heading from Wilmington to Churchmans Marsh under the existing lane geometry. Beyond the Marsh, nearly half of the mainline traffic exits at SR 1/ SR 7 or SR 273, resulting in congestion on the ramps at these locations.

Level of Service

The mainline of I-95 currently operates at level of service (LOS) F between the SR 1/SR 7 interchange and the SR 141 interchange. Additionally, the LOS at the interchange ramp terminals (merges, weaves, and diverges) is generally worse than the mainline LOS. By 2007, failing conditions would be expected to extend from the SR 273 interchange to the I-495 split in the northbound direction during the AM peak period. Average speeds of under 10 mph could be expected approaching the SR 1/ SR 7 interchange, resulting in excessive delays and lengthy travel times for motorists. Additionally, motorists traveling on northbound SR 1 would continue to experience queuing and long delays as traffic backs up along the ramp from northbound SR 1 to northbound I-95. In the southbound direction, failing conditions would continue through the SR 141 interchange and into the Churchmans Marsh area. Average speeds under 30 mph would be expected and the queues could extend back to the I-295 merge junction.

Safety

A study of the accident history statistics along this corridor between 1998 and 2001 indicates that over 1,700 reported accidents have occurred along this section of I-95 over the four-year study period. The majority of these accidents (56%) have been rear end collisions, which is typical of congested freeways, where stop-and-go traffic frequently occurs. Eighteen (18) fatalities have resulted from these accidents, indicating the severe nature of the accidents along this corridor. Additionally, the accident rate per million vehicle miles (MVM) has steadily

increased between 1998 and 2001, from 0.73 accidents per MVM in 1998 to 0.90 accidents per MVM in 2001. The accident statistics were also examined based on location. The results indicate that a greater number of accidents occur at or near the ramp junctions than on straightaway segments. Therefore, the merge, diverge, and weaving areas produce the greatest safety risk within the corridor.

Anticipated Traffic Growth

Traffic growth along the I-95 corridor between 1990 and 2000 exceeded projections, with most segments of the corridor experiencing traffic growth of 5 percent or more per year. As traffic continues to grow into the future, travel conditions will continue to deteriorate along I-95. With much of the corridor already experiencing LOS F conditions during the peak periods, a significant portion (about 25% by the year 2007) of the traffic demand will not be able to clear through the congested network within the peak period. The result of this unmet demand will be longer peak periods, with congested conditions occurring more often throughout the day.

b. Consequences

The implementation of the Preferred Alternative is expected to result in a broad range of traffic and safety improvements, as outlined below.

Level of Service

The following LOS improvements are anticipated in the northbound direction based on capacity analysis and traffic simulations:

- The modified lane configuration at SR 273 will allow for the free flow of ramp traffic from SR 273 onto I-95. The remaining three (3) lanes of traffic on the mainline will provide acceptable LOS for the through movement at the proposed lane drop location.
- The additional lane provided on the mainline north of the SR 1/ SR 7 interchange is required to accommodate the large traffic volume present at this location. Adding this lane allows the corridor to operate under capacity, with an improvement from LOS F to LOS E through Churchmans Marsh. The reconfigured ramps at this interchange should also eliminate the queuing and delays currently experienced on northbound SR 1.
- The corridor improvements result in nearly 100% of projected demand to be serviced during the peak hour, and also result in an overall reduction of about 7% in corridor travel times, including a 30% reduction in travel times for commuters using northbound SR 1.
- It should be noted that the improvements from the Preferred Alternative only temporarily solve the traffic congestion concerns in the northbound direction. Based on current traffic growth projections, the I-95 corridor would be expected to perform at LOS F again by the year 2010, even after the implementation of the Preferred Alternative. Therefore, additional improvements that build on the Preferred Alternative would be required in the future. These additional improvements could include an additional lane on I-95 northbound, from the I-295 split to the I-495 split, and the eventual development of a collector/distributor (CD) road system from SR 273 to I-295.

The following LOS improvements are anticipated in the southbound direction based on capacity analysis and traffic simulations:

- Providing a lane addition on I-95 at the SR 141 CD road merge should eliminate the existing congestion at this merge point. The additional mainline lane through

Churchmans Marsh results in an improvement from LOS F to LOS D or better throughout the corridor in the southbound direction.

- The flyover ramp at the SR 1/ SR 7 interchange allows for the closure of the loop ramp in the northwest quadrant of the interchange. This modification would eliminate the weaving movements on the existing CD road and also on southbound SR 7, thus improving traffic operations. This improvement also provides an expressway-to-expressway ramp for through traffic (southbound I-95 to southbound SR 1) and therefore separates local traffic from freeway traffic.
- The corridor improvements result in free flow conditions along the entire corridor in the southbound direction and nearly a 40% decrease in average corridor travel times.
- The improvements associated with the Preferred Alternative are expected to enable southbound I-95 to perform under capacity through the year 2015. However, without additional improvements, such as a CD road system, several portions of I-95 will fail by the design year of 2025.

Safety

The accidents currently observed on this segment of I-95 are primarily caused by congestion and lane changes due to merges, diverges and weaves. To illustrate the correlation between congested conditions and high accident rates, recent available accident data (2001) was analyzed at the two most congested areas on the Turnpike – northbound at the SR 1/SR 7 interchange and southbound through the SR 141 interchange. The data indicates that 25 percent of the accidents at the SR 1/SR 7 interchange occur during the AM peak period (6:30AM – 8:30AM), and 42 percent of the accidents at the SR 141 interchange occur during the PM peak period (4:00PM – 6:00PM), whereas peak period traffic only accounts for approximately 10 percent of the annual average daily traffic (AADT). This indicates that the accident rate is highest during the most congested time periods. Therefore, the operational and capacity improvements associated with the Preferred Alternative would be expected to provide an improvement in the safety of the roadway by reducing corridor congestion. Safety would be further enhanced under the Preferred Alternative because the interchange improvements address some existing design deficiencies, including substandard ramp curve radii and substandard acceleration/deceleration lane lengths.

B. Natural Environment

This section provides a general overview and description of the natural environment of the study area. Natural environmental resources investigated for this assessment include physiography, topography and geology; soils; water resources including surface waters, groundwater, hydrology and stormwater management; floodplains; navigable waterways; coastal zones; waters of the United States; woodlands, wildlife and habitat; and rare, threatened and endangered species. A description of each natural resource category presents the existing conditions and potential consequences of the Preferred Alternative to that resource. The consequences section presents those resources found within the right-of-way of the Preferred Alternative and a discussion of potential mitigation concludes the discussion if applicable.

1. Surface and Subsurface Geology

a. Existing Conditions- General Topography, Geology and Soils

Physiography/Topography

At the SR 1 Interchange, the project area south of I-95 is located within the Coastal Plain and physiographic region and the area north of I-95 is located within the Piedmont physiographic

region. The topographic relief of the project is approximately 65 feet ranging from 5 feet to 70 feet National Geodetic Vertical Datum (NGVD). The topography of the surrounding area is relatively flat with elevated embankments associated with the access ramps to SR 1 and the Christiana Mall. At the southern end of the project area, moderately steep stream valley slopes of Eagle Run and its tributaries characterize the topography.

The project area along I-95, between the SR 1 Interchange and SR 141, also lies within the Piedmont and the Coastal Plain physiographic regions. The topographic relief of the area is approximately 80 feet ranging from 10 to 90 feet NGVD.

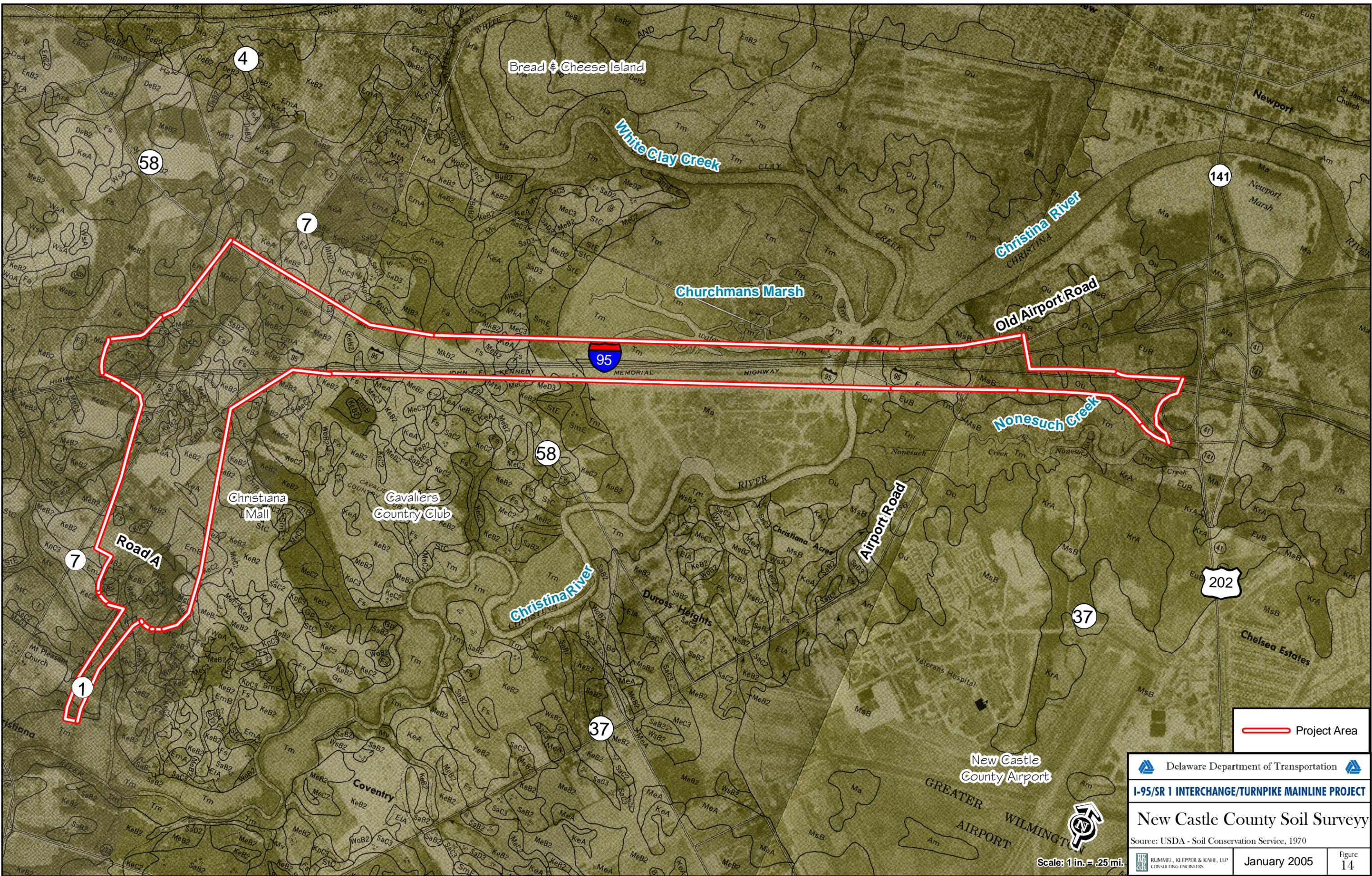
Geology

The underlying bedrock located within the project area is part of the Potomac Formation and is overlain by the Columbia Formation and some present-day Holocene sediment in the interchange area. The Potomac Formation is comprised of unconsolidated Early to Late Cretaceous sediments. They include variegated red, gray, purple, yellow and white, frequently lignitic silts and clays interbedded with white, gray and rust-brown quartz sands and some gravel. Individual beds are usually restricted laterally in northern Delaware. The Columbia Formation is Pleistocene in age, and together with Holocene deposits, is mapped as a surficial Quaternary unit of varying thickness. It consists of unconsolidated, gravelly, coarse and medium sands interbedded with silts. Columbia deposits are fluvial and derived from glaciated areas to the north and northeast. Sediments in present-day stream valleys and marshes are Holocene age fine sands, silts and clay (Source: *Delaware Turnpike Improvements Project Natural and Biological Technical Resources Study*).

Soils

The *New Castle County Soil Survey* states that the project area is composed of soils in the Sassafras-Fallsington-Matapeake association. The Sassafras-Fallsington-Matapeake association is described as level to gently rolling, well-drained and poorly drained, moderately coarse textured and medium-texture soils on uplands. Twenty-eight (28) soil series occur within the project area. Five (5) of the soil series, Elkton silt loam, Fallsington, Mixed Alluvial Land, Othello-Fallsington-Urban and Tidal Marsh, are identified as hydric. Nine (9) of the soil series, Elsinboro-Delanco-Urban, Keyport silty clay loam 5-10% slopes, Made Land and Urban Land complex, Matapeake, Matapeake-Sassafras-Urban Land complex, Sassafras and Matapeake, Mattapex, Sassafras and Woodstown loam 2-5% slopes series are identified as nonhydric. Two (2) others, Keyport 0-5 % slopes and Woodstown loam 0-2% slopes may contain hydric inclusions.

Prime farmland soils are identified within the limits of disturbance of the project. These include Fallsington loam (Fs), Fallsington sandy loam (Fa), Matapeake silt loam (MkB2, MeB2), Mattapex silt loam (MtB2), Sassafras sandy loam (SaB2), and Woodstown loam (WsA). However, these soils are already disturbed from previous construction and are not suitable for farm production. There will be no impacts to prime farmland soils anticipated. The soil units mapped in the project area are listed in **Table 9** and shown in **Figure 14**.



Bread & Cheese Island

White Clay Creek

Christina River

Churchmans Marsh

Old Airport Road

Nonesuch Creek

Christiana Mall

Cavaliers Country Club

Christina River

Duros Heights

New Castle County Airport

GREATER WILMINGTON AIRPORT

Coventry

Project Area

Delaware Department of Transportation

I-95/SR 1 INTERCHANGE/TURNPIKE MAINLINE PROJECT

New Castle County Soil Survey

Source: USDA - Soil Conservation Service, 1970

RUMMEL, KLEPPER & KAHL, LLP CONSULTING ENGINEERS

January 2005

Figure 14

Scale: 1 in. = .25 mi.



Table 9: Soil Units within Project Area

Soil Map Unit	Soil Description	Hydric Soil List	Prime Farmland Soil
EmA	Elkton silt loam, 0-2 percent slopes	Hydric	No
EuB	Elsinboro-Delanco-Urban land complex, 0-8percent slopes	Nonhydric	No
Fs	Fallsington loam	Hydric	Yes
Fa	Fallsington sandy loam	Hydric	Yes
KeA	Keyport silt loam, 0-2 percent slopes, moderately eroded.	Nonhydric*	No
KeB2	Keyport silt loam, 2-5 percent slopes, moderately eroded.	Nonhydric*	No
KpC3	Keyport silty clay loam, 5-10 percent slopes, severely eroded	Nonhydric	No
Ma	Made land and Urban land complex, 0-8 percent slopes	Nonhydric	No
MeA	Matapeake silt loam, 0-2 percent slopes	Nonhydric	Yes
MeB2	Matapeake silt loam, 2-5 percent slopes, moderately eroded	Nonhydric	Yes
MeC2	Matapeake silt loam, 5-10 percent slopes, moderately eroded.	Nonhydric	No
MeC3	Matapeake silt loam, 5-10 percent slopes, severely eroded	Nonhydric	No
MeD3	Matapeake silt loam, 10-15 percent slopes, severely eroded	Nonhydric	No
MkB2	Matapeake silt loam, silty substratum, 2-5 percent slopes, moderately eroded	Nonhydric	Yes
MsB	Matapeake-Sassafras-Urban land complex, 0-5 percent slopes	Nonhydric	No
MtA	Mattapex silt loam, 0-2 percent slopes	Nonhydric	Yes
MtB2	Mattapex silt loam, 2-5 percent slopes, moderately eroded	Nonhydric	Yes
Mv	Mixed alluvial land	Hydric	No
Ou	Othello-Fallsington-Urban land complex	Hydric**	No
SaB2	Sassafras sandy loam, 2-5 percent slopes, moderately eroded	Nonhydric	Yes
SaC2	Sassafras sandy loam, 5-10 percent slopes, moderately eroded	Nonhydric	No
SaC3	Sassafras sandy loam, 5-10 percent slopes, severely eroded.	Nonhydric	No
SaD3	Sassafras sandy loam, 10-15 percent slopes, severely eroded	Nonhydric	No
SmE	Sassafras and Matapeake soils, 15-30 percent slopes	Nonhydric	No
StC	Silty and clayey land, sloping	Nonhydric	No
Tm	Tidal marsh	Hydric	No
WoB2	Woodstown loam, 2-5 percent slopes, moderately eroded	Nonhydric	Yes
WsA	Woodstown loam, 0-2 percent slopes	Nonhydric*	Yes

* Nonhydric - however may contain hydric inclusions

** Othello and Fallsington are hydric. Urban land is nonhydric.

b. Consequences

Total impacts to topography and soils from the Preferred Alternative depends upon the amount of cut and fill required to complete the project, which will be determined during the design phase of the project. The Preferred Alternative will require grading and moving of soil in areas in order to achieve suitable elevations for roadway construction. Overall, changes in the topography can be expected to be minor and small scale. No effects to the underlying geology are anticipated.

No long-term impacts to topography, prime farmland soils, soils or the geology in the project area are anticipated under the Preferred Alternative.

c. Mitigation

The activities during construction/excavation and the equipment utilized for these activities could potentially affect soils and create a risk to local water resources. During times of precipitation, exposed soil surfaces will be susceptible to the detachment and transportation of sediments into local water bodies. Properly designed and maintained soil and erosion control facilities will be used to prevent sediment from entering the Christina River and its tributaries.

2. Water Resources

a. Surface Water

(1) Existing Conditions

The Christina River is the largest surface water body located within the project area. The river's headwaters begin in Maryland and it enters Delaware north of Newark. The Christina River flows through the coastal plain, then widens and becomes tidally influenced upstream of its confluence with the Delaware River. The Christina River is tidally influenced in the vicinity of the project area. It has a total stream length of 84.8 miles and a mainstream length of 27.0 miles. Eagle Run, a nontidal tributary of the Christina River, crosses through the southern edge of the I-95/SR 1 Interchange improvement site.

The project area is located within the Christina River and White Clay Creek watersheds. The Christina River Basin provides 75 percent of the water supply for residents and businesses in New Castle County. The Christina River Basin is occupied mainly by 3 land uses: Urban/Suburban (34 percent), Agricultural (31 percent), and Open Space/Forested Lands (35 percent). The White Clay Creek watershed is truly an exceptional resource. The White Clay Creek watershed is renowned for its scenery, opportunities for birding and trout fishing and for its historic features. The watershed is also an important source of drinking water for residents in both Pennsylvania and Delaware. In 1991, citizens of the White Clay Creek area requested that the creek and its tributaries be considered for inclusion in the National Wild and Scenic Rivers System. To protect this great resource, the White Clay Creek watershed became part of the Wild and Scenic Rivers System in June 2001 and is under the jurisdiction and management of the National Park Service (NPS). In general, surface water quality in Delaware has remained fairly stable due to water quality protection program efforts to control both point and non-point source pollution in spite of increased development and population growth. Negative impacts to water quality are mainly the result of past practices or contamination events, non-regulated activities, or changes that are occurring on a regional scale.

As established under the Clean Water Act (CWA), water quality standards are the regulations that list designated uses, water quality criteria and an anti-degradation policy. The standards have been established to protect public health and welfare and enhance water quality. Designated uses are the water uses specified in water quality standards for each water body. The CWA requires that the uses are achieved and protected, even if they are not currently being

attained. Supported uses for Eagle Run and Christina River according to State surface water quality standards are shown in **Table 10**.

Table 10. Uses Supported by Surface Waters in the Vicinity of the Project Area

River	Public Water Supply	Agricultural Water Supply	Industrial Water Supply	Primary Contact Recreation	Secondary Contact Recreation	Aquatic Life Support & Cause	Fish Advisory
Eagle Run (tributary of Christina River)	F	F	F	N	F	N, Dissolved oxygen	N
Christina River	--	--	F	N	F	F	Y

Source: State of Delaware Watershed Assessment Report (305 (b)), April 2000.

F = Fully Supports; N = Does Not Support, or No Advisory; P = Partially Supports; Y = Fish Consumption Advisory in Place.

According to the State of Delaware 2000 Watershed Assessment Report (305(b)), prepared by the DNREC, the streams of the watershed suffer from impaired water quality due to the following problems: nutrients, toxics, bacteria, fish consumption advisories, sediment, and stream habitat. The following Delaware Fish Consumption Advisories as of June 1999, shown in **Table 11**, were In the Report.

Table 11 : Water Quality Data for Eagle Run and Christina River (1997-1999)

River	Assessed Parameters						Toxics	Fish Advisory
	pH (Standard = 6.5-8.5)			Temperature (C) (Standard = 30 C)				
	Max	Min.	Avg.	Max	Min.	Avg.		
Eagle Run	7.6	6.8	7.2	23.3	-	-	PCBs, Dieldrin	No consumption
Christina River	7.8	6.3	7.2	27.3	-	-	PCBs, Dieldrin	No consumption

River	Dissolved Oxygen (mg/l) (Standard =5.5)			Total Nitrogen (mg/l)			Total Phosphorous (mg/l)			Chlorophyll a (ug/l)			Enterococcus Bacteria (standard= 100#/100ml)		
	Max.	Min.	Avg.	Max.	Min.	Avg.	Max.	Min.	Avg.	Max.	Min.	Avg.	Max.	Min.	G.M.
Eagle Run	12.6	1.5	6.6	1.301	0.225	0.739	0.113	0.021	0.082	21	-	9	-	-	289
Christina River	10.8	5.0	8.3	2.312	0.206	1.164	0.318	0.070	0.149	179	-	56	-	-	153

Max.= Maximum, Min. = Minimum, Avg. = Average, G.M. = Geometric Mean - = no data available

Source: State of Delaware 2000 Watershed Assessment Report (305(b)) April 2000

Surface Water Resource Protection Areas are defined as lands that drain on the surface or underground to existing and proposed public water supply reservoirs and the land surfaces within the 100-year floodplain and steep slopes adjacent to the floodplain upstream of any existing or proposed public water supply intakes.

According to the May 2001 Water Resource Protection Area maps prepared by the University of Delaware, there are no surface water resource protection areas located within the project area.

(2) Consequences

The Preferred Alternative has the potential to affect surface waters to some degree. Direct impacts to waters of the US are discussed in more detail in Section II.B.7, Waters of the US including Wetlands.

In addition to direct impacts, the Preferred Alternative also has the potential to indirectly affect surface waters. The Preferred Alternative will result in an increase in impervious surfaces within the project area. The conversion of open-space and forested areas to impervious areas would be expected to increase surface runoff and peak storm flows as well as introduce sediment and other pollutants into waterways.

Additional adverse effects to surface water quality may occur during construction of a Preferred Alternative. Grading operations would expose soil to erosion during storm events, leading to sedimentation of project area waterways.

(3) Mitigation

Direct impacts to waters of the US will require a Section 404 permit from the U.S. Army Corps of Engineers (ACOE), a Section 10 Rivers and Harbors Act permit from the ACOE (see Section 5.a.) and a Subaqueous Lands Permit from DNREC. Water quality and Coastal Zone Consistency Certifications are also required from DNREC for work within waters of the US. Ongoing coordination with the NPS, who administers the Wild and Scenic Rivers program, will determine any requirements of that program based on the presence of the project within the White Clay Creek watershed. Impacts have been minimized where possible during the preliminary engineering phase and minimization options will continue to be explored during the design phase.

Studies have shown that many of the adverse indirect effects of highway runoff water quality can be minimized through the use of stormwater Best Management Practices (BMPs). Detention and retention ponds provide both quantity and quality controls as they temporarily store runoff to allow for settling of suspended solids and retention of sediment and other runoff contaminants. Extended detention and retention ponds have been shown to be very effective in removing pollutants such as metals. Nutrient removal can be enhanced in stormwater management through the use of shallow marsh systems, with the greatest potential for pollutant removal in a wetland/pond combination.

A stormwater management plan will be developed in accordance with Delaware's Sediment and Stormwater Regulations to minimize adverse effects to water resources. The plan will include measures to address both quantity and quality controls (See Section II.B.3 Hydrology and Stormwater Management for more details). Water quality is further protected through the requirement to obtain a Section 401 water quality certification from DNREC as part of the permit process for impacts to wetlands and waterways.

Adverse impacts to water quality during construction will be minimized through strict adherence to DelDOT erosion and sediment control procedures. Sediment erosion control plans, which include measures such as turbidity curtains, porta dams, super silt fence, clean water diversions, check dams, sediment basins, and seeding and mulching will be developed during the design process and reviewed by DelDOT as part of the permitting process. All the erosion control devices will undergo daily inspections to ensure they are functioning properly. Additional protection will be given to aquatic resources during construction through the strict observance of time of year restrictions.

The following are typical construction specifications that could be incorporated into the special provisions to prevent contamination of surface waters:

- A spill contingency plan will be developed prior to construction to reduce contamination of the water supply with gasoline, diesel fuel, oil, concrete, paint, asphalt, or other similar potential spills during construction.
- Planking, tarps, wraps or other suitable containment materials will be used to prevent debris from falling into the Christina River during construction.
- Borrow areas for fill material and construction staging areas will be located in upland areas. The amount of material that will need to be borrowed or wasted from the project impact area will be calculated as design progresses.
- Surplus or unsuitable material will be disposed of in an approved landfill.
- Construction and demolition within waters of the US will be limited by time of year restrictions to reduce impacts to fish spawning.
- All work will be performed in accordance with the approved sediment erosion control plans and stormwater management plans.
- Heavy equipment will be placed on mats or suitable materials to prevent damage to waters of the U.S.
- Onshore sanitary facilities will be provided during construction activities

b. Groundwater

(1) Existing Conditions

Delaware's ground water resources are generally abundant and of high quality. Groundwater serves approximately two-thirds of the domestic water needs for the State's population.

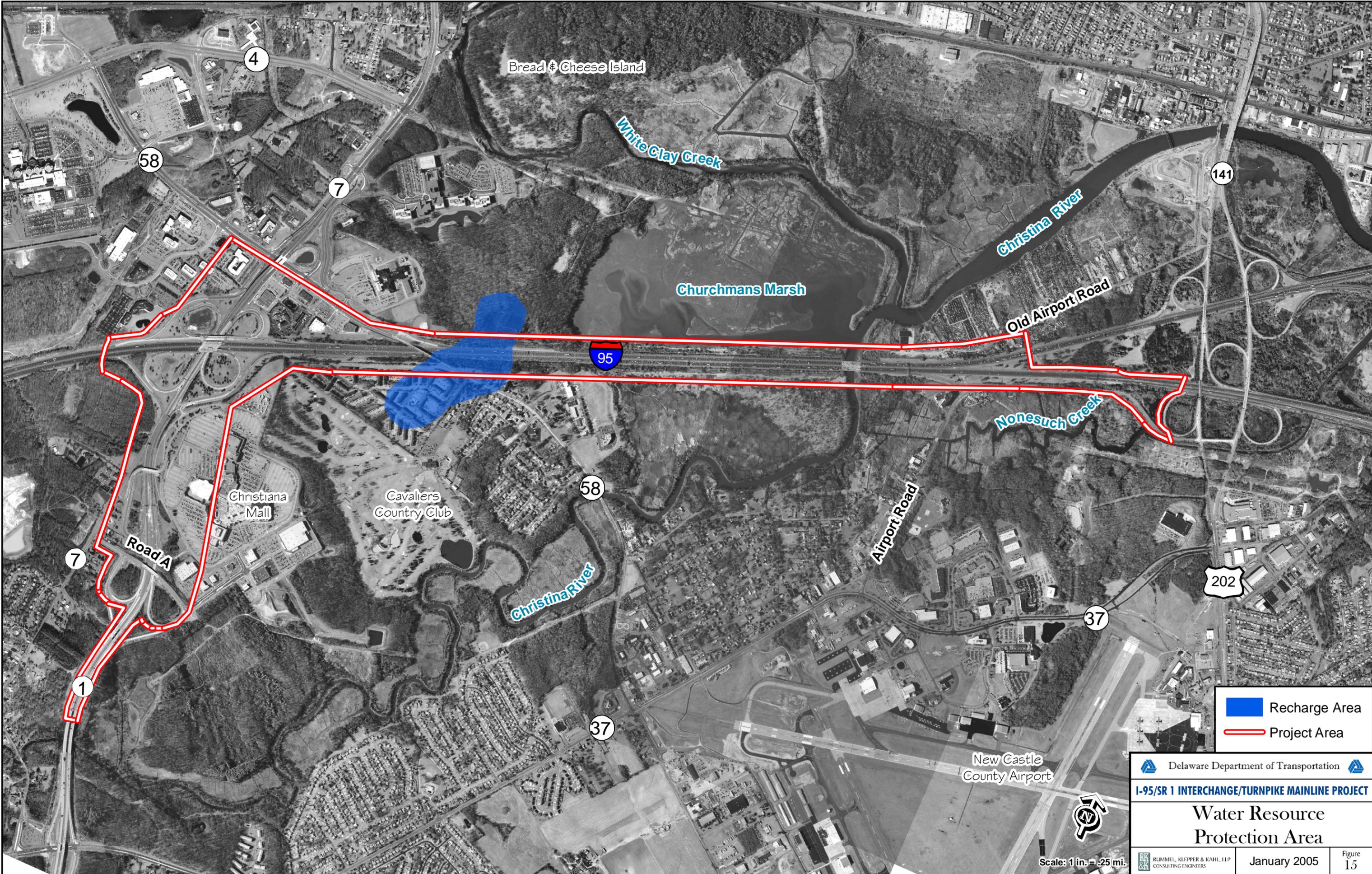
The greatest concentration of Delaware's residential, commercial, and industrial development is located north of the C & D Canal. This portion of the State accounts for approximately 60 percent of the State's total freshwater use of which one-third is from groundwater sources.

Groundwater Resource Protection Areas

New Castle County enacted a water resource protection ordinance in September 1991. This ordinance is designed to maintain sufficient groundwater recharge and maintain water use requirements and stream flow. Two types of Groundwater Resource Protection Areas (RPA) were established: Recharge RPAs and Wellhead RPAs.

Recharge RPAs are defined as areas identified as having surfaces underlain with deposits permeable enough to promote infiltration to groundwater. Pollutants released to these areas have the potential to enter the groundwater system. Land use management restrictions are aimed at preventing pollution sources in these areas. In addition, since these areas presently serve as recharge areas, permitted land use must maintain the rate and quality of stormwater runoff, and volume and quality of groundwater recharge, at predevelopment levels. One Groundwater Recharge RPA is located at the intersection of I-95 and SR 58 (Churchmans Road), as shown on **Figure 15**. Regulations governing development in Resource Protection Areas are set forth in the New Castle County Unified Development Code Section 40.10.380. DelDOT is exempt from the permit process for projects in water resource protection areas.

Wellhead RPAs are defined in Section 1428 (e) of the Federal Safe Drinking Water Act "the surface and subsurface areas surrounding a water well or well field, supplying a public water system, through which contaminants are reasonably likely to move toward and reach such water or well field." There are no Wellhead RPAs located within the project area.



- Recharge Area
- Project Area

Delaware Department of Transportation

I-95/SR 1 INTERCHANGE/TURNIPIKE MAINLINE PROJECT

Water Resource Protection Area

Scale: 1 in. = .25 mi.

Wells in Project Area Vicinity

Twenty-five community public water systems serve 96 percent of the total population of New Castle County (WRANCC, 1989). These systems consist of two large, private investor-owned suppliers (Artesian Water Company and Wilmington Suburban Water Corporation), 6 municipalities and 17 small community systems.

DNREC permit records of public and private wells indicate that five domestic and one industrial private water supply wells are located within or adjacent to the project area. No public wells are located in the project area.

Sole Source Aquifers

The project area lies within the Potomac Aquifer. This aquifer consists of unconsolidated sedimentary deposits of the Coastal Plain. These deposits store and transmit water through interconnected pore space. The Potomac Aquifer is composed of several sandy zones within the Potomac Formation. These sandy zones are interbedded with variegated clay and differ considerably in lateral extent.

The project area is located completely within the stream flow source zone of the New Jersey Coastal Plain Aquifer System, a Sole Source Aquifer. The US EPA defines a sole source aquifer as one that supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer. These areas can have no alternative drinking water source(s) that could physically, legally, and economically supply all those who depend upon the aquifer for drinking water. Proposed federal financially assisted projects, which have the potential to contaminate the designated sole source aquifer, are subject to EPA review.

(2) Consequences

No long-term impacts to resource protection areas, public wells or sole source aquifers are anticipated with the Preferred Alternative.

The Preferred Alternative would not require excessive excavation to construct, thereby preventing any alteration of groundwater flow within the Corridor. However, potential sources of groundwater contamination from highway deicing, urban runoff, and fuel tank leakages may seep into groundwater supplies as the movement of water between surface water and groundwater provides a pathway for chemical transfer between the terrestrial and aquatic systems.

Highway construction could influence aquifer recharge areas through direct conversion of land to impermeable surfaces. The increase in impervious cover associated with the additional highway lanes could increase runoff velocities by limiting the percolation time of stormwater into the groundwater pathways, ultimately decreasing base flows of adjacent surface waters.

(3) Mitigation

Implementation of BMPs during and after construction, such as stormwater management ponds, biofiltration systems, and the use of sediment/erosion control will reduce the amount of contaminants entering groundwater supplies by treating runoff from the roadway before entering streams. Implementing proven construction practices and design features will also minimize potential impacts to the water quality of groundwater resources. Potential groundwater contamination activities can be minimized as follows: chemical products will be properly contained and disposed of offsite at an approved dumping facility; all vehicular equipment will be in good working condition with no fluid leakage; when not in use, the equipment will be parked on a non-permeable surface; and spills or leaks will be cleaned immediately by removal of the contaminated soil.