

III. ENVIRONMENTAL RESOURCES AND CONSEQUENCES

This chapter details the important features of the project area that are potentially impacted by the implementation of the Preferred Alternative, and reviews those impacts of the alternatives not preferred. The project area, as shown in *Figure III-1*, includes an approximately one-mile wide corridor surrounding the centerlines of the four retained alternatives in southern New Castle County. The northern boundary generally follows the C&D Canal from just west of US 301 to just east of SR 1. The eastern boundary of the project area parallels SR 1/US 13 to Boyds Corner Road before turning west to parallel SR 896, and then traverses south through Middletown. The southern limit of the study area includes US 301 in Warwick, Maryland. The western boundary of the project area parallels Choptank Road and Bethel Church Road to the C&D Canal.

In addition to the project area described above, some data were developed using a larger portion of southern New Castle County in order to simplify data collection and present a regional picture of the area in which the project is being proposed. The larger project area is the Middletown-Odessa-Townsend (M-O-T) Planning District of New Castle County (refer to *Figure III-2*).

A more detailed discussion of the resources, impacts and consequences of the project is presented in the technical reports that are listed in *Appendix D* and incorporated herein by reference.

In this chapter, *Section A* presents the existing socioeconomic environment, including: land use; population, housing, employment, and transportation; communities and community facilities; potential environmental justice issues; and visual and aesthetic conditions. *Section A* uses the larger M-O-T Planning District for most data collection. *Section A* also details the impacts of the project on socioeconomic resources and discusses avoidance, minimization and mitigation commitments to lessen the impacts of the project on these resources.

In *Section B*, the evaluation of cultural resources includes a summary of the research and evaluation of architectural and archaeological resources to date. The section presents a list of known historic structures and buildings that may be affected by the project alternatives. The effects of the Preferred Alternative on historic structures, as detailed in the *Documentation in Support of a Finding of Adverse Effect and Memorandum of Agreement* (Draft, September 2007), and potential strategies to avoid, minimize or mitigate adverse effects are summarized. Finally, the section provides a summary of the development of the Archaeological Predictive Model with regard to areas of potential archaeological sensitivity. A Memorandum of Agreement (MOA) between the FHWA, DelDOT, the Delaware SHPO and the Maryland Historical Trust (MHT) outlines the steps to be taken to complete the Section 106 consultation process with regards to both archaeological sites and historic structures. A copy of the draft MOA is included in *Appendix H*.

Section C presents a discussion of air quality and potential impacts of the project. *Section D* discusses noise sensitive receptors in the project area, potential noise impacts of the project and potential noise abatement. *Section E* presents an overview of hazardous materials sites in the project area that may be affected by or affect the implementation of a build alternative.

Section F presents a summary of natural environmental resources, including: topography, geology and soils; groundwater; surface water and water quality; floodplains; waters of the United States, including wetlands; vegetation and wildlife; rare, threatened and endangered species; coastal zone management areas; and unique and sensitive areas. *Section F* also details the impacts of the project on natural resources and discusses avoidance, minimization and mitigation commitments to lessen the impacts of the project on these resources.

Traffic, energy and temporary construction impacts of the project are discussed in *Sections G, H, and I*, respectively. A secondary (indirect) and cumulative effects analysis is presented in *Section J*. The final sections of this chapter present a consideration of mobile source air toxics (MSATs, *Section K*), the relationship between local short-term uses of the human environment and the maintenance of enhancement of long-term productivity (*Section L*) and the irreversible and irretrievable commitment of resources (*Section M*).

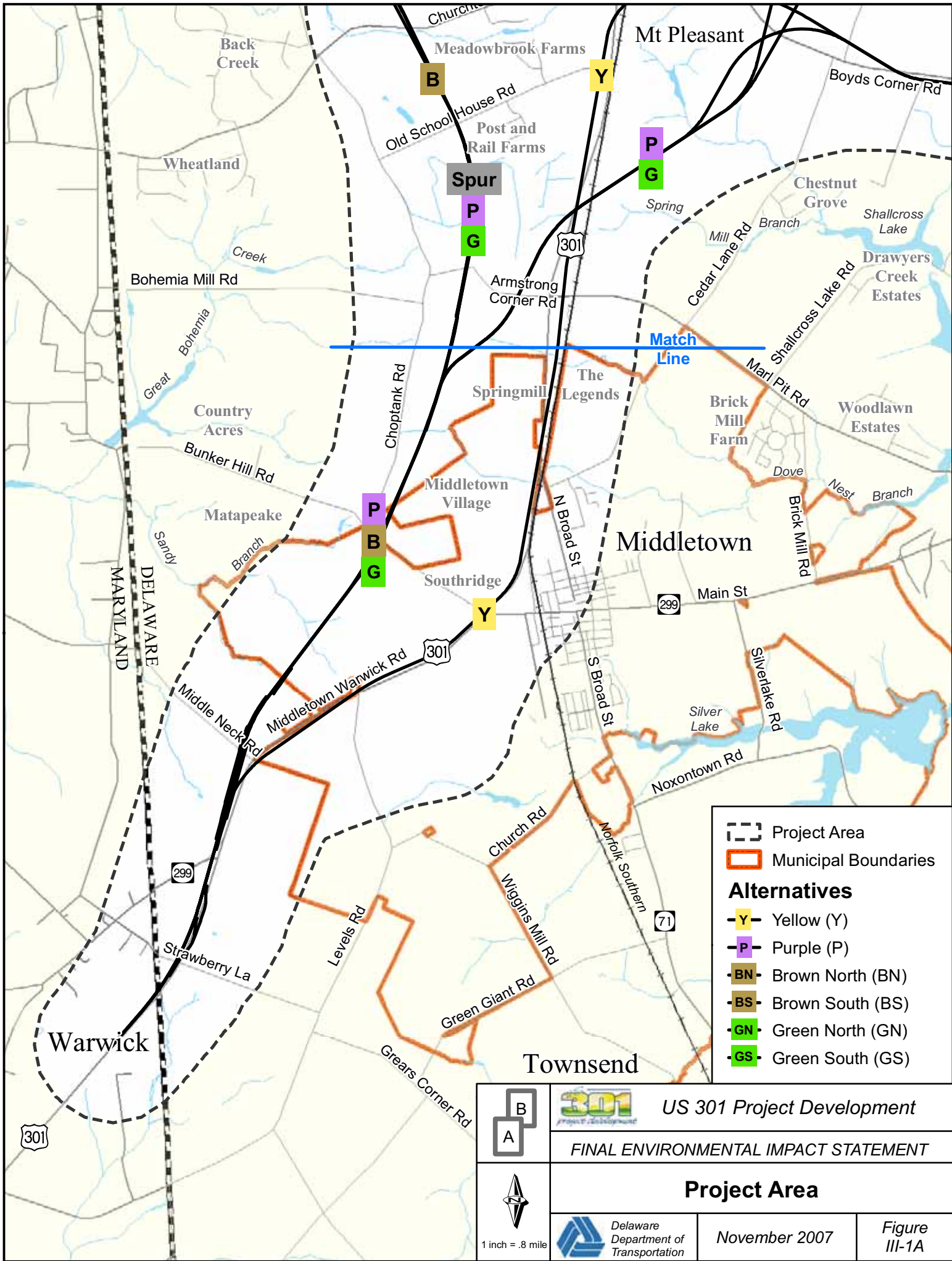
A. Socioeconomic Environment

This section describes the existing social and economic setting of the project area, shown in *Figure III-1*. A regional overview of southern New Castle County is presented, followed by descriptions of the three incorporated towns in the area. A discussion of the project's conformity with local and regional plans and with state and county-wide planning documents concludes the regional overview. Resources inventoried and evaluated include land use, population, and housing; communities and community facilities; parks and recreation areas (including greenways); demographics and environmental justice; economic resources; and aesthetics and quality of life issues. The potential impacts of the alternatives on the socioeconomic resources are described along with efforts to avoid, minimize, or mitigate those impacts.

1. Regional Overview

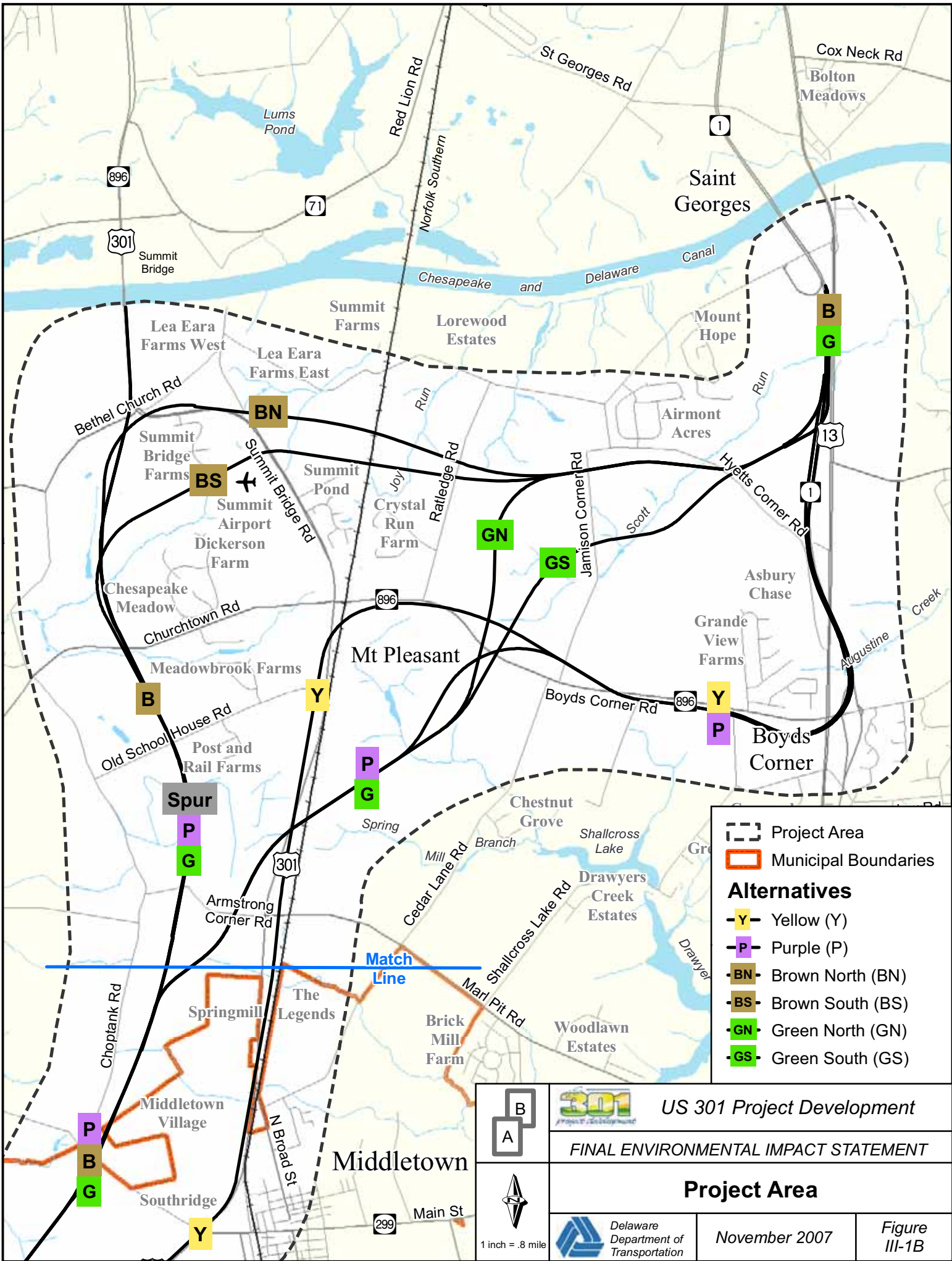
New Castle County, Delaware, is the fastest growing and most developed of Delaware's three counties. The county accounts for 64 percent of Delaware's total population, 64 percent of the state's labor force, 65 percent of the total employment in the state, and 80 percent of the state's total wages (*New Castle County 2002 Comprehensive Development Plan Update*, adopted March 25, 2002).

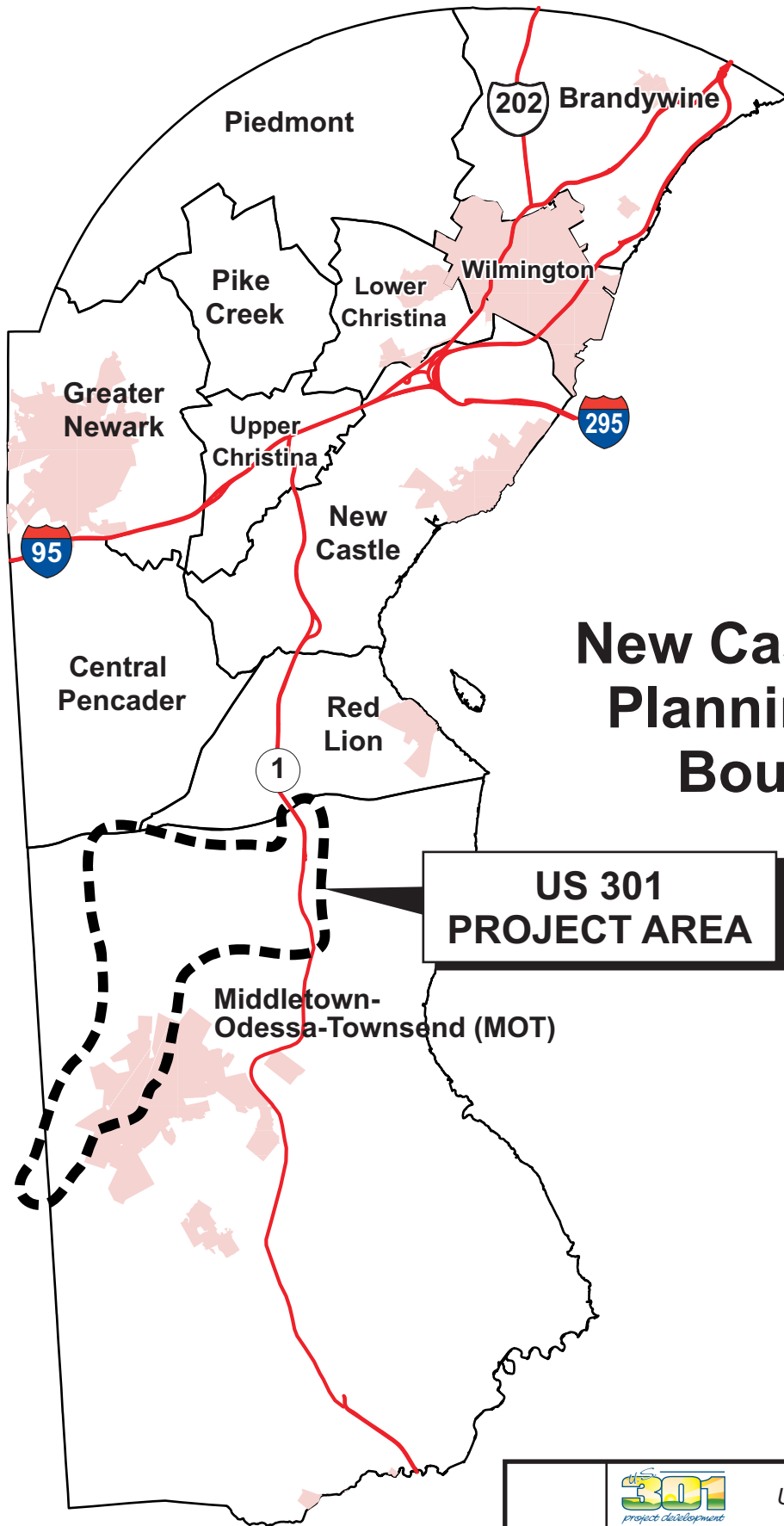
The county is divided east-west by the Chesapeake and Delaware (C&D) Canal. North of the Canal, growth has been more intense and concentrated in the areas around Newark and Wilmington, spreading to new communities supported by transportation provided by I-95, US 40, and SR 2, as well as public transportation options including commuter rail (Southeast Pennsylvania Transit Authority, or SEPTA) and buses. South of the Canal, growth has historically occurred at a slower rate until recent decades. Since 1990, the area surrounding the Canal has experienced a boom in residential development (both built and planned) because of the availability of land and adopted zoning changes. Between 1970 and 2000, 68,231 new homes were built in New Castle County, with the highest rates of growth in the three planning districts closest to the Canal: Central Pencader and Red Lion to the north and the Middletown-Odessa-Townsend (M-O-T) Planning District south of the Canal. In the M-O-T Planning District (see *Figure III-2*) alone, 3,324 new homes were constructed in the decade between 1990 and 2000.



	Project Area
	Municipal Boundaries
Alternatives	
	Yellow (Y)
	Purple (P)
	Brown North (BN)
	Brown South (BS)
	Green North (GN)
	Green South (GS)

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Project Area			
		Delaware Department of Transportation	November 2007
1 inch = .8 mile			Figure III-1A





New Castle County Planning District Boundaries

**US 301
PROJECT AREA**

Middletown-
Odessa-Townsend (MOT)

Source:



NOT TO SCALE



As Shown



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FINAL ENVIRONMENTAL IMPACT STATEMENT

NEW CASTLE COUNTY
PLANNING DISTRICT BOUNDARIES



Delaware
Department of
Transportation

November 2007

Figure
III-2

a. Middletown-Odessa-Townsend Planning Area

New Castle County’s 2002 *Comprehensive Development Plan Update* designates the area within New Castle County south of the Canal as the M-O-T Planning District. According to the Wilmington Area Planning Council (WILMAPCO), in the past three decades the population of the M-O-T district has almost tripled, from 10,077 persons in 1970 to 29,682 persons in 2000. The number of households has more than tripled, from 3,101 in 1970 to 9,549 in 2000. This growth is projected to continue to 2025, as shown in **Table III-1**.

Table III-1: Total Population and Household Trends in the Middletown-Odessa-Townsend Planning District, 1970 to 2025

MOT	1970	1980	% change	1990	% change	2000	% change	2025	% change
Total Population	10,077	13,120	30.2%	18,634	42.0%	29,682	59.3%	48,214	62.4%
Total Households	3,101	4,454	43.6%	6,225	39.8%	9,549	53.4%	18,627	95.1%

Source: New Castle County 2002 Comprehensive Development Plan Update

The accelerated growth in recent years continues to spur new development in the M-O-T region as a whole. The available stock of single family housing units doubled between 2000 and 2004, as noted in the 2007 *New Castle County Comprehensive Plan Update* (adopted July 24, 2007).

Each of the three incorporated towns (Middletown, Odessa, and Townsend) has seen varying degrees of development. Middletown has been affected most by pressures of new development and has added more than 1,898 acres through annexation, with the most recent annexations in July 2007. The Town of Townsend, south of US 301, has also undergone significant annexations, which have increased the size of the municipality from 111 acres to 587 acres. Odessa, southeast of US 301, has maintained the town boundaries and seen a reverse trend in development within its incorporated limits, with population and households decreasing over the last 30 years. According to the U.S. Census Bureau, Odessa’s population was 547 in 1970 and decreased to 286 in the year 2000.

The M-O-T region has traditionally experienced balanced residential, educational, commercial, and industrial growth; however, in the last fifteen years there has been a shift to extensive residential growth. This growth has been heavily concentrated north of the M-O-T towns, around the C&D Canal bridge crossings on the St. Georges Bridge (US 13) and the Summit Bridge (US 301). One focus of the new comprehensive plan is to control sprawl and concentrate growth in southern New Castle County within an area roughly bounded by the C&D Canal, US 301, SR 1 and the Town of Middletown.

Business, commercial and economic growth in the M-O-T planning area has not been as active as residential growth. Development patterns and levels of economic growth vary between the three municipalities that are within the M-O-T Planning District, and are assessed below on an individual basis. Each has prepared a town Master Plan, which sets forth goals and objectives for future growth and development.

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Middletown

The Town of Middletown is the traditional hub of the farming community that surrounds it. Incorporated in 1861, the town began at the crossroads of Main Street and Broad Street, and after its incorporation, was laid out in a grid pattern around those crossroads. The town grew in importance in the region due to the railroad (currently owned and operated by the Norfolk Southern Railroad), which became the chief conveyance of grain and other agricultural goods to markets.

In Middletown, the majority of new construction is residential and has taken place in the areas immediately north, east, and west of the town center. Based on past market conditions, build-out of current projects would not be expected to be completed for approximately ten years. Approval and construction of some planned development is currently on hold until proposed additional sewage treatment facilities can be completed in the town of Middletown. The areas of Middletown designated for residential and commercial growth are Westown, Greenlawn, The Legends, Middletown Village, and Cricklewood. Middletown has responded to development pressures by annexing land to the east, west, and south of town to accommodate new growth; the latest annexations took place in July, 2007. Additional acres are planned for annexation in the next few years.

The town has developed a separate Master Plan (a Livable Delaware Growth Plan) for the approximately 2,500 acres of land that was annexed west of SR 71, identified as the Westown growth area. The proposed land use plan for the Westown area includes:

- Residential including single-family, duplexes, and townhouses;
- Commercial including an auto mall, home improvement store, and miscellaneous retail;
- Business including office space, manufacturing, and industrial;
- Park, recreation space, and open space; and
- Educational including a primary school campus and a college campus.

The proposed development has been approved, and roadway improvements that will support traffic generated by the project are under construction or in design. The proposed schedule for the roadway improvements is 2005 to 2010.

The *2001 Update to the 1998 Middletown Comprehensive Plan* (March 5, 2001) (*Middletown Comprehensive Plan*) identifies the “Ridge Route” from the US 301 MIS and has preserved the north-south right-of-way in their land use plan for the improvements to US 301. (The Ridge Route is incorporated in the Purple, Brown, and Green Alternatives.) The *Middletown Comprehensive Plan* recommends continued coordination with DelDOT and WILMAPCO in the decision making process for a US 301/Middletown interchange to allow for integration of land use with the town’s transportation network. The US 301 roadway corridor has been identified as the western boundary of development on the 2001 zoning map, and the town has preserved the land within the US 301 corridor for such use. The *Middletown Comprehensive Plan* recommends that US 301 serve as a boundary for office and industrial uses, and transition to preserved agricultural land to the west. The updated *Town of Middletown Comprehensive Plan* (adopted November 2005) acknowledges the US 301 Project Development process and

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recognizes the benefits to the town of the completion of a new, limited-access highway with an interchange at Levels Road.

Odessa

The Town of Odessa (area 0.4 square miles) saw a decline in population and households between 1970 and 2000. The town is bisected north-south by US 13, which divides within the town limits, and SR 299 (Main Street) in an east-west direction. Odessa has a small amount of commercial development, which is located west of and between the northbound and southbound lanes of US 13. According to the *2001 Odessa Comprehensive Plan*, much of the commercially zoned land is either vacant or underutilized. Odessa is an historic community, which aims to strengthen historic design guidelines and zoning ordinance amendments to discourage development plans and also preserve environmentally sensitive areas. The town is impacted by existing vehicular traffic on US 13 (although less so since the completion of SR 1) and SR 299 as vehicles use this roadway through town to access SR 1. Residents are concerned about noise, air quality, and pedestrian mobility issues caused by increased traffic in the area.

Based on the 2006 Update to the 2001 Town of Odessa Comprehensive Plan (October 2006), Odessa will continue to focus on residential growth within its boundaries, with the possibility of annexation of a small (approximately 75 acres) amount of additional land for mixed residential and commercial development.

Townsend

Townsend is located south of Middletown, west of SR 71, and is bisected by the Norfolk Southern Railroad and Caldwell Corner Road (Main Street). Similar to Odessa, land use in Townsend is predominantly single-family residential. There are a limited number of apartment units. Due to a series of recent annexations there is a large portion of land on the north side of town which is planned for new residential development. The town has a small core of commercial, office, and industrial land uses concentrated around the intersection of the railroad and Main Street, and includes the remaining regional grain elevator and storage/shipping facility in southern New Castle County. Like Odessa, there are limited commercial employers and community service centers scattered throughout the town (the *2003 Townsend Comprehensive Plan*).

b. Transportation Network

In southern New Castle County (the M-O-T Planning District), travel patterns include those related to employment, local travel, and intra-regional travel. Travel patterns and potential impacts of the project on travel patterns are discussed in this chapter in **Section G**.

Roadway Network

The roadway network in southern New Castle County consists of freeway, arterial, collector and local roadways, as shown on **Figure III-1**. The county is traversed in a north-south direction by four major roadways and the Norfolk Southern Rail line:

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- US 301 enters southern New Castle County on the west side at the Delaware/Maryland state line and travels through the west side of the Town of Middletown, parallel to the Norfolk Southern rail alignment. US 301 crosses the C&D Canal on the Summit Bridge.
- US 13 traverses the entire state from the southern border of Delaware and Maryland in Sussex County to the northeastern border of Delaware and Pennsylvania.
- SR 1 is a limited access tolled highway. SR 1 parallels US 13 from south of Dover to I-95. SR 1/US 13 delineates the eastern edge of the project area.
- Outside and to the east of the project area, SR 9 traverses the state along the Delaware River.

There are two major arterial east-west routes in southern New Castle County. SR 299, which enters Delaware from Maryland after passing through the Town of Warwick, passes through Middletown (Main Street) and Odessa as it crosses the county ending at SR 9. Churchtown Road/Boyd's Corner Road (SR 896) crosses the county north of Middletown. Both of these roads interchange with SR 1 at the east edge of the project area.

Numerous local roads cross southern New Castle County and provide a transportation network for the area's residents. Local roads include Choptank Road, Churchtown Road, Old Schoolhouse Road, Armstrong Corner Road, Bohemia Mill Road, Strawberry Lane, Levels Road, Marl Pit Road, Cedar Lane Road, Bunker Hill Road, Hyetts Corner Road and Lorewood Grove Road. Many of the local roads intersect within the Town of Middletown. SR 71 provides a north-south connection between Middletown and Townsend.

Transit Service

In southern New Castle County, public transportation services are provided by the Delaware Transit Corporation (DTC). DTC, an operating division of the DelDOT, is the statewide provider of public transportation services in Delaware. In southern New Castle County, the existing public transit services are commuter bus service and local shuttle bus.

Two bus routes service the project area and the Town of Middletown:

- Route 301 – Express commuter bus service along SR 1 between Wilmington and Dover. Route 301 operates weekdays between 5:40 AM and 8:50 PM and operates express only service with stops at the Boyd's Corner and Odessa Park and Ride lots.
- Middletown Shuttle – Operates daily providing connections to the Route 301 Express route at the Odessa Park and Ride. The Middletown Shuttle operates local stop service from the Bethesda United Methodist Church Park and Ride along SR 299 to the Odessa Park and Ride. DTC is currently evaluating two proposals to expand service to accommodate the growth occurring at locations west of existing US 301.

Transit facilities designed to support public transportation are located within the M-O-T area. These include:

- Boyd's Corner Park and Ride is located in the northeast quadrant of SR 1 and Pole Bridge Road. It includes 216 parking spaces and is served by Route 301.

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- Odessa Park and Ride is located in the northwest quadrant of SR 1 and DE 299. This facility includes 102 parking spaces and is served by bus Route 301 and the Middletown Shuttle.
- Bethesda United Methodist Church Park and Ride is located near the corner of East Main Street and North Broad Street. It includes 20 parking spaces and is served by the Middletown Shuttle.
- Mid-County Operations and Maintenance Facility was opened in 2004 and is located in the southeast quadrant of US 13 and SR 72. This facility provides dispatch and maintenance of transit vehicle operations in southern New Castle County.

c. *Project Conformity with State and Regional Plans*

The US 301 Project Development effort is in conformity with the guidelines for development set forth in *Delaware Strategies for State Policies and Spending 5 Year Update July, 2004*, also known as *Livable Delaware*. In that document, guidelines indicate preferred locations, within designated growth areas, of limited access roadways and bypasses, as well as areas where preservation, rather than growth, is the objective of the planning process. During the alternatives development process, these policies for growth areas were reviewed and considered in the planning process.

The *New Castle County 2002 Comprehensive Development Plan Update* discusses regional conformity with WILMAPCO's *Long Range Transportation Plan*, and continued interaction with DeIDOT and WILMAPCO to implement *The Greater Route 301 Major Investment Study* and other major roadway projects. The US 301 Project Development effort is consistent with the implementation of that plan. In the *2007 New Castle County Comprehensive Plan Update*, partnered planning for transportation with WILMAPCO and DeIDOT is identified for various transportation projects, including the US 301 Project.

Neither the *Town of Townsend Comprehensive Plan* (adopted February 2003; revised August 2003) nor the *Town of Odessa Comprehensive Plan 2001* discusses US 301 project. The updated *Middletown Comprehensive Plan* (November 2005) discusses various transportation improvements in southern New Castle County, including the Choptank Road improvements, the tri-party agreement between the developers, New Castle County and Middletown for the transportation improvements associated with the Westown development, and the US 301 project. The plan states that the town has adopted a course of action to preserve land along the ridge route for the new limited access roadway and to preserve a corridor for the upgrade of existing US 301 to a four-lane roadway, should either option be selected. The town recognizes the ridge route as the western boundary for development and recommends that New Castle County limit development west of this route. In facilitating the plan, the town has taken an active role in the location of a Middletown interchange with the new roadway as part of US 301 Project Development.

On September 27, 2006, a Memorandum of Agreement was entered into by DeIDOT; the Office of State Planning Coordination; the Delaware Department of Agriculture; New Castle County; three school districts (Appoquinimink, Colonial and Smyrna); the Towns of Middletown, Odessa and Townsend; and WILMAPCO for collaborative and cooperative comprehensive planning of

land development, infrastructure and services for southern New Castle County. A part of that agreement indicates that the alignment for US 301 is an important component of the transportation infrastructure in southern New Castle County.

2. Land Use

a. *Existing Conditions*

According to the Delaware Office of State Planning Coordination, the majority of land use in the project area as of 2002 is agricultural (64.2 percent). Residential use and forest lands make up the next largest portions of land in the project area. Urban land uses, including commercial, industrial, institutional, and transportation, are scattered throughout the project area but are primarily concentrated in the towns and along US 301 and the major arterials. The percentages of each land use category are shown in **Table III-2** and on **Figure III-3**.

Table III-2: Existing Land Use in the Project Area

Land Use	M-O-T Planning District		Project Area	
	Area (acres)	Percent	Area (acres)	Percent
Residential	14,149	11.6	2,869	14.6
Agriculture	58,747	48.4	12,578	64.2
Forest	14,192	11.7	1,346	6.9
Recreation/Open Space	442	0.4	143	0.7
Water	3,271	2.7	131	0.7
Wetlands	25,261	20.8	869	4.4
Transitional	1,374	1.1	321	1.6
Urban/Built Up ¹	4,067	3.3	1,334	6.7
Total	121,503	100%	19,591	100%

Source: Delaware Office of State Planning Coordination, 2002; Maryland Department of Planning, 2002

Notes: ¹Urban/Built Up includes transportation, commercial, industrial, and institutional.

Although the existing land use in much of the project area is shown as agricultural or forest, much of the area included in these categories is planned and/or approved for development (see **Section A.3**).

b. *Environmental Consequences and Mitigation*

There are no direct impacts to land use with the No-Build Alternative.

The Preferred Alternative will impact 941 acres in the project area. Based on the 2002 land use GIS data layer provided, the largest conversion, 757 acres, will be of land currently used for agriculture. Other existing land uses that will be converted are shown in **Table III-3**. Impacts to these uses and potential mitigation are discussed separately in other sections of this document, including the SCEA in **Section III.J**.

Table III-3: Preferred Alternative Acres to be Converted from Current Uses

2002 Land Use Category	Acres	2002 Land Use Category	Acres
Agricultural	757	Transportation/Utility/ Communication	31.3
Commercial	14.8	Transitional	19.6
Forest	43.5	Urban	4.1
Industrial	0.0	Water	0.1
Residential	39.6	Wetlands	27.1

Source: 2002 Land Use – Delaware Office of State Planning Coordination

Notes: Wetland acres are calculated based on 2002 Land Use only.

Overall LOD acres also include a portion in Maryland.

Implementation of any of the build alternatives, including the Preferred Alternative, will result in the conversion of acres from present land uses to transportation land use. Changes in land use that would occur as a result of the build alternatives, based on the New Castle County Department of Planning 2002 database, are shown in *Table III-4*.

Table III-4: Build Alternatives - Acres to be Converted from Current Uses

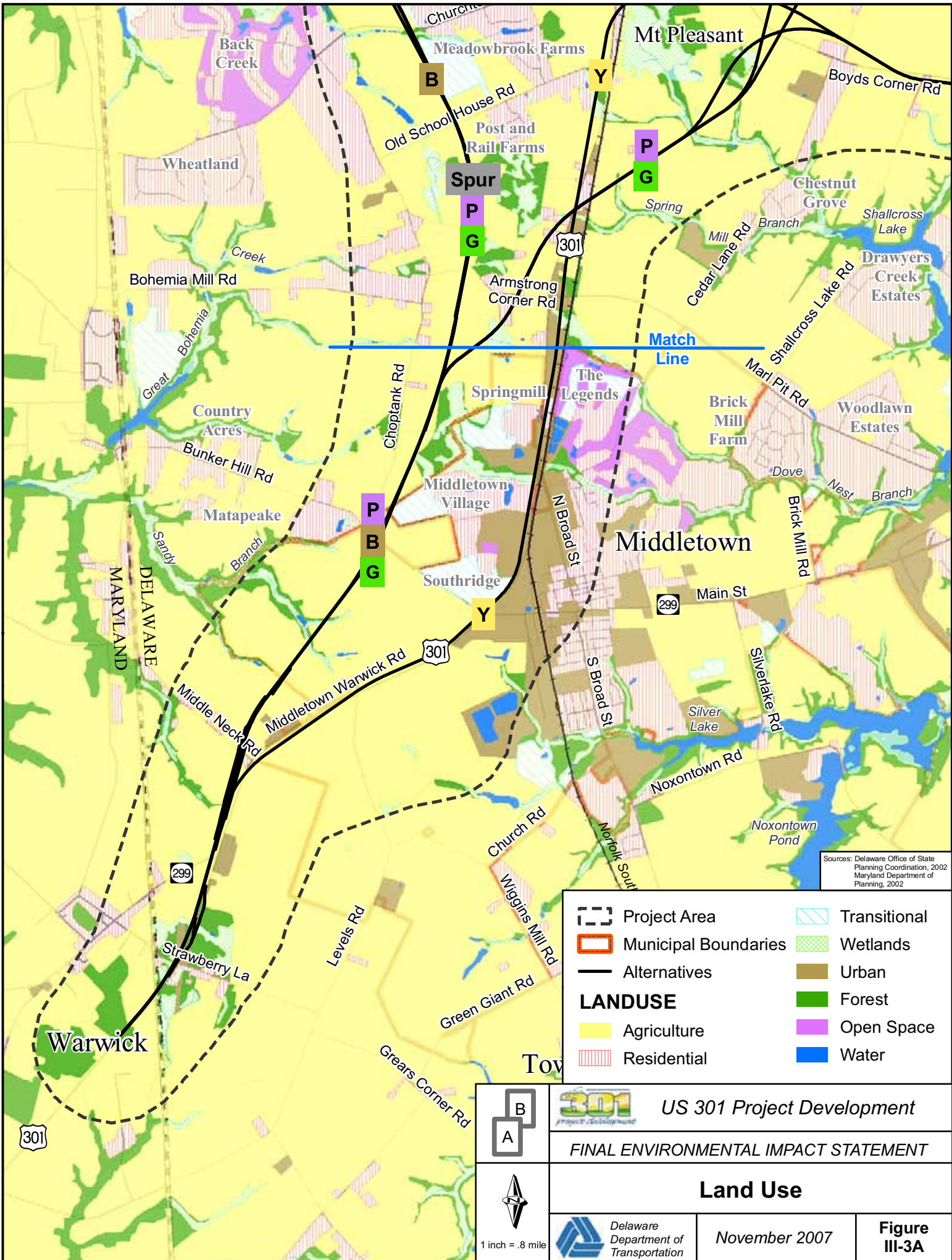
2002 Land Use Category	Yellow	Purple	Brown North	Brown South	Green North (DEIS)	Green South
Agricultural	521.1	693.3	766.5	739.9	745.9	721.0
Commercial	66.2	11.1	8.2	8.2	9.1	9.1
Forest	40.1	43.0	40.7	54.2	37.2	39.4
Industrial	1.8	0.0	0.0	0.0	0.0	0.9
Residential	81.8	42.6	11.5	15.9	38.2	38.0
Transportation/Utility/ Communication	66.3	64.0	23.4	22.1	22.0	22.0
Transitional	14.9	19.3	26.2	16.7	20.9	20.8
Urban	52.5	4.4	5.4	24.4	4.1	4.1
Water	2.3	0.5	0.1	0.5	0.1	0.1
Wetlands	23.4	23.3	13.4	12.3	19.5	20.1
Total (rounded to nearest whole number)	870	906	896	894	897	875

Source: 2002 Land Use – Delaware Office of State Planning Coordination

Notes: Wetland acres are calculated based on 2002 Land Use and 2006 field delineations, except for the Preferred Alternative, which is based only on 2002 Land Use.

Overall LOD acres also include a portion in Maryland.

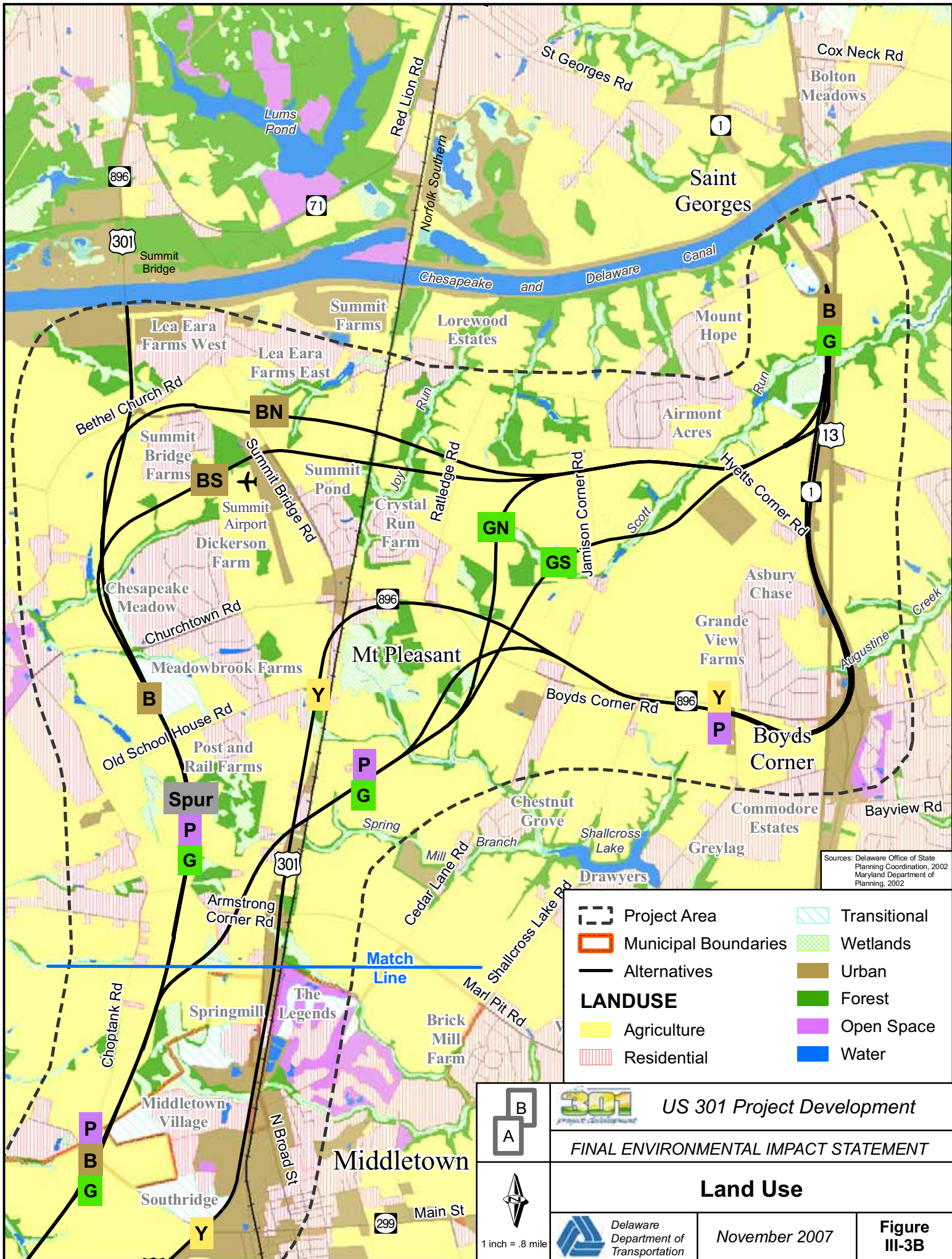
Alternatives are as shown in Appendix A and B and include the preferred options.



Sources: Delaware Office of State Planning Coordination, 2002
 Maryland Department of Planning, 2002

- | | | | |
|----------------|----------------------|--|--------------|
| | Project Area | | Transitional |
| | Municipal Boundaries | | Wetlands |
| | Alternatives | | Urban |
| LANDUSE | | | Forest |
| | Agriculture | | Open Space |
| | Residential | | Water |

 A B	 US 301 Project Development
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Land Use	
 1 inch = .8 mile	 Delaware Department of Transportation
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Figure III-3A	



Sources: Delaware Office of State Planning Coordination, 2002
 Maryland Department of Planning, 2002

- Project Area
- Municipal Boundaries
- Alternatives
- LANDUSE**
- Agriculture
- Residential
- Transitional
- Wetlands
- Urban
- Forest
- Open Space
- Water

 1 inch = .8 mile	 US 301 Project Development FINAL ENVIRONMENTAL IMPACT STATEMENT	
Land Use		
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3. Planned Development

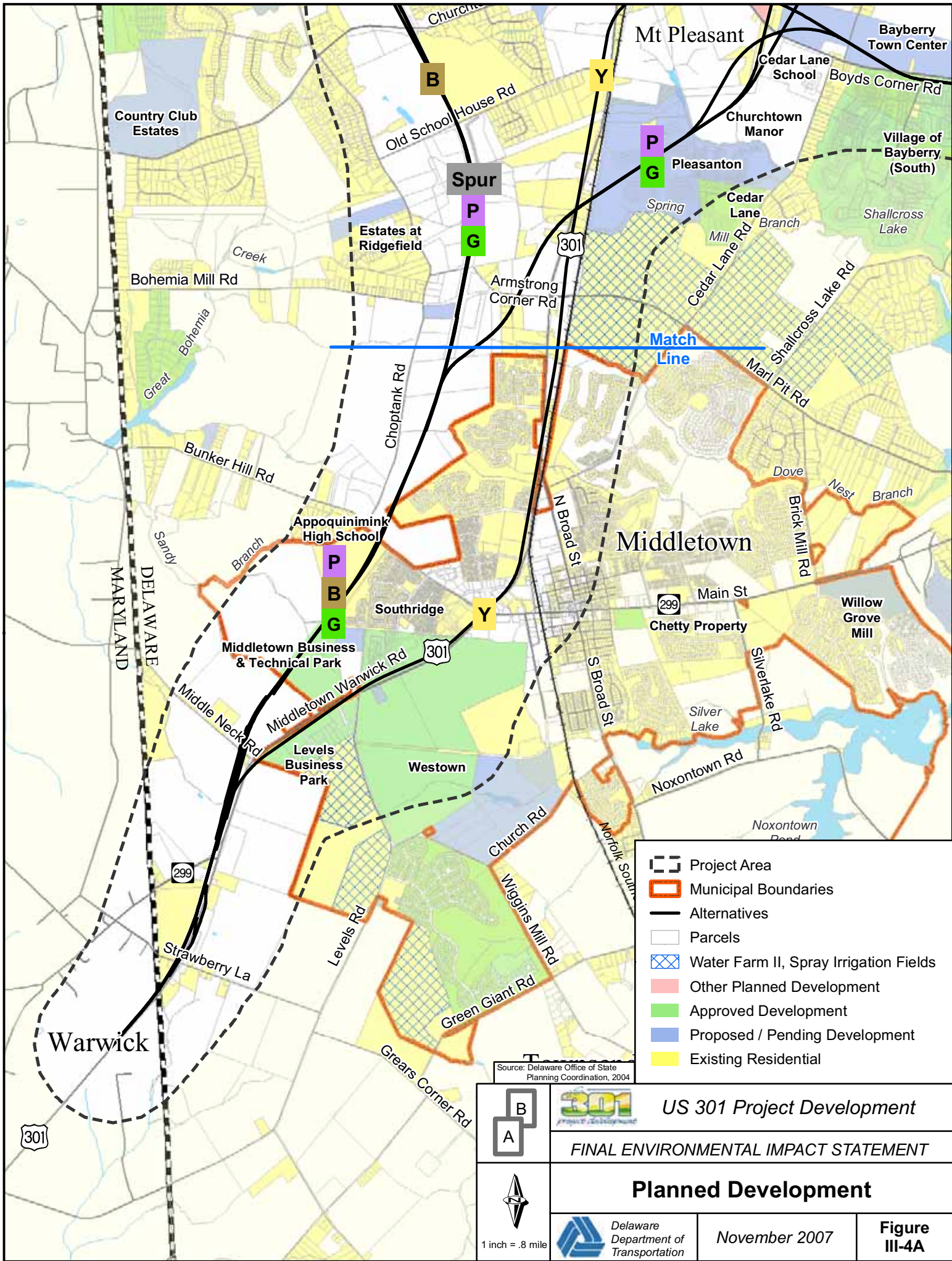
a. *Existing Conditions*

There is a large amount of development, approved, pending or under construction, within the M-O-T Planning District. Planned development for unincorporated areas of southern New Castle County is listed in *Table III-5 and Table III-6*. Additional residential development is planned, built or under construction within the incorporated town limits of Middletown (including Westown) and Townsend, as listed on *Table III-7*. *Figure III-4* shows planned development in the project area.

**Table III-5: Planned Residential Development in the Project Area
within Unincorporated Areas of M-O-T Planning District**

Development Name	Type	Acres	# of Units	Status
Cantwell Ridge	Residential	129.6	187	Approved
Bohemia Mill Pond	Residential	123.7	50	Approved
Back Creek II	Residential	181.2	76	Approved
Spring Creek	Residential	112.6	142	Approved
Lorewood Estates	Residential	21.4	10	Approved
Bishops Walk	Residential	39.1	42	Approved
Robinson Run North	Residential	63.8	68	Approved
Shannon Cove	Residential	518.5	410	Approved
Sugar Loaf Farms	Residential	32.9	28	Approved
Goldsborough Farm	Residential	65.1	81	Approved
Odessa National	Residential	614.8	761	Approved
Stonefield	Residential	145.5	186	Approved
Enclave at Odessa	Residential	157.8	205	Approved
Asbury Chase II	Residential	59.3	40	Approved
Baymont Farms	Residential	217.6	157	Approved
Bayberry North	Residential	463.0	768	Approved
Bayberry South	Residential	835.7	1,186	Approved
Cedar Lane	Residential	87.3	78	Approved
Biggs Farm	Residential	30.3	20	Approved
Country Acres II	Residential	10.6	6	Approved
Fairways at Odessa National	Residential	68.5	80	Approved
Country Club Estates	Residential	246.7	116	Pending
Canal View at Crossland (Age-Restricted)	Residential	70.8	262	Pending
Crossland	Residential	139.1	170	Pending
Rothwell Village	Residential	141.8	150	Pending
Village of Scott Run (Age-Restricted)	Residential	175.3	271	Pending
Carter Farm	Residential	407.2	412	Pending
Pleasanton East	Residential	226	293	Pending
Pleasanton	Residential	435.6	564	Pending
Windsor at Hyetts Corner	Residential	150.1	143	Pending
Penfield/Lester Property	Residential	113.6	140	Pending
Spring Oaks	Residential	102	119	Pending
Robinson Crossing	Residential	121.6	81	Pending
Total, Approved & Pending	N/A	6,308	7,302	N/A

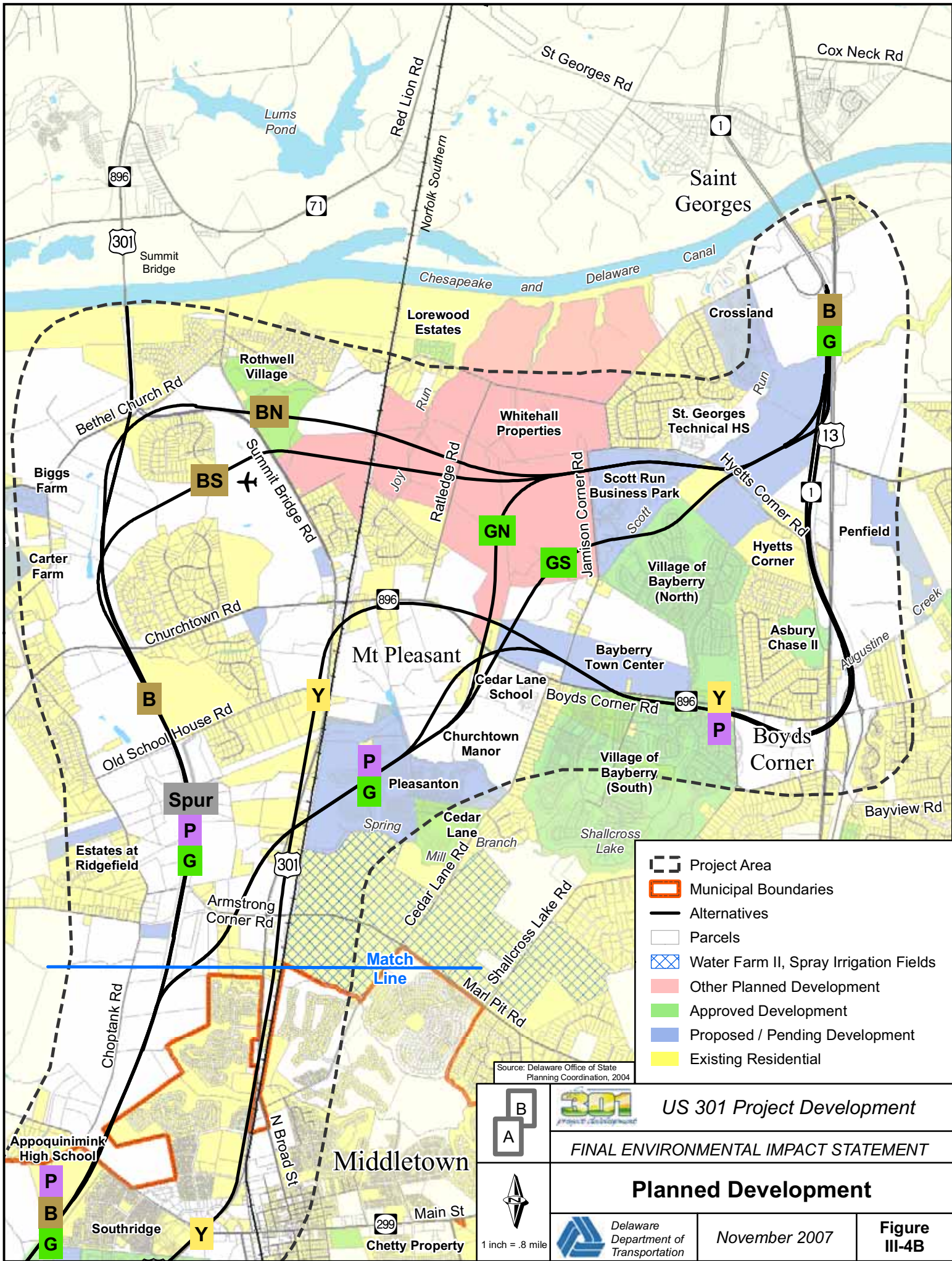
Source: New Castle County Department of Planning and Zoning web pages. Status as of 2007. Approved development may be under construction.



- Project Area
- Municipal Boundaries
- Alternatives
- Parcels
- Water Farm II, Spray Irrigation Fields
- Other Planned Development
- Approved Development
- Proposed / Pending Development
- Existing Residential

Source: Delaware Office of State Planning Coordination, 2004

	<i>US 301 Project Development</i>		
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<p>1 inch = .8 mile</p>	Planned Development		
	November 2007		Figure III-4A



- Project Area
- Municipal Boundaries
- Alternatives
- Parcels
- Water Farm II, Spray Irrigation Fields
- Other Planned Development
- Approved Development
- Proposed / Pending Development
- Existing Residential

Source: Delaware Office of State Planning Coordination, 2004

		US 301 Project Development
FINAL ENVIRONMENTAL IMPACT STATEMENT		
Planned Development		
		Delaware Department of Transportation
1 inch = .8 mile		November 2007
		Figure III-4B

Table III-6: Planned Non-Residential Development in the Project Area within Unincorporated Areas of M-O-T Planning District

Development Name	Type	Acres	# of Units	Status
Scott Run Business Park	Light Industrial	230.9	1.7 M sq ft	Approved
Bayview Crossing	Commercial	9.98	--	Approved

Source: New Castle County Department of Planning and Zoning. Status as of 2007. Approved development may be under construction.

Table III-7: Planned Residential Development in Middletown

Development Name	Total Units	Type
Middletown		
Estates at St. Anne's	465	Single family homes
Dove Run	298	Single family homes
Lakeside	185	Single family homes
Legends	378	Single family homes
Longmeadow	243	Single family homes
Middletown Crossing	134/100	Single family homes/ Duplexes
Parkside	492	Single family homes
Springmill	362	Single family homes
Spring Arbor at Southridge (Westown)	182/12/123	Single family homes/Duplexes/Triplexes (age-restricted 55+)
The Parkway at Southridge (Westown)	1/4/237	Single family homes/Duplexes/Townhomes
Westown (Levels)	1,000/260/540	Single family homes/Duplexes/Townhomes
Willow Grove Mill	339/248/192	Single family homes/Townhomes/Condominiums
Highlands	172/611/220	Duplexes/Townhomes/Apartments
Caribou Lane	22	Townhomes
Congressional Village (Legends)	96	Condominiums
Middletown Village	262/514/300	Single family homes/Townhomes/Condominiums
Chetty Builders Main Street Complex (Mixed Use)	312	Condominiums Retail, Restaurant and Day Care
Total Dwelling Units	8,304	N/A

Source: Rae Teel, Middletown Town Manager's Office and Tim Deschepper, Middletown Planner. Includes developments of 10 or more dwelling units.

As shown in *Tables III-5 and III-7*, there are a total of 7,302 new dwelling units planned or under construction in the unincorporated portion of southern New Castle County in and adjacent to the project area, and over 8,000 planned or under construction within the town of Middletown. When added together, the total number of new dwelling units in the project area (constructed since the 2000 Census, under construction, and approved) is over 15,000.

There are also a number of planned non-residential developments approved, permitted, or under construction in Middletown and in the unincorporated portion of the project area. These are identified on *Tables III-6 and III-8*.

Table III-8: Planned Non-Residential Development in Middletown

Middletown			
Development Type	Details	Total Size	Comments/Status
Office	Cricklewood Grove Office Park	25,000 sf	--
	Cricklewood Grove Medical Office	9,900 sf	--
	Greenlawn Office Park	141,704 sf	--
	Middletown Corporate Center	126,300 sf	126,300 sf proposed; 13,500 under construction
Retail/Commercial	Cricklewood Grove Office Park	15,000 sf	--
	Market Place Shopping Center	160,000 sf	71,708 sf completed; 18,524 proposed
	Middletown Commons	221,141 sf	62,140 sf completed; 164,797 proposed
	Middletown Crossing	310,000 sf	Remaining 50,900 sf under construction
	Middletown Square Shopping Ctr	--	69,019 sf remain
	Middletown Village Shopping Ctr	155,608 sf	25,989 sf completed
	Willow Grove Mill	460,000 sf	Proposed WaWa with gas pumps
Pederson Property	203,313 sf	Retail/office and restaurant (19,500 sf)	
Storage Units	Delaware Industries	5-1,200 sf units	Built or under construction
	Sentinel Self Storage	--	81,525 sf completed
Industrial	Middletown Industrial Park	@ 275 acres	
Middletown – Westown			
Development Type	Property/Development	Comments/Status	
Education	Elementary, Middle & High Schools, Day Care	Appoquinimink High School (210,000 sf; under construction); to accommodate @ 2,850 students	
	Future 4-Year College	Proposed; currently an agricultural preserve	
Manufacturing; industrial	Levels Business Park	700,000 sf on 100 acres; 105,230 sf completed; 99,097 sf proposed (5 sites); 30,750 sf under construction	
Manufacturing	Bunker Hill Center I	214,699 sf completed; 14,000 sf under construction; 38,130 sf proposed	
	Bunker Hill Center II	191,243 sf completed or under construction	
Industrial	Auto Mall	Auto Mall 54 acres	
	Kohl Industrial Center	Walmart/Retail/Office – 78 acres; Office Park – 20 acres	
Retail	Westown Town Center Cochran Farm Property Westown Ramunno Property	1,528,100 sf total 1,198,000 sf approved including Westown Town Center	
	Middletown Commons	250,741 sf proposed; 226,937 completed	
Commercial	Bunker Hill Center	11,400 sf restaurant space	
	Kohl Commercial Property	621 hotel rooms	
	Cochran Farm Property	95.96 acres - Auto Mall	
Office	Various locations	550,000 sf total	
		280,000 sf approved	
Public Facilities	Town Park	100 acres under construction	
	Future Recreation Area	100 acres; sports fields (currently in agricultural preservation, TDR in process)	

Sources: Rae Teel, Middletown Town Manager's Office; Westown - Tim Deschepper, Middletown Town Planner
sf = square feet

b. Environmental Consequences and Mitigation

There will be no impacts to planned development with the No-Build Alternative. Completion of any of the build alternatives, including the Preferred Alternative, will directly impact some planned developments in the project area. The Preferred Alternative will impact areas of Westown, Pleasanton, Churchtown Manor, Scott Run Business Park, the Village of Scott Run and the Whitehall Properties. Some planned developments have agreements with New Castle

County, DelDOT and/or Middletown to accommodate a planned US 301 roadway; others may be willing to accommodate a planned US 301 in their development plans. DelDOT has consulted and will continue to consult with the owners/developers of these and other affected planned development areas to provide appropriate compensation for property acquisitions. Further information on property acquisitions is found in *Section A.5* of this chapter.

Of the major developments in the project area, the proposed Westown development would be impacted by construction of the Yellow Alternative and minimally impacted by the construction of the Green, Purple, and Brown Alternatives. The development plans for Bayberry would be impacted by construction of the Yellow, Purple or Green South Alternatives. Scott Run Industrial Park would be affected by construction of the Green or Brown Alternatives.

4. Farms and Farmland

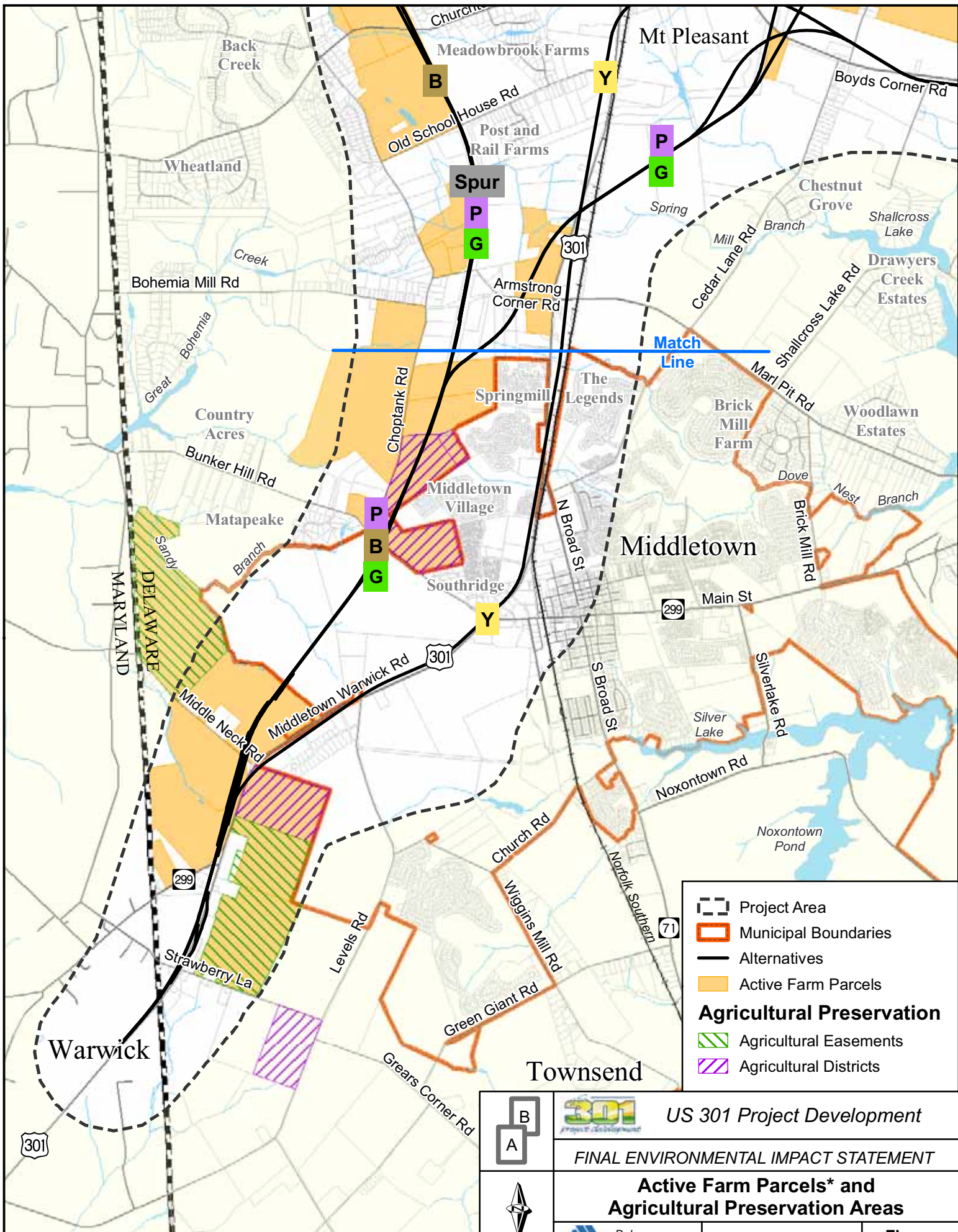
a. *Existing Conditions*

Despite rapid residential growth in southern New Castle County, 48.4 percent of land use remains agricultural. Within the project area, 64.2 percent of the land use is designated agricultural (DE Office of State Planning, 2002 Land Use) although much of that land is planned or approved for development (*Tables III-5, III-6, III-7 and III-8*). According to the USDA 2002 Census of Agriculture (National Agricultural Statistics Service: www.nass.usda.gov), approximately 26 percent of New Castle County was farmed, representing a 25 percent decrease compared to 1987 farm use.

Active farms make up a significant portion of the proposed right of way for the alternatives, and most of the project area consists of prime farmland soils (*Figure III-14*). Currently, active farmland in the project area is located primarily north and west of Middletown between existing US 301, the C&D Canal and the state line. Many of these farms are located off of Choptank and Bohemia Mill Roads. Additional active farms are located adjacent to the project area to the south. *Figure III-5* shows the land use areas identified as active farmlands (see below) and designated agricultural preservation areas in the project area.

Five farms within the project area are designated as agricultural districts or easements. Districts provide a temporary agreement between the owner and state or county to continue using the land for agriculture for a 10-year period (renewable), while agricultural easements are farms that are permanently dedicated to farming. This dedication is recorded as a deed covenant and is carried forward to all future owners.

Farms within the project area include dairy and equine operations and crop production (mainly corn, wheat, barley and soybeans) (USDA 2002 Census of Agriculture). Field surveys were conducted during June 2006 to identify active (with crops or livestock visible) farmlands within the limit of disturbance of the alternatives. Farmlands that appeared to have transitioned into non-agricultural uses were not included in the survey, nor were farm parcels already approved for development. Based on the field survey, county tax parcel maps and aerial survey mapping, 28 active farm parcels were identified within or adjacent to the project area.



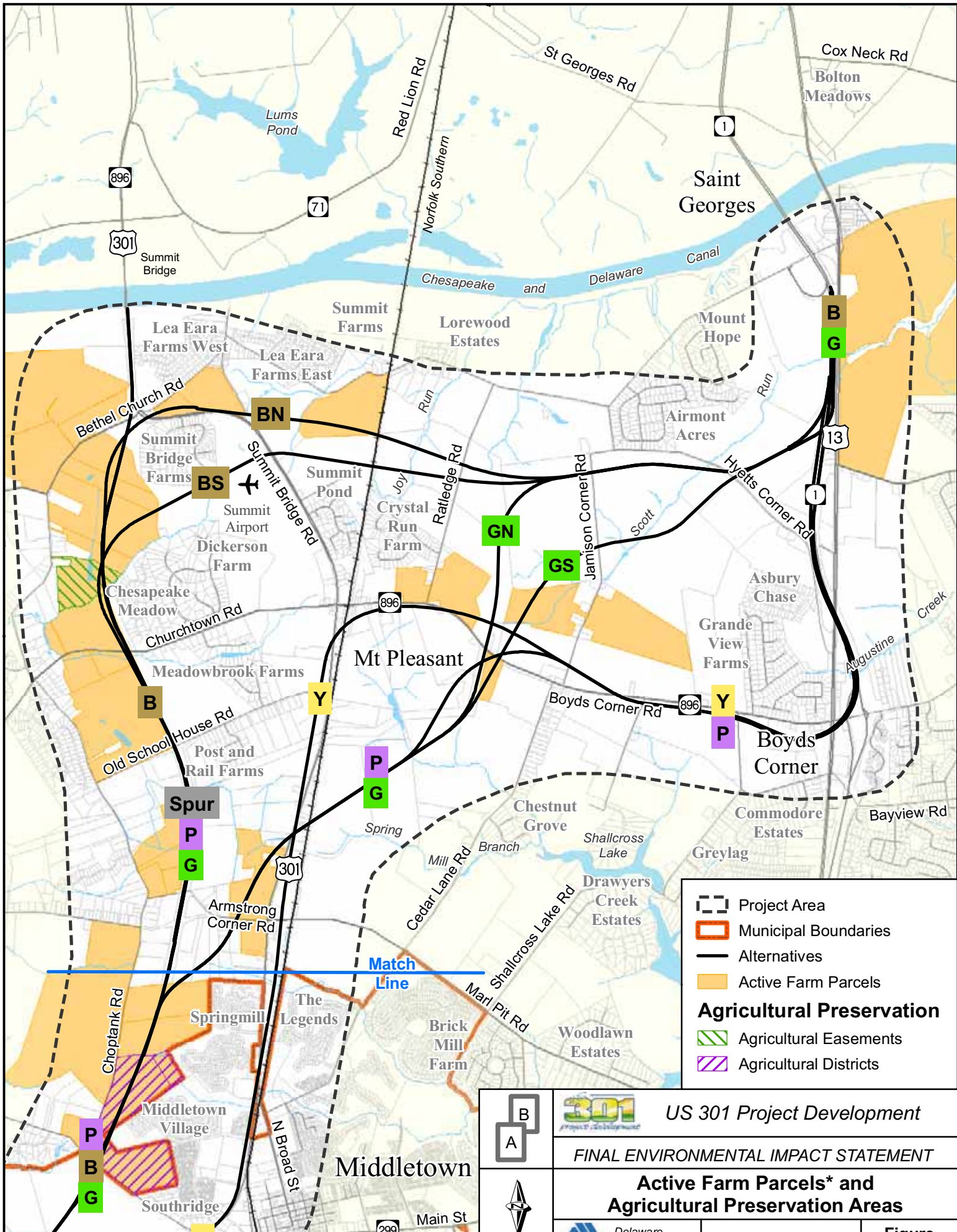
*Active farm parcels were estimated during 2006 windshield survey and review of aerial photography; excludes farm parcels pending/approved for development.

1 inch = .8 mile

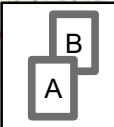


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Figure III-5A



*Active farm parcels were estimated during 2006 windshield survey and review of aerial photography; excludes farm parcels pending/approved for development.



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Active Farm Parcels* and Agricultural Preservation Areas



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Figure III-5B

There are businesses within the project area that are vital to or support agriculture. South of Middletown, Middletown Veterinary, Hooper, Inc. (Case Tractor), and Money’s Farm Market are located along existing US 301. North of Middletown, Logullo’s Country Market, M L Whiteman & Sons Landscape Contractors, Ciamaricone’s Landscaping, and Mr. Mulch are located adjacent to existing US 301. In addition to those businesses located adjacent to major roadways within the project area, the Peavey Agricultural Products processing plant and grain storage/shipping facility is located in Townsend and serves the needs of many of the local farmers in both Delaware and Maryland.

b. Environmental Consequences and Mitigation

Farm parcels were evaluated using the Land Evaluation Site Assessment (LESA) model, a state and federally approved land analysis system that rates agricultural parcels for suitability for long-term agricultural use. A higher LESA score indicates high agricultural suitability. The 300-point rating system is based on a Land Evaluation (LE) factor (determined by using a land use dependent soil productivity index) and a Site Assessment (SA) factor (derived from non-soil factors, many of which are non-agricultural).

For each alternative, the specific parcels impacted by the alternative were quantitatively assessed by multiplying the LESA score by the amount of land within the parcel that is impacted, thus providing an acre-weighted total score for the specific portion of land impacted. The acre-weighted total scores for each of the affected parcels were then added and divided by the number of acres impacted by the alternative. The result is an acre-weighted score for each alternative.

The LESA score for the Preferred Alternative is 211; 15 farms (as identified during field survey in 2006) were identified as impacted. The LESA score with development parcels excluded is 219. The LESA evaluation for the retained alternatives is shown in **Table III-9**.

Table III-9: LESA Model Scores for Impacted Farm Parcels

Alternative	Yellow Alternative	Purple Alternative	Brown Alternative North Option	Brown Alternative South Option	Green Alternative North Option (DEIS)	Green Alternative South Option
Farms Impacted ¹	9	16	13	15	15	15
LESA Score ²	192	203	198	202	210	204
LESA Score ³	212	218	202	209	218	213

Notes: 1. Includes the total acres of specific parcels impacted by each alternative.
2. Indicates total impacts, regardless of existing land use.
3. Excludes farmland parcels with existing and planned development.

The variance in the LESA scores for the retained alternatives is small (the range of scores is 192 to 210), with the Yellow Alternative having the lowest LESA score (192) and the Green Alternative North Option having the highest LESA score (210). All of the alternatives will impact farm parcels that are suitable for agriculture based on their LESA score.

The Farmland Protection Policy Act (FPPA), as amended in 1984 and 1994, includes criteria defining the situations to which the FPPA applies and for which a Form AD-1006 (Form CPA-106 for corridor-type projects) is required. The AD-1006 Farmland Conversation Impact Rating (FCIR) is used by federal agencies who wish to convert farmland to nonagricultural uses. Calculations on the form result in a farmland conversion impact rating which assesses the value of farmlands to be converted. The FCIR CPA-106 form, completed for the Preferred Alternative and included in *Appendix G*, uses a one-mile wide corridor (1/2 mile on either side of the centerline of the alignment) to complete the requirements of the FPPA. The form is coordinated through the state Natural Resources Conservation Service (NRCS) office. Impacts to prime farmland soils are discussed in detail in *Section F* of this chapter.

The No-Build Alternative will not impact farms or farmland. Impacts to active farm parcels are updated for the Preferred Alternative based on the identification of individual parcel impacts for the entire length of the project, recent aerial photography, and input from the farming community. The Preferred Alternative will impact 831 acres on 28 active farm parcels that are not currently proposed for development. This total includes areas outside of the LOD for the project that will no longer be accessible upon completion of the Preferred Alternative and areas proposed for wetlands mitigation. Only one farm parcel will be a total acquisition (it includes the primary wetland mitigation site) and the remainder will be partial acquisitions. Three of the farms that are impacted are under agricultural preservation protection: two are easements (impacting 10.9 acres) and one is an agricultural district (32.6 acres of impact). An additional 17 parcels will be impacted that are currently being farmed and are proposed, pending or approved for development. These parcels will account for an additional 371 acres. Only one parcel, a DP&L alignment parcel, will be a total acquisition. Farm impacts are discussed in the following paragraphs.

The Preferred Alternative alignment LOD will impact 616 acres of prime farmland soils, an increase from the 437 acres reported for the Green North Alternative in the DEIS. This increase is due to the enlarged footprint of the roadway, more detailed stormwater management facilities and sites proposed for wetland mitigation. Topography was obtained for the area, allowing for more detailed engineering, including preliminary drainage concepts which required that the roadway profile be raised slightly higher than the DEIS alignment in some places (refer to the introduction on page III-1). It is anticipated that all of the alternatives impacts would increase proportionally, were they subjected to the same level of detail as the Preferred Alternative. Many of the calculations for land acquisitions for the Preferred Alternative also include “remainder” portions (portions of parcels that will be inaccessible following construction of the Preferred Alternative) of parcels that are impacted directly.

The Preferred Alternative would not impact businesses associated with or essential to farming in the area. As part of the build alternative, a proposed connection between Strawberry Lane and existing US 301, south of Levels Road, will assure continued safe local access for transportation of large farm machinery across new US 301 and provide access to a farm machinery repair business.

As described in the DEIS, the other build alternatives would impact active farm parcels and prime farmland soils (*Table III-10*). These impacts were considered during the evaluation of alternatives and selection of the Preferred Alternative.

The Green Alternative South Option would impact the fewest (398) acres of prime farmland soil, while the Yellow Alternative would impact the lowest number of active farmland parcels (9). Each of the build alternatives would partially impact one or more agricultural districts or easements. The Yellow Alternative impacts 14.1 acres of an agricultural district that has been approved for development as a part of the Westown project. The Purple, Brown and Green Alternatives would impact 32.6 acres of an agricultural district north of Bunker Hill Road. The Brown Alternative will impact 9.4 to 12.4 acres of an easement north of Churchtown Road, while the spur road (Purple and Green Alternatives) would impact 5.3 acres of the same property. The Preferred Alternative also impacts 5.9 acres of a county agricultural easement in order to provide the Strawberry Lane connection to existing US 301. This additional impact would occur with all of the build alternatives, were they subjected to same level of detail in engineering as the Preferred Alternative.

Table III-10: DEIS Impacts to Prime Farmland Soils, Active Farms, and Agricultural Preserves

Alternative	Yellow Alternative	Purple Alternative	Brown Alternative North Option	Brown Alternative South Option	Green Alternative North Option (DEIS)	Green Alternative South Option
Prime Farmland Soils Impacted (acres) ¹	203	415	412	424	437	398
Active Farmland Parcels Impacted ²	9	15	16	13	15	15
Partial Takes	7	5	3	2	4	4
Total Takes	2	10	13	11	11	11
Agricultural Districts Impacted Number (acres)	1 (14.1)	1 (32.6)	1 (32.6)	1 (32.6)	1 (32.6)	1 (32.6)
Agricultural Easements Impacted Number (acres)	0 (0)	1 (6.0)	1 (9.4)	1 (12.4)	1 (6.0)	1 (6.0)

Notes: 1 The impacts to farmland soils includes areas of proposed development.

2 Based on field survey only and does not include parcels planned and approved for development. Includes estimated total and partial takes.

The Yellow Alternative will impact the seven businesses that are related directly or indirectly to agriculture. All of the alternatives will impact the Middletown Veterinary property (requiring a partial strip take), and the Yellow Alternative would require the relocation of Hooper, Inc. (Case Tractor).

None of the build alternatives completely avoid impacts to farms and farmlands. Acquisitions of active farm parcels have been minimized through alignment location and engineering design and will be further minimized, where possible, during final design.



Property owners will be contacted regarding potential acquisitions and be fairly compensated for the required acreage. In some cases (agricultural preservation lands), compensation will be determined based on the “highest and best development use of the property with no consideration given to the restrictions and limitations” of the preservation agreement (Delaware Code Title 3, Chapter 9, Subchapter IV, Section 922). Compensation will also be provided for any farmland that may be unsuitable or inaccessible for farming purposes as a result of the roadway improvements. For those businesses that are subject to relocation, owners will be provided relocation assistance in accordance with the Uniform Relocation Assistance and Real Property Acquisition Act of 1970, as amended by the Uniform Relocation Act Amendments of 1987 (Refer to *Appendix F*).

5. Population and Housing

a. *Existing Conditions*

Data were extracted from the US Census Bureau web site to describe population and housing within the project area. The Census tracts in the project area are shown on *Figure III-6*.

According to the 2000 Census, 18,132 persons live in the four census tracts that include the project area, as shown in *Table III-11*. Tract 166.01, located between the state line and Summit Bridge Road/US 301/SR 71, has the highest population of the four tracts; tract 168.01, located south of US 301 has the smallest population. The other two tracts, 166.02 and 166.04, are located to the east of Summit Bridge Road/US 301/SR 71. Census tract 166.04 includes most of the area of Middletown east of SR 71 and the Town of Odessa.

Table III-11: Population and Housing in the Project Area

Geographic Area	Number of Persons	Number of Housing Units	Number of Occupied Housing Units	Average Household Size
166.01	5,712	1,974	1,885	3.03
166.02	4,442	1,402	1,366	3.25
166.04	4,995	1,995	1,842	2.71
168.01	2,983	1,112	1,056	2.82
Project Area Total	18,132	6,483	6,149 (95.1%)	

Source: US Census 2000

There are 6,149 housing units in the project area, and 95 percent are occupied. In census tracts 166.01, 166.02 and 168.01, most of the housing units are detached single family homes. Many of the homes in tracts 166.01 and 166.02 are located in more recently constructed developments.

The population is also identified by age, in order to identify those persons who are classified as elderly (age 65 and older).

Table III-12: Population Age Distribution in the Project Area

Geographic Area	Number of Persons	Age Distribution								Median Age
		Under 25		25-44		45-64		65 and Older		
		#	%	#	%	#	%	#	%	
Delaware	783,600	269,915	34.4	236,441	30.2	175,418	22.4	101,726	13.0	36.0
New Castle County	500,265	176,303	35.2	157,485	31.5	108,574	21.7	57,903	11.6	35.0
166.01	5,712	2,183	38.2	2,077	36.4	1,104	19.3	348	6.1	33.5
166.02	4,442	1,702	38.3	1,523	34.3	992	22.3	225	5.1	35.2
166.04	4,995	1,979	39.6	1,646	33.0	973	19.5	397	7.9	31.5
168.01	2,983	990	33.2	922	30.9	755	25.3	316	10.6	37.7
Project Area Total	18,132	6,854	33.2	6,168	29.9	3,824	18.6	1,286	6.2	Average: 34.5

Source: US Census 2000

Note: Shaded area identifies tract with highest percentage of elderly in the project area.

As shown in *Table III-12*, the highest percentage of elderly persons in the project area, 10.6 percent, are in Census tract 168.01; this tract includes the area mostly south of Middletown. The only concentration of elderly residents identified in the project area was in Springmill, an “active adult” community with an age requirement of 55 and older.

b. Environmental Consequences and Mitigation

Property Impacts and Relocations

There will be no impacts to existing properties from the No-Build Alternative. The Preferred Alternative will impact a total of 143 properties, of which 26 will be full acquisitions and 117 will be partial acquisitions. DelDOT will obtain a permanent easement on one additional property. Occupants of approximately 21 residential or business properties will require relocation assistance, including 17 total acquisitions and four partial acquisitions, resulting in 35 separate relocation assignments. Property acquisitions required by the Preferred Alternative are shown in *Table III-13* by zoning classification.

Table III-13: Property Impacts of the Preferred Alternative

Zoning Classification ¹	Total Acquisitions		Partial Acquisitions		Total Properties
	Number	Acres	Number	Acres	
Business/General Business	0	0	6	122.20	6
Commercial Regional	5	6	14	91.69	19
Industrial	3	3	3	1.34	6
Residential NC15/NC21/NC40	2	7	17	11.82	19
Residential R1/R2	0	0	2	1.01	2
Suburban	12	71	70	674.85	83
Suburban Reserve	4	303	5	173.86	9
Total Acquisitions (number)	26	390	117	1106.65	143

Note 1: Zoning classifications for New Castle County and Town of Middletown

Zoning classifications do not accurately reflect the use of the property, i.e., the “General Business” category includes the Appoquinimink High School property; several properties with residential or “Suburban” zoning are residential open space or owned by utility companies and do not reflect residential acquisitions; and the “Suburban” and “Suburban Reserve” categories represent mostly residential properties or farmlands, including the Whitehall Properties, the Middletown Baptist Church property, and properties owned by DP&L, the Appoquinimink School District and the University of Delaware.

Each of the build alternatives would impact a number of properties along its alignment, as shown in the DEIS, with property impacts ranging from small partial takes to total parcel acquisitions and relocations. These impacts were considered during the evaluation of alternatives and the selection of the Preferred Alternative. The number of properties impacted and the numbers of relocation impacts associated with each of the alternatives is detailed in *Table III-14*.

Table III-14: Preliminary Property Impacts by Retained Alternative

Zoning Classification ¹	Yellow Alternative	Purple Alternative	Brown Alternative North Option	Brown Alternative South Option	Green Alternative North Option (DEIS)	Green Alternative South Option
Residential						
<i>Full</i>	128	7	2	2	4	4
<i>Partial</i>	48	23	18	25	24	24
<i>Relocations</i>	118	7	2	2	3	3
Business²						
<i>Full</i>	58	5	4	4	8	7
<i>Partial</i>	50	16	14	14	16	17
<i>Relocations</i>	32	0	0	0	2	4
Other³						
<i>Full</i>	21	18	6	6	12	15
<i>Partial</i>	72	85	56	49	68	63
<i>Relocations</i>	11	9	0	2	8	11
Full Takes Total	207	30	12	12	24	26
Partial Takes Total	170	124	88	88	108	104
Total Relocations	161	16	2	4	13	18
Total Affected Properties	377	154	100	100	132	130

Notes:

¹ Zoning classifications for New Castle County and Town of Middletown; if zoning is not known, property is included in Other category.

² Business includes General Business, Business Park, Commercial, Industrial, Manufacturing classifications.

³ Other includes Suburban, Suburban Reserve and Open Space classifications.

The Yellow Alternative would require the greatest number (377) of property acquisitions and the most relocations; there would be 118 residential, 32 business and 11 other relocations with this alternative. The alternatives that follow the ridge route would require less property acquisitions and relocations, with the Brown Alternative Options impacting the fewest properties.

Relocation Plan

For properties impacted by the Preferred Alternative, each property owner will be contacted regarding the acreage to be acquired. For right-of-way takes where small portions will be acquired, owners will be compensated fairly based on assessment of property value and the size of the acquisition. In addition to just compensation for the assessed property value, those owners whose residences or business properties will be taken will be provided relocation assistance in accordance with the Uniform Relocation Assistance and Real Property Acquisition Act of 1970, as amended by the Uniform Relocation Act Amendments of 1987 (Refer to *Appendix F*).

A comparison of relocations required and the potential stock of housing and business opportunities that will be available within the project area (*Tables III-5 and III-7*) shows that a sufficient supply of housing units (single family residence, townhomes and apartments) should be available for occupancy during the estimated time of relocation. A detailed relocation plan for property impacts associated with the Preferred Alternative is included in *Appendix F*.

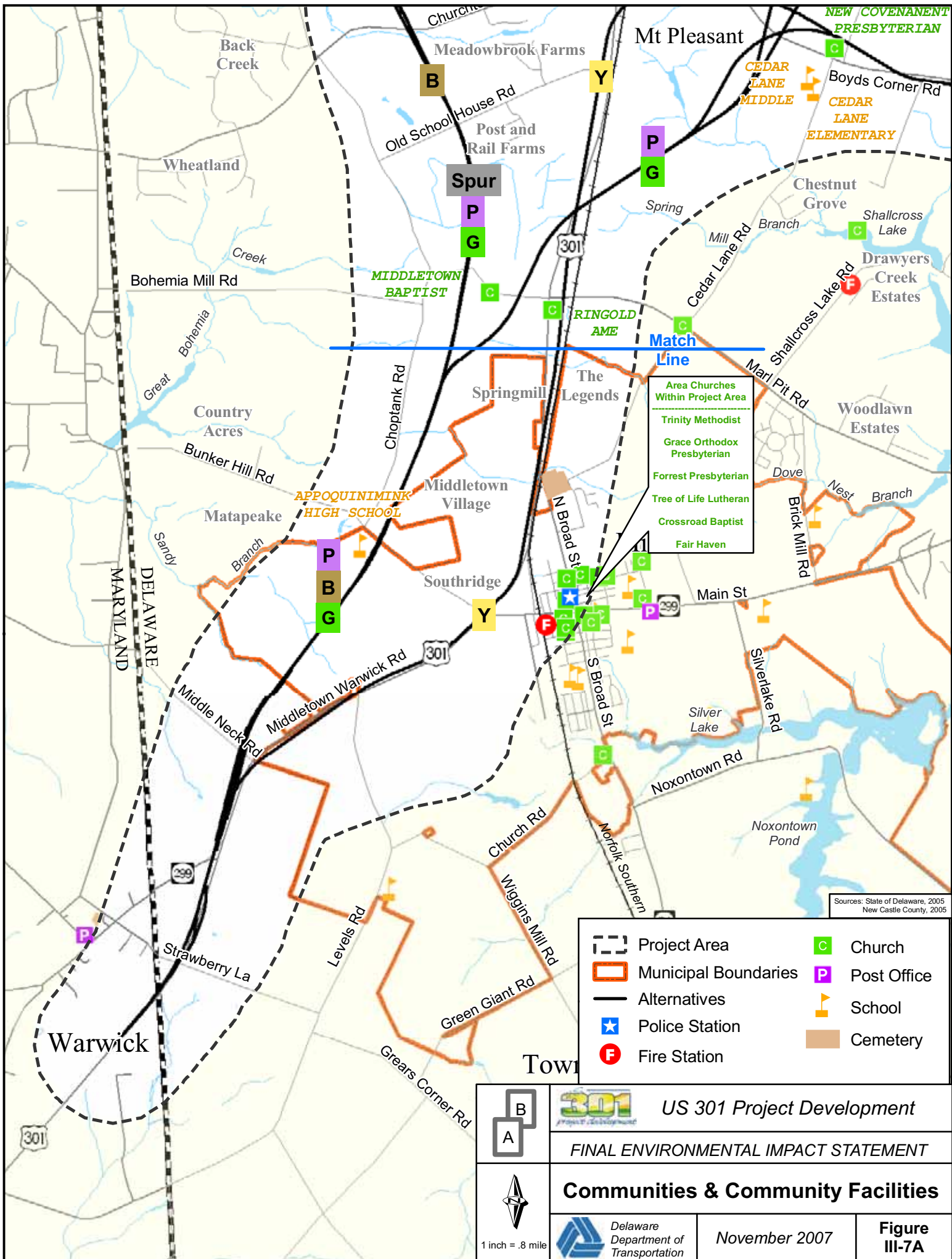
6. Communities and Community Facilities

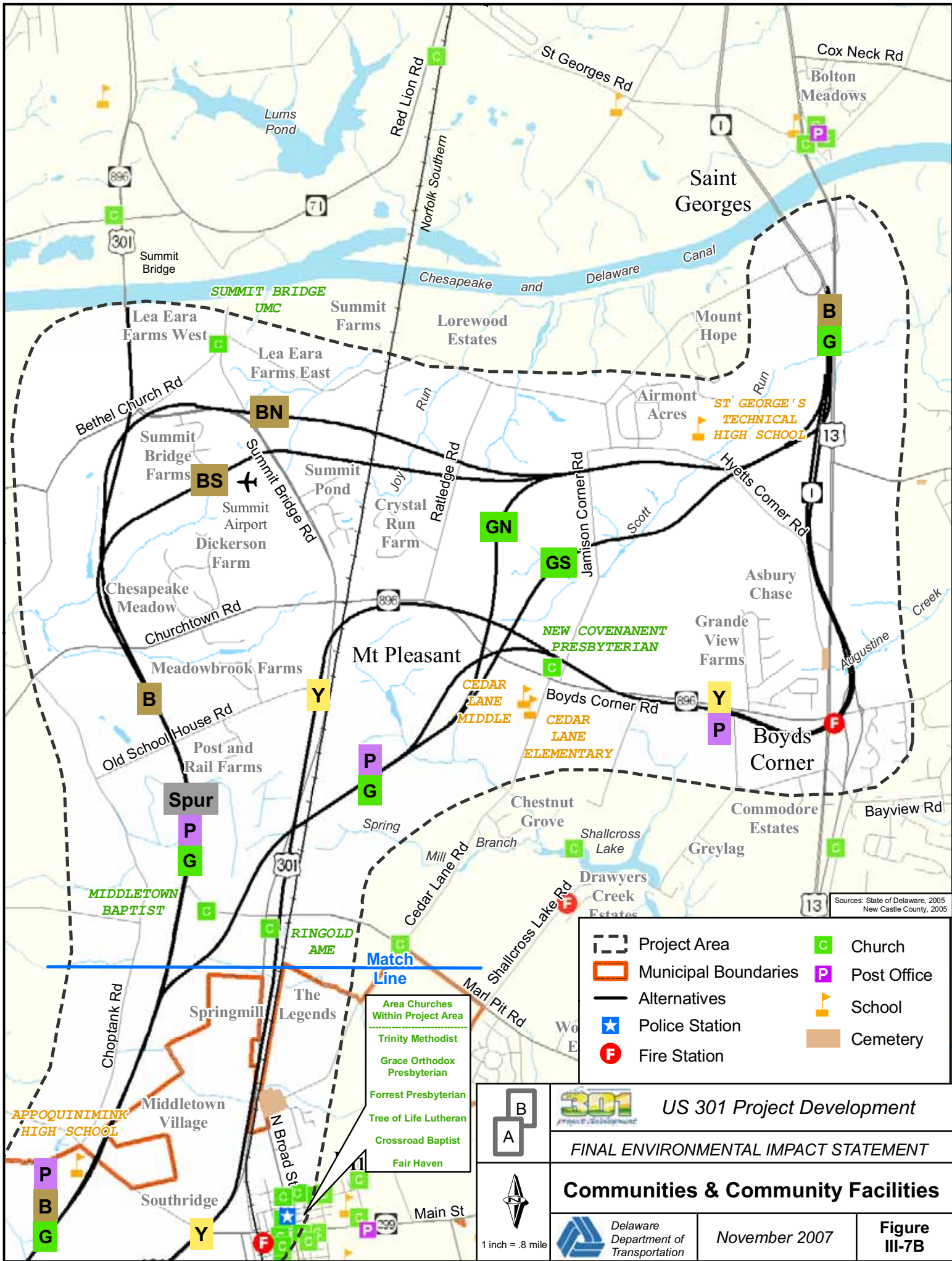
a. *Existing Conditions*

Communities

The existing communities, shown on *Figure III-7*, were identified from an inventory of information from the State of Delaware and New Castle County sources. Within the Town of Middletown, communities include Springmill, Middletown Village, The Legends, Bunker Hill Center, Brick Mill Farm, downtown, and Middletown Commons. Both within and outside of Middletown, there are many communities represented by homeowners associations, including:

Fox Hunter Crossing	Post and Rail Farms	Summit Farms
Matapeake	Springmill	Midland Farms
Grande View Farms	Mount Hope	Augustine Creek (east of SR 1)
Middletown Village	The Legends	Chesapeake Meadow
Airmont	Dickerson Farms	Crystal Run Farms
Summit Bridge Farms	Summit Pond	Back Creek
Westside Hunt	Lea Earra Farms	Asbury Chase





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Most of the communities within and surrounding the project area consist of single family homes or town homes. Many of the community residents are active participants in the project development process, have attended Public Workshops and individual community meetings, and have submitted comments about the proposed alternatives. *Chapter IV* discusses the details of community involvement. *Table III-15* provides a profile of the communities in southern New Castle County that are adjacent to or within 1,500 feet of one or more of the alternatives alignments.

Table III-15: Community Profiles and Alternatives Adjacent

Name	# Units	Type of Units	Within 1,500 feet of Alternative					
			Yellow	Purple	Brown North	Brown South	Green North / Preferred	Green South
Airmont	117	Single family			X	X	X	
Asbury Chase	77	Single family	X	X				
Grande View Farms	170	Singe Family	X	X				
Summit Farms	148	Singe family			X			
Lea Earra Farms	132	Single family	X	X	X	X	X (spur)	
Summit Bridge Farms	91	Single family	X	X	X	X	X (spur)	X
Dickerson Farm	92	Singe family				X		
Chesapeake Meadow	69	Single family		X	X	X	X (spur)	X
Meadowbrook Farms	65	Single family	X					
Post and Rail Farms	34	Single family		X	X	X	X (spur)	X
Ratledge Road/ Jamison Corner Road	@ 20	Single family Farming					X	
Springmill	363	Singe-family	X	X	X	X	X	X
The Legends	140	Single family	X					
Middletown Village	291 481	Single Family Town houses	X	X	X	X	X	X
Crystal Run Farms	81	Single family				X	X	
Matapeake	27	Single family		X	X	X	X	X
Summit Pond	67	Single family				X		
Midland Farms	@ 20	Single Family		X	X	X	X	X

Community Facilities

Community facilities, also shown on *Figure III-7*, are located throughout the project area. Community facilities include emergency services (fire, rescue and police), schools, public parks, recreation areas and greenways, churches, cemeteries, libraries, and post offices. Many of the community facilities are identified in *Table III-16*.

Table III-16: Community Facilities in the Project Area

Emergency Services	Municipal Facilities	Airport
Middletown Police (NCC) Middletown Volunteer Fire Company No. 27 Southern Patrol Unit & Paramedic Company No. 9 Odessa Fire & Rescue Station 4	Middletown Post Office National Guard Armory Middletown Town Hall Delaware Court No. 9 Appoquinimink Public Library	Summit Airport
		Golf Courses
		Back Creek Frog Hollow
Schools	Churches	Day Care Centers
Appoquinimink High School (under construction) Silver Lake Elementary School St. Georges Technical High School Middletown High School Cedar Lane Elementary School Redding Middle School Cedar Lane Middle School (under construction) Everett Meredith Middle School Cedar Lane Early Childhood Center Groves Adult High School St. Andrews School Middletown Charter School St. Annes School Middletown Middle School Brick Mill Elementary School	Summit Bridge Methodist New Covenant Presbyterian Full Gospel Church of Deliverance Union Church Immanuel United Methodist Haven United Methodist Mount Calvary Baptist Trinity Methodist Dales Memorial Methodist St Josephs Catholic Middletown Baptist Grace Orthodox Presbyterian St. Anne's Church St. Anne's Episcopal Bethesda United Methodist Forest Presbyterian Ringgold Chapel AME	Middletown Charter School Day Care 8 additional Day Care Centers
		Parks & Recreation Areas
		Future Water Farm II Middletown Commons C&D Canal Greenway Trails
		Cemeteries
		Forest Cemetery St Anne's Church Cemetery Asbury Cemetery

In addition to the existing facilities, several public park areas are planned/approved in conjunction with Westown and other developments (see *Section A.2.a* and *Tables III-7* and *III-8* in this Chapter), and Delaware Greenways has proposed the Scott Run Greenway Trail and a series of pathways (non-motorized, on-alignment, separated paved paths) to connect the C&D Canal with the public open space along Marl Pit Road (proposed water farm area). See *Section F.12* and *Figure III-22* of this Chapter for existing and proposed greenways and trails.

b. Environmental Consequences and Mitigation

There will be no direct impacts to communities from the No-Build Alternative. However, inaction will continue to compound congestion and safety concerns on roadways traveled by residents within these communities, affecting travel times and access for residents and businesses.

The Preferred Alternative will avoid physical impacts to communities as a whole, although there will be impacts to individual properties (either relocations or partial takes of land) within communities located adjacent to the alignment. Community impacts will take the form of noise and visual impacts; these impacts will be avoided or minimized through the construction, where possible, of visual earth berms. These berms will provide visual screening from the roadway as well as provide a reduction of noise impacts (in some cases, eliminating the noise impacts altogether). Refer to *Section A.9* of this Chapter for a discussion of visual effects and *Section D.2.b* for a discussion of noise abatement.

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The Yellow Alternative would impact the community fabric of Middletown by bisecting the town, affecting local access as well as businesses and residences along existing US 301. All of the build alternatives avoid physical impacts to the remaining communities located throughout the project area, although there may be impacts to individual homes in these communities. Some planned residential developments with approved subdivision plans may also be impacted by one or more of the alternatives.

Within some communities adjacent to one of the build alternatives, residences adjacent to the alignment may be acquired and the owners relocated. These impacts are on the edges of communities, and, therefore, do not impact the communities as a whole, and the fabric of the community would remain intact. Most of the impacts to communities in the project area will be associated with noise and visual impacts and air quality effects caused by the proximity of one of the build alternatives. Air quality is discussed in *Section C*.

There are no impacts to community facilities from the No-Build Alternative. The Preferred Alternative, as well as the Purple, Brown and Green South Alternatives, would require acquisition of a portion of the Appoquinimink High School property, but the acquisition is not anticipated to affect any school activities. Odessa Fire & Rescue Station 4, located at Boyds Corner Road and US 13, may be impacted by the Yellow and Purple Alternatives due to the construction of the US 301 ramps to SR 1, and may require relocation.

There will be no impacts to publicly owned public parks and recreation areas from the No-Build Alternative or from any of the build alternatives, including the Preferred Alternative. All of the build alternatives have been engineered to include structures such as steeper slopes and retaining walls in order to avoid these resources. All of the build alternatives that cross the proposed Scott Run Greenway and associated connecting pathways (refer to *Figure III-22* in *Section F.12*) will be designed to provide for full connectivity of these paths and trails.

Visual impacts to communities from all build alternatives, including the Preferred Alternative, may be minimized by landscaping and grading to provide a buffer screening of natural vegetation. Landscaping would be determined during the final design phase of the project. Earthen berms are proposed for each of the alternatives in several locations to screen the highway from nearby communities (Southridge, Middletown Village, Springmill, Chesapeake Meadow, Summit Bridge Farms (Brown only), Lea Eara Farms (Brown only) and Airmont). Potential noise impacts would also be minimized or eliminated by the berms. Potential noise impacts are discussed in detail in *Section D*.

A summary of affected communities and proposed mitigations is presented in *Table III-17*.

Table III-17: Summary of Residential Community Impacts

Community	Potential Impacts and Proposed Mitigation (DEIS - All Alternatives)	Potential Impacts and Proposed Mitigation (Green North Only - Preferred Alternative)
Airmont	Brown and Green Alternatives right of way would be within 360 to 3,000 feet of the nearest homes and would be 300 feet wide. The roadway elevation would be below to above grade. A visual screening earth berm is proposed along the south side of the community.	The Preferred Alternative right of way would be within 360 feet of the nearest homes and would be 300 feet wide. The roadway elevation would be at grade to below grade (west to east), following natural contours. Impacts include visual changes and noise increases between +5 dBA and +8 dBA. An earth berm is proposed to provide visual screening along the south side of the community where the roadway is above grade.
Grande View Farms	The Yellow and Purple Alternatives right of way would be within 80 to 320 feet of the nearest homes and would be 200 to 225 feet wide. The roadway elevation would be above grade. An earth berm is not feasible due to proximity and influence of other local roadways.	The Preferred Alternative will not impact Grande View Farms.
Lea Earra Farms	All of the build alternatives right of way would be within 0 and 850 feet of the nearest homes and would be at grade, rising to above grade approaching Summit Bridge. Roadway width would be between 220 and 260 feet. An earthen berm is proposed to the south of Lea Earra Farms to screen visual impacts.	The Preferred Alternative right of way would be within 100 feet of the nearest homes where the improvements would tie into Summit Bridge Road south of the Summit Bridge. Existing tree lines would shield the community from visual intrusions. Roadway width would be approximately 220 feet. Noise increases would be barely perceptible (a +3 dBA increase). No mitigation is proposed.
Ratledge Road/Jamison Corner Road	Not Evaluated	The Preferred Alternative right of way (Option 4B Modified) would be close to only two homes (approximately 190 feet and 300 feet) in this community. The roadway would be above grade at existing SR 896 (Boyd's Corner Road) descending to grade north of SR 896. Roadway width would be approximately 325 feet wide. The selection of Option 4B Modified represents an avoidance/ minimization option designed to eliminate impacts to active farms and reduce noise impacts. The Option 4B Modified alignment is within 600 feet of Cedar Lane School complex and would induce a noise impact to the two closest homes. No mitigation is proposed.
Summit Bridge Farms	All of the build alternatives would require right of way acquisition from properties nearest the alignment, which would be between 0 and 300 feet from the adjacent properties. Alignments would be at grade, rising to above grade approaching Summit Bridge. Roadway width would be between 200 and 600 feet. Visual screening berms are proposed except on the north side of the community (affected by Brown North and Yellow Alternatives), where an earth berm is not feasible due to proximity and influence of other local roadways.	The Preferred Alternative right of way for the Spur Road would be 400 feet from the rear property line of the nearest homes on the west side of this community; the alignment (northbound lane only) would be at grade, rising to above grade to cross relocated SR 896. Improvements to SR 896 as it passes the north side of the community would reconstruct SR 896 farther from the community towards the western edge. Noise increases of between +1 dBA and +6 dBA are predicted. No mitigation is proposed.

Table III-17: Summary of Residential Community Impacts

Community	Potential Impacts and Proposed Mitigation (DEIS - All Alternatives)	Potential Impacts and Proposed Mitigation (Green North Only - Preferred Alternative)
Chesapeake Meadow	The Brown, Purple and Green Alternatives right of way would be within 130 to 160 feet of the nearest properties, and the roadway right of way between 260 and 310 feet wide. The roadway would be above-grade at this location. An earth berm is proposed adjacent to the roadway to mitigate visual impacts.	The Preferred Alternative right of way for the Spur Road would be between 150 to 175 feet from the nearest homes on the west side of the community, and the roadway right of way between 260 and 310 feet wide. The roadway would be at-grade to slightly above grade at this location. Churchtown Road would overpass the Spur Road (approximately 30 feet above existing ground) on the south side of the community. Potential impacts include visual and audible changes; noise increases at the first row of homes would be as much as +13 dBA. An earth berm is proposed adjacent to the Spur Road to mitigate visual impacts. The berm would also provide some noise benefit; noise increases will be lowered to no more than +8 dBA. No mitigation is proposed for the Churchtown Road overpass.
Springmill	The Yellow Alternative right of way would be 87 feet from the east side of the community, 525 feet wide and above-grade at this location. An earth berm is not feasible due to proximity and the influence of local roadways and the railroad. The Brown, Purple and Green Alternatives right of way would be between 650 and 1500 feet from the northwest corner of the community, between 260 and 550 feet wide and at to above grade in this location. An earthen berm is proposed to visually screen the community from these alternatives.	The Preferred Alternative right of way would be 650 feet from the northwest corner of the community, between 260 and 550 feet wide and at-grade or above grade in this location. Impacts to the homes nearest the alignment could include visual and noise changes. Predicted noise impacts would raise the noise level between +7 and +8 dBA. Visual changes are minimal due to intervening tree lines. An earth berm is proposed to visually screen the community from the alternative; the visual berm would also provide some noise benefit.
The Legends West	The Yellow Alternative right of way would be 400 feet from the nearest homes on the west side of this community. The roadway right of way would be 400 to 550 feet wide and above grade in this location. An earth berm is not feasible due to proximity and the influence of local roadways and the railroad.	The Preferred Alternative will not impact The Legends West.
Midland Farms	Not evaluated. Location and membership includes individual homes east and west of Choptank Road, along Bohemia Mill Road and Armstrong Corner Road	The Preferred Alternative will cross over Armstrong Corner Road between 1,250 and 1,500 feet east of Choptank Road and then stay elevated as it crosses over existing US 301 and the Norfolk Southern Railroad. Armstrong Corner Road will cross over the Spur Road and return to grade east of Choptank Road. Some individual homes will be physically impacted, requiring total or partial acquisition. Visual impacts are expected, and some individual homes will experience noise increases; no mitigation is proposed as homes are widely scattered.

Table III-17: Summary of Residential Community Impacts

Community	Potential Impacts and Proposed Mitigation (DEIS - All Alternatives)	Potential Impacts and Proposed Mitigation (Green North Only - Preferred Alternative)
Middletown Village	<p>The Yellow Alternative right of way would be 500 feet from the nearest residences and 200 to 400 feet wide east of the community and above grade. An earth berm is not feasible in this location due to proximity and the influence of local roadways. ROW</p> <p>The Brown, Purple and Green Alternatives right of way would be between 200 and 2,000 feet from homes on the west side of the community. The roadway would be 250 to 325 feet wide and below to above grade in this location. An earthen berm is proposed to visually screen the community from these alternatives.</p>	<p>The Preferred Alternative right of way would be approximately 180 feet from homes on the west side of the community. The roadway would be at-grade to slightly above grade and approximately 400 feet wide due to the proposed earth berm in this location. Homes along the westernmost street of the community would experience a noise increase of +12 dBA and visual changes due to the roadway. An earth berm is proposed to visually screen the community from the alternative; the earth berm will also provide some noise reduction.</p>
Southridge	<p>Not evaluated. Although a noise impact was predicted, there were less impacts to residences before the roadway was moved closer to the community (and away from the Appoquinimink High School) during refined engineering.</p>	<p>The Preferred Alternative will pass approximately 120 feet from the nearest homes in this development. The roadway will be slightly above existing grade adjacent to the community. Homes adjacent to the new US 301 would experience an increase of up to +16 dBA over existing conditions. An earth berm is proposed to visually screen the community from the alternative; the earth berm will also provide some noise reduction to all but 14 residences at the southern end of the community.</p>
Matapeake	<p>The Brown, Purple and Green Alternatives right of way would be between 500 and 1,200 feet from homes on the east side of the community. The roadway would be 330 feet wide and would be below grade in this location. No mitigation is proposed at this location.</p>	<p>The Preferred Alternative right of way would be approximately 1,200 feet from homes on the east side of the community. The roadway would be 350 feet wide and would be below grade in this location. Bunker Hill Road would overpass the roadway to the east of the community and east of the new Appoquinimink High School. Visual impacts will be minimal, and no noise impacts are predicted. No mitigation is proposed at this location.</p>

7. Environmental Justice

Title VI of the Civil Rights Act of 1964 (USC 2000d *et seq.*) and Executive Order 12898 (*Federal Actions to Identify and Address Environmental Justice in Minority and Low Income Populations*, February 11, 1994, commonly referred to as environmental justice), require all federal agencies "...to identify and address as appropriate, disproportionately high and adverse human health or environmental effects ... on minority populations and low-income populations". Title VI requires federal agencies to ensure that their programs, policies, and activities do not have the effect of excluding minority or low income populations from the benefits of the project, or subjecting persons or populations to discrimination. Environmental justice considerations require that minority populations and low-income populations are specifically included in public participation and outreach programs.

a. *Existing Conditions*

Racial distribution in the project area is shown in **Table III-18**. The percentages of minority populations in the project area are, for most of the Census tracts, less than for the state and county as a whole. Of note is the larger than average percent of Hispanic population in tract 166.04 (4.7 percent) and the larger than average number of black/African American persons in tract 166.04 (23.1 percent). The latter Census tract includes the Town of Middletown east of the Norfolk Southern Railroad alignment and the Town of Odessa. No concentrations of minority populations, however, were identified in the project area. There is a growing Hispanic community in Middletown Village.

Table III-18: Racial Distribution in the Project Area

Geographic Area	Number of Persons	White		Black or African American		Native American		Asian & Pacific Islander		Other		More than One Race		Hispanic*	
		#	%	#	%	#	%	#	%	#	%	#	%	#	%
Delaware	783,600	584,773	74.6	150,666	19.2	2731	0.3	16,542	2.1	15,855	2.0	13,033	1.7	37,277	4.8
New Castle County	500,265	365,810	73.1	101,167	20.2	979	0.2	13,115	2.6	11,087	2.2	8,107	1.6	26,293	5.3
166.01	5,712	5,116	89.6	426	7.5	4	0.1	60	1.0	45	0.8	62	1.1	161	2.8
166.02	4,442	4,083	91.9	237	5.3	2	0.0	38	0.9	45	1.0	37	0.8	87	2.0
166.04	4,995	3,635	72.8	1,152	23.1	7	0.1	40	0.8	95	1.9	66	1.3	237	4.7
168.01	2,983	2,730	91.5	190	6.4	8	0.3	3	0.1	21	0.7	31	1.0	47	1.6
Project Area Total	18,132	15,564	85.8	2005	11.1	21	0.1	141	0.8	206	1.1	196	1.1	532	2.9

Source: US Census 2000

*Note: Hispanic population can be of any race and is included within the various other race categories.

Shaded areas identify tracts in the project area with the highest minority populations.

Low-income populations are identified by the number of persons whose income is below the standard poverty level established by the Department of Health and Human Services. In 1999, that level was determined to equal an approximate annual income of \$19,350 for a family of four. The percentage of individuals in the project area and in the state and county determined to be below poverty level is shown in **Table III-19**.

Table III-19: Low-Income Populations in the Project Area

Geographic Area	Total Population	Individuals Below Poverty Level	Percent Individuals Below Poverty Level
Delaware	783,600	69,901	9.2
New Castle County	500,265	40,710	8.4
166.01	5,712	216	3.8
166.02	4,442	43	1.0
166.04	4,995	567	11.2
168.01	2,983	76	2.5
Project Area Total	18,132	902	--

Source: US Census 2000

Shaded areas identify tracts in the project area with the largest percentage of low income population.

Although the majority of the project area does not have a high percent of low-income individuals, Census tract 166.04 (which encompasses Middletown) has a higher percent of individuals living below poverty level (11.2 percent) than both the state (9.2 percent) and New Castle County (8.4 percent). Census tract 166.04, as stated above, includes eastern Middletown and Odessa. There are no concentrated areas of low-income populations in the project area.

b. Environmental Consequences and Mitigation

None of the alternatives, including the No-Build and the Preferred Alternative, will have a disproportionately high or adverse effect on minority or low-income communities, although the construction of US 301 under any of the build alternatives as a toll facility may affect the ability of low-income persons to use the new roadway. The continued use of non-tolled, local roadways will still be available with the Preferred Alternative and all build alternatives.

Several individual residences occupied by persons of minority or low-income would be directly impacted (acquisitions and relocations) by the Yellow, Purple, and Green Alternatives, as well as the Preferred Alternative. The Middletown Village community would be directly impacted (acquisitions and relocations) by the Yellow Alternative. The Middletown Village community would also be indirectly impacted (possible noise impacts) by all of the build alternatives. Coordination with environmental agencies, elected officials, community organizations and associations, including low-income and minority representatives, and the public has been an important part of the process.

All impacted persons, regardless of ethnicity or income, will be fairly compensated for property impacts that occur as a result of the implementation of the project and will be assisted in relocation. Efforts to avoid or minimize these and other property impacts will continue through final design. As shown in *Tables III-5, III-6, III-7 and III-8*, development within the project area is very active, and comparable replacement housing is projected to be available for any displaced person. Unavoidable property acquisitions and relocations of any individuals, families, or businesses will be conducted in accordance with the Uniform Relocation Assistance and Real Property Acquisition Act of 1970 and Amendments.

8. Economic Resources

a. *Existing Conditions*

The economy of the project area has undergone a significant change over the most recent decades, from a mostly rural, agrarian-based economy to a more residential, service-oriented economy. Future growth is planned for the project area that includes commercial, office, industrial, and general business opportunities. As the landscape has changed from farmland to developed residential communities, more people living within the project area are employed outside of the area and commute to jobs in Wilmington, Newark, Dover and elsewhere. Residents in the project area are employed in a variety of occupations, as shown in **Table III-20**.

Table III-20: Occupations of the Employed Population in the Project Area

Geographic Area	Management Professional & Related Occupations	Service Occupations	Sales and Office Occupations	Farming, Fishing & Forestry Occupations	Construction Extraction & Maintenance Occupations	Production, Transportation & Materials Moving Occupations	Total Civilian Employed	Unemployed (% of total population in labor force)
Delaware	132,858	54,912	104,059	1,926	35,950	47,106	376,811	20,549 (5.2%)
New Castle County	97,390	33,430	70,906	662	20,293	26,639	249,320	13,571 (5.2%)
166.01	951	321	922	23	333	365	2,915	33 (1.1%)
166.02	1,118	236	688	0	167	214	2,423	57 (2.3%)
166.04	658	416	701	3	260	482	2,520	141 (5.3%)
168.01	303	168	435	2	283	249	1,440	72 (3.2%)
Total	3,030	1,141	2,746	28	1,043	1,310	9,298	303 (3.0%)

Source: US Census 2000

Professional occupations lead the numbers of employed in the project area, with sales and office occupations the second highest employment category. The Census data also indicate only 22 persons in the armed forces in the project area. The occupation category in the project area with the fewest employees is agriculture (Farming, Fishing & Forestry), 28 persons total. It is noted that unemployment in the project area (3.0 percent) is below that of the state (5.2 percent) and of New Castle County (5.2 percent).

Residents of the project area are employed in a number of employment sectors, as shown in **Table III-21**.

Table III-21: Industries Employing those in the Project Area

Geographic Area	Agriculture ¹	Construction	Manufacturing	Wholesale Trade	Retail Trade	Transportation ²	Information	F.I.R.E. ³	Professional ⁴	Education ⁵	Arts/Entertain ⁶	Other	Public Administration
Delaware	4,042	27,866	49,720	10,384	43,578	18,002	7,155	43,787	34,885	73,056	28,979	15,752	19,605
New Castle County	1,231	15,118	32,862	6,634	25,774	11,957	5,106	35,995	27,214	49,176	18,076	10,458	9,719
166.01	63	225	532	112	328	185	75	370	270	357	179	73	146
166.02	12	155	440	54	257	130	72	288	282	397	168	59	109
166.04	6	194	504	85	305	107	43	271	206	316	152	156	175
168.01	9	191	301	59	172	155	22	111	83	137	57	59	84
Total	90	765	1,777	310	1,062	577	212	1,040	841	1,207	556	347	514

1 Includes agriculture, forestry, fishing, hunting, mining

2 Includes transportation and Warehousing, and utilities

3 Includes finance, insurance, real estate and rental & leasing

4 Includes professional, scientific, management, administrative and waste management

5 Includes education, health and social services

6 Includes arts, entertainment, recreation, accommodation and food services

As *Table III-21* illustrates, the agricultural industry employs the fewest persons in the project area (90), and the manufacturing industry employs the most (1,777).

Businesses in the project area were identified through property tax records and a windshield survey. Of the 13,170 persons 16 years of age and over living in the project area in 2000, 9,298 people were employed in the project area. Based on the projections from the Delaware Population Consortium, there has been an increase of less than 100 jobs in the area between 2000 and 2005. Most businesses in the area are small, employing fewer than 100 people. Some of the businesses and commercial areas in the project area include:

Summit Airpark	Happy Harry's	Dove Run Shopping Center
Christiana Care	Ruby Tuesday	Middletown Crossing Shopping Center
Fastenal/Stone Flooring Gallery	Everett Theater	Middletown Shopping Center
WaWa	Ciamaricone's Landscaping	Middletown Square Shopping Center
Bayhealth Medical Center	Cooper Wilburt Vault Company	Ashley Plaza
301 Plaza (truck stop)	Middletown Transcript	Summit Village Shopping Center
Rite Aid	Shone Lumber	Cochran Square
J. Walker Concrete & Masonry	Middletown Chevrolet	Shoppes of Mount Pleasant

The Town of Middletown and Appoquinimink School Districts are the largest employers in the project area. Middletown's largest employers, excluding the school district, are listed below.

<u>Employer</u>	<u># Employees</u>	<u>Employer</u>	<u># Employees</u>
Johnson Controls, Inc.	230	DelStar Technologies, Inc.	127
Acme (Grocery)	190	Letica Corporation	107
Lowe's Home Center	150	Food Lion (Grocery)	100
Super G (Grocery)	140	NAPA/Quaker City	75

Source: Town of Middletown Comprehensive Plan (November 2005)

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Most people in the project area, approximately 82 percent, commute to work alone in a private vehicle, as shown in *Table III-22*, and the mean travel time to work is over 30 minutes. Another 9.5 percent of commuters travel in car or van pools to work.

Table III-22: Mode of Commuting

Geographic Area	Drove Alone	Car Pool	Public Trans	Walk	Other	Work at Home	Total Workers	Mean Travel time (minutes)
Delaware	295,413	42,990	10,354	9,637	3,585	11,091	373,070	24.0
New Castle County	193,564	26,842	9,442	6,748	2,110	6,428	245,134	31.9
166.01	2,404	261	17	89	9	92	2,915	34.8
166.02	2,031	192	50	0	0	128	2,423	33.4
166.04	2,025	264	37	42	81	37	2,520	35.5
168.01	1,114	164	12	12	13	92	1,440	31.9
Total	7,574	881	116	165	103	349	9,298	34 minutes
% of Total	81.5	9.5	1.3	1.6	1.0	3.8		

Source: US Census 2000

Note: Public transportation includes commuting by taxi.

According to the US Census Bureau 2000 Census, the mean household income in the project area in 1999 ranged from \$41,937 to \$81,083, while *per capita* income ranged from \$18,775 to \$26,829. *Tables III-23* and *III-24* provide a profile of household and individual incomes in the project area.

Table III-23: Household Incomes in 1999, in \$1000s, in the Project Area

Geographic Area	Number of Households											Median Household Income (\$)
	Total Households	Less than \$10K	\$10K-\$15K	\$15K-\$25K	\$25K-\$35K	\$35K-\$50	\$50K-\$75K	\$75K-\$100K	\$100K-\$150K	\$150K-\$200K	\$200K or more	
Delaware	298,755	21,125	15,284	33,898	36,361	50,582	63,663	35,968	28,145	7,549	6,180	47,381
New Castle County	188,947	11,944	7,785	18,761	20,440	29,904	41,058	26,272	21,873	6,088	4,849	52,419
166.01	1,884	69	64	62	182	161	419	437	360	106	24	72,434
166.02	1,387	20	7	59	64	125	327	402	236	108	39	81,083
166.04	1,899	153	70	320	183	371	406	221	133	25	17	41,937
168.01	1,058	41	31	84	81	191	338	164	86	19	23	56,118

Source: US Census 2000

Table III-24: Per capita and Individual Earnings in the Project Area

Geographic Area	Population, 16 Years & Older	Employed in Labor Force	Per capita Income (\$)	Mean Earnings, Male, Full-Time, Year-Round (\$)	Mean Earnings, Female, Full-Time, Year-Round (\$)
Delaware	610,289	401,152	23,305	38,961	29,544
New Castle County	389,036	263,440	25,413	42,541	31,829
Tract 166.01	4,067	2,970	25,492	51,671	37,378
Tract 166.02	3,147	2,480	26,829	51,671	36,396
Tract 166.04	3,707	2,661	18,775	36,345	26,520
Tract 168.01	2,249	1,512	25,302	39,583	30,873

Tax Base

New Castle County’s budget is derived from ten sources, with the majority funding from real estate taxes (including Real Estate Transfer taxes), at approximately 48 percent of the approved Fiscal Year 2005 budget. Sewer charges and fees make up the next largest portion of revenue at approximately 22 percent. The remaining revenue comes from service charges and fees, personal property taxes, and other miscellaneous revenues.

b. Environmental Consequences and Mitigation

The No-Build Alternative will not directly impact economic resources in the project area. However, the No-Build Alternative will continue to experience increased congestion in the project area as the population increases due to development. This could cause the new development to not reach its full build-out potential, due to lack of access to major roadways and congestion on local roads. The local road congestion would eventually hinder access to local businesses and thereby discourage economic development, as well as slow the transport of goods and services.

Completion of any of the build alternatives, including the Preferred Alternative, is anticipated to lower traffic congestion on local roadways, providing residents better accessibility to businesses located in the project area. Any of the build alternatives would allow easy access to businesses in the project area, which would attract more businesses to the project area. Smaller, local businesses could suffer if larger chain stores move into the area. However, this may also generate a larger employment base. The build alternatives may also decrease drive-by traffic for businesses along the local roadway network resulting in negative effects to existing businesses.

Each of the build alternatives, including the Preferred Alternative, would impact a number of existing businesses (refer to **Section A.5.b, Tables III-13 and III-14**) along the alignment, requiring them to relocate. This may result in loss of income to the owners and loss of employment for workers in these locations. Relocation assistance will be provided to all businesses affected by the implementation of a build alternative. The build alternatives may also impact planned businesses (commercial, retail, industrial) in the project area, thus altering the projected number of jobs available in the future or altering the locations of these proposed future employment opportunities. The construction of US 301 will provide additional jobs in the area for the duration of construction, likely to begin in 2011 and last between 4 and 10 years.

9. Visual and Aesthetic Characteristics

a. Existing Conditions

Within the project area, the visual landscape can be separated into distinct types. To the south and west of Middletown, the landscape is rural in character, consisting mostly of active farmlands (both cropland and horse farms), interspersed wooded areas, historic and more modern farm buildings clustered around farmhouses, and scattered roadside businesses along two-lane roads. Northward, along the ridge route, the look and feel of rural farmland persists, changing toward the northern portion of the project area to include a landscape of modern, single family housing developments intermixed with productive farming areas and open space. Housing developments are clustered close to the Summit Bridge and along the south side of the C&D Canal in the northern portion of the project area, in between existing active farmlands and open fields. This landscape persists along SR 896 (Boyd's Corner Road).

The heart of the project area includes the Middletown townscape. An historic district centered at the intersection of Main Street (SR 299) and Broad Street (SR 71) is surrounded by progressively modern structures and well-kept older buildings. The town's landscape still retains a small, rural town feel, although the landscape is continually changing. A new Town Hall and Fire Department are among the latest additions. Newly constructed business and medical centers and small retail centers/strip malls line the main routes that access the town (US 301, SR 299, SR 71). The Norfolk Southern Railroad alignment parallels SR 71 through a portion of the town. North of Middletown, along existing US 301, the landscape is a rural/suburban mix of housing types, historic homes, forested land, and businesses that front the roadway. The Summit Airport covers a large parcel of land north of the town, south of the C&D Canal, in the midst of farms (corn is grown on a portion of the airport's land) and other business enterprises.

There is a new visual aspect and feeling in the project area that is associated with the many newer housing developments that proliferate. Mostly single family homes on modest-sized lots, these new developments have contributed new elements to the disappearing rural farm country that was once southern New Castle County. Two new schools are under construction: Alfred G. Waters Lane Middle School (in the Cedar Lane Campus) and Appoquinimink High School at the southern end of Choptank Road. St. Georges Technical High School on Hyetts Corner Road enrolled its first class in 2006, and Brick Mill Elementary School opened for classes in 2003. New shopping centers and service-oriented businesses have accompanied this phenomenal residential growth.

b. Environmental Consequences

The No-Build Alternative will have no effect on the visual or aesthetic quality of the project area. Except for the effects of increasing congestion on the roadways, the landscape will continue to evolve from its former rural character to a more suburban nature.

All of the build alternatives, including the Preferred Alternative, would change the aesthetic view of the landscape and the viewsheds that surround them. The construction of a four-lane limited access freeway within the rural and suburban landscape will affect the visual quality of the views

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of properties immediately surrounding the new roadway as well as other views that are somewhat distant. Although designed to limit impacts to existing natural land cover, farmlands, forests, and open spaces will change in character. In many places, the views of farm fields will be replaced by concrete roadway and traffic, such as along the length of the spur road (Purple and Green Alternatives). The visual effects of the roadway cannot be quantified, but the new roadway will be visible from numerous homes, some of which are historic.

New US 301 will be designed to be at-grade or below grade in many areas, but will be elevated up to 25 feet above existing ground at overpasses and as high as 30 feet above grade at the interchange with SR 1. In some locations, such as adjacent to the Grande View Farms development, the roadway will remain elevated for over 2,000 feet with the Yellow and Purple Alternatives. Earthworks, graded and landscaped, will support overpassing roadways and access ramps wherever possible, and stormwater management ponds will be designed with sensitive native and wetland plantings. Low bridge structures will cross streams and sensitive wetland areas.

Additional visual impacts along US 301 will result from the installation of overhead signage and toll collection facilities that include a toll plaza near the Delaware/Maryland line and collection facilities on north-serving ramps. Highway lighting, planned for installation at toll plazas and ramp/interchanges, will also affect those communities and individual homes close to the roadway.

c. Mitigation

Earth berms are proposed to be constructed in several locations along US 301 under all of the build alternatives, including adjacent to the communities of Southridge, Middletown Village, Springmill, Chesapeake Meadow, Summit Bridge Farms (Brown only), Lea Earra Farms (Brown only) and Airmont, in order to screen these residential areas from the new roadway. The proposed berms would be between 1,400 feet and 2,840 feet long and would be between six feet and 16 feet high. Wherever possible, visual earth berms will be installed prior to roadway construction, to shield communities from construction impacts. In addition, visual and aesthetic effects to historic properties have been evaluated for the Preferred Alternative and will be considered for mitigation, which could be in the form of berms, privacy screens or fencing. Mitigation will be considered in consultation with the Delaware SHPO and affected property owners as detailed in the draft MOA included in *Appendix H*.

The roadway design includes a wide (66 feet in most places) median with appropriate landscaping. Appropriate tree plantings may be included along the outside of the roadway during the final design, to provide some additional visual screening. Wherever possible, the roadway would be constructed at-grade or below, and, in most locations where overpasses are required, the smaller, local roadway will be elevated to cross over the larger US 301 roadway to lessen the visual impacts on the surrounding community. Roadway lighting, where required for safety considerations, would be designed to focus its effect on the roadway and lessen the visual impact of light on the surrounding landscape. Minimization of roadway lighting effects will be determined during final design.

B. 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, archaeological sites, cultural landscapes, and districts, as defined by the National Register of Historic Places (36 CFR 60.4). A district is a significant concentration of one or more of the types of cultural resources listed above. Cultural resources in the project vicinity, potential effects and potential avoidance, minimization and mitigation strategies are discussed below.

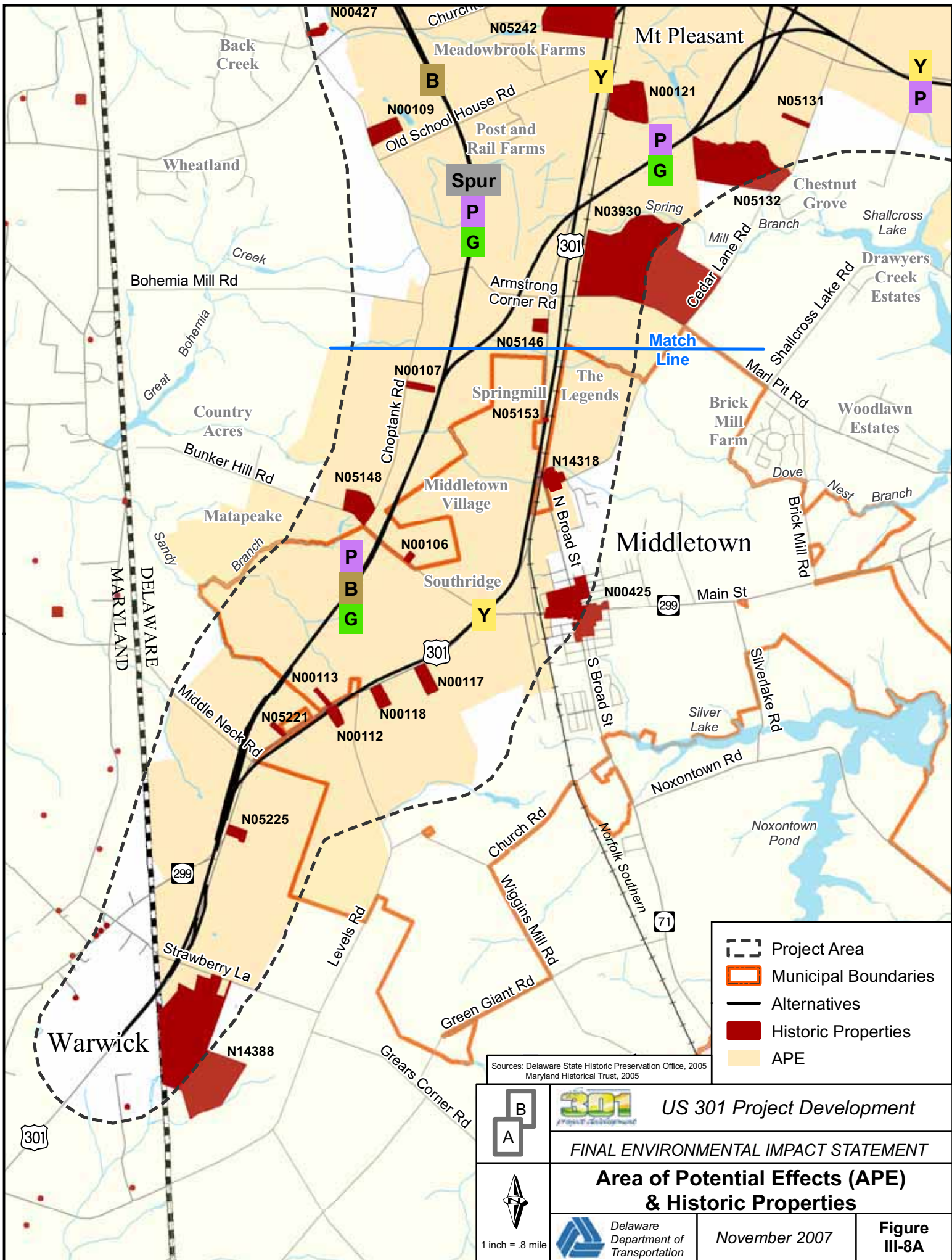
1. Existing Conditions

a. Architectural Resources

DelDOT undertook background research, development of a historic context, and a windshield survey of the initial Area of Potential Effect (APE) to identify the known and potential historic resources in the APE and reported their findings in the *Historic Context and Reconnaissance Survey Report* (July 2005). The initial APE was defined as the area within 600 feet of the centerlines of the alternatives under review at the time (Yellow, Orange, Purple, Brown, and Green) without exclusions.

An evaluation level survey was performed in July, August and September 2005 to assess resources for eligibility for the National Register of Historic Places. DelDOT and the SHPO consulted regarding the scope of the evaluation level survey effort at meetings on July 28 and August 10, 2005, and the APE was revised to address design changes to the alternatives. A Draft *Determination of Eligibility Report* (September 2005) reported the results of the evaluation level survey. The APE for the alternatives retained for detailed evaluation (Yellow, Purple, Brown and Green Alternatives) as adjusted for potential indirect visual and audible effects, is shown in **Figure III-8**.

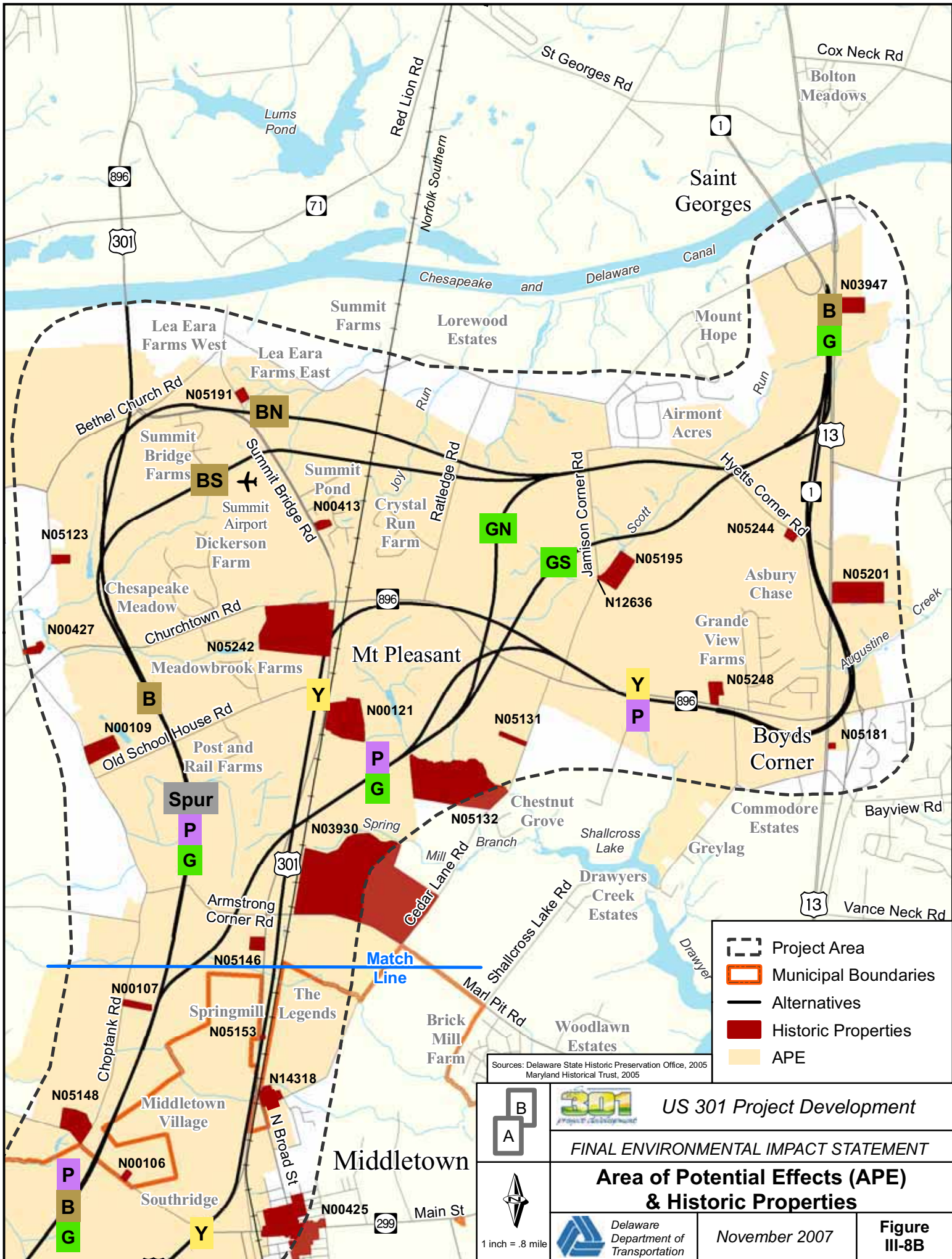
DelDOT, SHPO, FHWA, and New Castle County staff conducted a field tour to review and discuss the results of the evaluation level study of architectural resources on November 4, 2005. As a result of that meeting as well as additional DelDOT and SHPO comments on the draft eligibility report, supplemental information was prepared for several of the surveyed resources. A few additional resources were identified and evaluated, as alternatives were refined, and the APE adjusted accordingly. The evaluation of historic architectural resources was completed in October 2006; the results of the surveys will be reported in the Final *Determination of Eligibility Report*. A total of 31 historic properties- resources listed in or determined eligible for listing in the National Register of Historic Places- were identified. **Table III-25** lists these 31 properties, along with their status (listed or eligible), and the determination of which of the retained alternatives are within 600 feet of each of the historic properties.



Sources: Delaware State Historic Preservation Office, 2005
 Maryland Historical Trust, 2005

- Project Area
- Municipal Boundaries
- Alternatives
- Historic Properties
- APE

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Area of Potential Effects (APE) & Historic Properties		
 1 inch = .8 mile		November 2007
		Figure III-8A



- Project Area
- Municipal Boundaries
- Alternatives
- Historic Properties
- APE

Sources: Delaware State Historic Preservation Office, 2005
 Maryland Historical Trust, 2005

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Area of Potential Effects (APE) & Historic Properties		
		November 2007
1 inch = .8 mile		Figure III-8B

Table III-25: Historic Properties¹ within the Area of Potential Effect

Cultural Resources Survey #	Resource Name	National Register Status	Within 600' of Alternative(s)¹
N00106	The Maples; George Derrickson House (Beers 1868) 1023 Bunker Hill Road	Listed	Purple, Brown, and Green
N00107	S. Holton Farm 2010 Choptank Rd	Listed	Purple, Brown and Green
N00109	Choptank 1542 Choptank Road	Listed	Purple, Brown and Green ²
N00112	Summerton; John Cochran House 840 Middletown Warwick	Eligible	Yellow, Purple, Brown, and Green
N00113	Rumsey Farm 841 Middletown Warwick Rd	Listed	Yellow, Purple, Brown, and Green
N00117	Cochran Grange; John P. Cochran House 704 Middletown Warwick Rd	Listed	Yellow
N00118	Hedgelawn; Kohl House; Wm R. Cochran House 772 Middletown Warwick Rd	Listed	Yellow
N00121	Weston; S. Brady Farm 4677 Summit Bridge Rd	Listed	Yellow and Purple
N00413	A. Eliason House; Twin Holly Farms 4353 Summit Bridge Farm	Listed	Yellow and Brown ²
N00425	Middletown Historic District Main Street & Broad Street	Listed	Yellow ²
N00427	Woodside; Henry Clayton House 1358 Choptank Rd	Listed	Purple, Brown and Green ²
N03930	Achmester N Side of Marl Pit Rd, One Mile E of Summit Bridge Rd	Listed	Yellow
N03947	Idalia Manor; Mrs. M.A. Osborne 1870 S. Dupont Highway	Listed	Yellow, Purple, Brown, and Green
N05123	Governor Benjamin T. Biggs Farm Choptank Road	Listed	Purple, Brown and Green ²
N05131	T.J. Houston Farm (Beers 1868) 1309 Cedar Lane	Eligible	Purple and Green ²
N05132	Lovett Farm/Mrs. Templeman House (Beers 1868) 1405 Cedar Lane Rd	Eligible	Purple and Green
N05146	Armstrong-Walker House; J. Cox Estate 5036 Summit Bridge Rd	Listed	Yellow
N05148	Rosedale; Mary Del Farm 1143 Bunker Hill Rd	Listed	Purple, Brown and Green
N05153	R.G. Hayes House 5187 Summit Bridge Rd	Eligible	Yellow
N05181	J.M. Vandergrift House; Elm Grange 2424 S. Dupont Highway	Listed	Yellow and Purple
N05191	S. Rothwell House; Green Forest Farm 669 Old Summit Bridge Rd	Eligible	Brown
N05195	J. Houston House (Beers 1868) 1000 Jamison Corner Rd	Eligible	Green South
N05201	Retirement Farm 2256 Dupont Hwy N	Listed	Yellow and Purple ²
N05221	C. Polk House Estate 929 Middletown Warwick Rd	Eligible	Yellow, Purple, Brown, and Green
N05225	B.F. Hanson House 1102 Middletown Warwick Rd	Listed	Yellow, Purple, Brown, and Green
N05242	Mt. Pleasant Farm 4564 Summit Bridge Rd	Eligible	Yellow

Table III-25: Historic Properties¹ within the Area of Potential Effect

Cultural Resources Survey #	Resource Name	National Register Status	Within 600' of Alternative(s)¹
N05244	"Fairview"; A.H. Diehl House (Beers 1868) 350 Hyetts Corner Rd	Eligible	Yellow and Purple
N05248	S.F. Shallcross House 1049 Boyds Corner Rd	Eligible	Yellow and Purple
N12636	State Bridge Number 383 Jamison's Corner Rd	Eligible	Green South
N14318	Forest Cemetery 1000 N. Broad Street	Eligible	Yellow
N14388	Shahan Farm, Lanape Acres 389 Strawberry Lane	Eligible	Yellow, Purple, Brown, and Green

¹ Architectural Resources listed in or determined eligible for the National Register of Historic Places located in the Area of Potential Effect (APE) based on consultation with between DelDOT and the SHPO.

² Properties are more than 600 feet from the alternative(s), but may be affected by noise or visual impacts.

b. Archaeological Resources

An historic context and archaeological predictive model were prepared for the initial APE, covering the Yellow, Orange, Purple, Brown and Green Alternatives, and documented in the *Archaeological Predictive Model Report* (A.D. Marble and Company, July 2005; revised September 2005).

The model was prepared as a planning tool to assist in the development of the designs for the various alternatives under consideration for the project and to aid in the assessment of their relative potential impacts on archaeologically sensitive areas. Both prehistoric (referring to pre-contact Native American history) and historic archaeological potential are considered in this model. Characterization of the environment has been accomplished using data available in Geographic Information System (GIS) format, and GIS has been used to compare the relative significance of the criteria within the various parts of the project area. Historic and modern ground disturbances were modeled to qualify the areas of archaeological potential relative to their likely integrity.

The results of the model are zones characterized by their probability to contain prehistoric and historic archaeological resources. These areas were illustrated in the September 2005 report and reviewed by archaeologists on staff at DelDOT and the SHPO. Illustrations of these areas are not provided here for the protection of the known and potential site areas. Section 304 of the National Historic Preservation Act, 36 CFR Part 800.11 of the Advisory Council on Historic Preservation's regulations implementing Section 106 of that same Act, and Delaware Code Title 7, Chapter 53, § 5314 permits the restriction of access to information on the location and nature of archaeological resources.

One known historic archaeological site, CRS Number N05191 was identified within the project's LOD; it's eligibility for listing in the National Register of Historic Places has not been evaluated. Additional efforts to identify potential archaeological resources to date have included a limited testing of the predictive model for prehistoric archaeological sites. This included a partial survey of DelDOT-owned parcels located within areas affected by multiple alternatives along the ridge

alignment. The additional efforts tested the hypotheses of the predictive model and mapped one known archaeological site. The survey, performed in June/July 2006, included plow-and-walk surface surveys and shovel testing, covering areas that had been identified as having high, medium, or low probability to contain archaeological sites. The results of this survey appear to support the hypotheses. The model was refined to include the retained alternatives (as shown in *Appendix A*) and the boundaries of the jurisdictional wetlands. The results of the limited testing and the revised model were reviewed by DelDOT and SHPO staff.

DelDOT is committed to performing the necessary archaeological analysis to determine National Register eligibility for archaeological resources in the project area. At this time, a comprehensive Phase I archaeological assessment has not been completed. Following the identification of the Preferred Alternative, an MOA is being prepared to establish the process for identifying archaeological resources within the limits of disturbance for the Preferred Alternative and evaluating their eligibility for the National Register (see *Appendix H*). Additional efforts will include a more comprehensive Phase I analysis, and, as a result of this analysis, consultation on the need for further investigation.

2. Environmental Consequences

Section 106 of the National Historic Preservation Act and its regulations (36 CFR 800) require that, once historic resources in the undertaking's APE are identified, the potential effects shall be assessed to determine if the undertaking will adversely affect one or more historic properties. Adverse effects can be direct physical impacts (examples i, ii, or iii below) or indirect (examples iv, v, vi and vii below). According to the regulations, examples of adverse effects include [36 CFR 800.5(a)(2)]:

- (i) physical destruction or damage to all or part of property
- (ii) alteration of property not consistent with Secretary's Standards
- (iii) removal of a property from its historic location
- (iv) change in character of a property's use or of physical features within setting provided they contribute to its significance
- (v) introduction of visual, audible, or atmospheric elements that diminish integrity
- (vi) neglect of property
- (vii) transfer, lease, or sale of property without adequate protection measures

The potential effects of the Preferred Alternative (the undertaking) on cultural resources, to the degree that they can be assessed with available information, are discussed in the following sections. While the architectural resources in the APE have been identified, the archaeological resources have not been fully identified. The Section 106 regulations allow for the phased identification of historic properties. The draft MOA outlines the process for completing the identification, evaluation and assessment of effects on archaeological sites.

a. Architectural Resources

The No-Build Alternative would have no effect on historic properties. As detailed in the section on Application of the Criteria of Adverse Effects below, the Preferred Alternative will have

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adverse effects on 12 historic properties within the APE of the project, and no adverse effect on three additional historic properties. The effects to historic properties include changes in the setting or context and/or the introduction of audible or visual elements. There are no physical impacts to any historic properties with the Preferred Alternative.

Preliminary Evaluation

The preliminary evaluation of potential effects determined that only the Yellow Alternative would directly physically affect architectural historic properties. The Yellow Alternative would require a total take of Summerton (N00112) and the R.G. Hayes House (N05153). The Yellow Alternative would also take a portion of the Armstrong-Walker House (N05146) and Mount Pleasant Farm (N05242), using land along each property's existing frontage with US 301. Although these physical impacts to the Armstrong-Walker House and Mount Pleasant Farm would not physically affect any significant buildings or structures, there remained the potential for visual and audible effects to these two resources in addition to the physical impacts.

The Yellow, Purple, Brown and Green Alternatives (including the Preferred Alternative) may audibly and visually affect architectural historic properties. *Table III-26* details the preliminary assessment of the potential for direct (physical) and indirect (audible and visual) effects of the alternatives on the 31 properties within the APE.

Table III-26: Preliminary Potential Effects of the Retained Alternatives on Historic Properties

CRS #	Historic Property Name	NR Status	Potential Effect					
			Yellow	Purple	Brown North	Brown South	Green North	Green South
N00106	The Maples; George Derrickson House (Beers 1868)	Listed	V,A	V,A	V,A	V,A	V,A	V,A
N00107	S. Holton Farm	Listed		V,A	V,A	V,A	V,A	V,A
N00109	Choptank	Listed		V,A	V,A	V,A	V,A	V,A
N00112	Summerton	Eligible	P	V,A	V,A	V,A	V,A	V,A
N00113	Rumsey Farm	Listed	V,A	V,A	V,A	V,A	V,A	V,A
N00117	Cochran Grange; John P. Cochran House	Listed	V,A	V,A	V,A	V,A	V,A	V,A
N00118	Hedgelawn	Listed	V,A	V,A	V,A	V,A	V,A	V,A
N00121	Weston; S. Brady Farm	Listed	V,A	V,A			V,A	V,A
N00413	A. Eliason House; Twin Holly Farms	Listed			V,A			
N00425	Middletown Historic District	Listed						
N00427	Woodside; Henry Clayton House	Listed		V,A	V,A	V,A	V,A	V,A
N03930	Achmester	Listed	V,A	V,A			V,A	V,A
N03947	Idalia Manor; Mrs. M.A. Osborne	Listed			V,A	V,A	V,A	V,A
N05123	Governor Benjamin T. Biggs Farm	Listed		V,A	V,A	V,A	V,A	V,A
N05131	T.J. Houston Farm (Beers 1868)	Eligible		V,A			V,A	V,A
N05132	Lovett Farm/Mrs. Templeman House (Beers 1868)	Eligible		V,A			V,A	V,A
N05146	Armstrong-Walker House; J. Cox Estate	Listed	P,V,A	V,A	V,A	V,A	V,A	V,A
N05148	Rosedale; Mary Del Farm	Listed		V,A	V,A	V,A	V,A	V,A
N05153	R.G. Hayes House	Eligible	P					
N05181	J.M. Vandergrift House; Elm Grange	Listed	V,A	V,A				
N05191	S. Rothwell House; Green Forest Farm	Eligible	V,A		V,A	V,A		
N05195	J. Houston House (Beers 1868)	Eligible					V	V,A
N05201	Retirement Farm	Listed	A	A				

Table III-26: Preliminary Potential Effects of the Retained Alternatives on Historic Properties

CRS #	Historic Property Name	NR Status	Potential Effect					
			Yellow	Purple	Brown North	Brown South	Green North	Green South
N05221	C. Polk House Estate	Eligible	V,A	V,A	V,A	V,A	V,A	V,A
N05225	B.F. Hanson House	Listed	V,A	V,A	V,A	V,A	V,A	V,A
N05242	Mt. Pleasant Farm	Eligible	P, V,A					
N05244	Fairview (Beers 1868)	Eligible	V,A	V,A				
N05248	S.F. Shallcross House	Eligible	V,A	V,A				
N12636	State Bridge Number 383	Eligible					V	V
N14318	Forest Cemetery	Eligible	V,A					
N14388	Shahan Farm, Lanape Acres	Eligible	V,A	V,A	V,A	V,A	V,A	V,A

*Architectural Resources listed on or determined eligible for the National Register of Historic Places located in the APE.

CRS = Cultural Resources Survey

NR = National Register of Historic Properties

V = Potential visual (indirect) impacts.

A = Potential audible (indirect) impacts.

P = Potential physical (direct) impacts.

The Purple Alternative may indirectly affect the most (22) historic resources. The Green Alternative North and South Options may each affect 21 historic resources. The Brown Alternative may affect the least number (North Option – 17; South Option – 16) of resources, and the Yellow Alternative may indirectly affect 17 historic resources (including two that will also have physical impacts).

The Brown Alternative (North and South Options) would affect one additional potentially eligible property (not included in **Table III-26**), the J. Biggs House located at 939 Bethel Church Road (N06320). The initial survey indicated that this house may include an early structure that was covered by later additions. The National Register eligibility of this resource has not yet been evaluated, as the full investigation would require removal of parts of the building.

Application of the Criteria of Adverse Effect

Following DeIDOT’s recommendation of the Green North Alternative as preferred, DeIDOT, FHWA and SHPO conducted field views in 2006 and 2007 to evaluate the properties affected by the Preferred Alternative and apply the Criteria of Adverse Effect. Those efforts are detailed in *Documentation in Support of a Finding of Adverse Effect and Memorandum of Agreement* (Draft, September 2007). The effects of the Preferred Alternative are described in the following paragraphs and summarized in **Table III-27**.

Table III-28 shows the existing and predicted noise levels for 21 of the 22 historic properties assessed for adverse effects; noise analysis does not apply to State Bridge 383. Refer to **Section D** in this chapter for details of the noise analysis. Two properties will have a noise impact, as defined by FHWA/DeIDOT criteria: S. Holton Farm and Armstrong-Walker House. The analysis indicates that four properties will experience a decrease over existing noise levels, because the Preferred Alternative will take traffic from the roadway with the most influence on traffic noise (existing US 301 or Choptank Road) to a roadway more distant from the property (new US 301).

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Table III-27: Summary of Adverse Effects of the Preferred Alternative to Historic Properties

CRS #	Resource Name	NRHP Status	NR Criteria ¹	Effect	Type of Effect ²	Comments
N00106	The Maples	Listed	C	Adverse Effect	(iv), (v)	Adverse visual; view of Rosedale will be blocked by the undertaking
N00107	S. Holton Farm	Listed	C	Adverse Effect	(iv), (v)	Adverse visual and audible
N00109	Choptank	Listed	A,C	Adverse Effect	(iv), (v)	Adverse visual
N00112	Summerton	Eligible	C	Adverse Effect	(iv), (v)	Adverse visual
N00113	Rumsey Farm	Listed	A,C	Adverse Effect	(iv), (v)	Adverse visual
N00117	Cochran Grange	Listed	A,C	No Effect		Intervening distance
N00118	Hedgelawn	Listed	A,C	No Adverse Effect	(v)	Intervening landscaping and development
N00121	Weston	Listed	A,C	No Effect		Intervening distance and landscaping
N00427	Woodside	Listed	A,C	No Effect		Intervening distance and tree line
N03930	Achmester	Listed	A,C	No Effect		Intervening distance and tree line
N03947	Idalia Manor	Listed	A,C	Adverse Effect	(v)	Adverse cumulative visual effect
N05123	Governor Benjamin T. Biggs Farm	Listed	A,B,C	Adverse Effect	(iv), (v)	Adverse visual
N05131	T.J. Houston Farm	Eligible	C	Adverse Effect	(iv), (v)	Adverse visual
N05132	Lovett Farm	Eligible	A,C	No Adverse Effect	(v)	Sufficient distance between farm complex and improvements
N05146	Armstrong-Walker House	Listed	A,C	Adverse Effect	(iv), (v)	Adverse visual
N05148	Rosedale	Listed	A,C	Adverse Effect	(iv), (v)	Adverse visual; view of The Maples will be blocked by undertaking
N05195	J. Houston House	Eligible	C	No Adverse Effect	(v)	Intervening distance and tree line
N05221	C. Polk House Estate	Eligible	C	Adverse Effect	(iv), (v)	Adverse visual
N05225	B.F. Hanson House	Listed	C	Adverse Effect	(iv), (v)	Adverse visual
N05244	Fairview	Eligible	A,C	No Effect		Intervening distance and topography
N12636	State Bridge Number 383	Eligible	C	No Effect		Revisit if planned improvements to Jamison Corner Rd not undertaken
N14388	Shahan Farm	Eligible	A,C	No Effect		Intervening distance and tree line

- 1 *Criterion A qualifies a resource in connection with historical events that have made a contribution to history – in this case agricultural history of New Castle County. Criterion B qualifies a resource based on its connection with individuals who made an important contribution to the area’s history. Criterion C qualifies a resource for its distinctive characteristics that are reflective of a type, period, or method of construction.*
- 2 (iv) *Change of the character of the property’s use or of physical features within the property’s setting that contribute to its historic significance.*
(v) *Introduction of visual, atmospheric, or audible elements that diminish the integrity of the property’s significant historic features.*

Table III-28: Historic Properties Potential Future Noise Levels

Noise Sensitive Area	Receptor	Historic Site Name	Address	Existing Peak Hour Leq (dBA)	2030	
					No-Build Leq (dBA)	Preferred Alternative Leq (dBA)
7	H-8	Rosedale	1143 Bunker Hill Rd.	(46)	51	53
	H-10	S. Holton Farm	2010 Choptank Rd.	46	54	59
	H-28	Choptank	1542 Choptank Road	(46)	48	46
8	H-11	Armstrong-Walker House	5036 Summit Bridge Rd.	67	67	66
	H-12	Achmester	North Side of Marl Pit Rd.	(46)	(46)	--
	H-14	Weston	4677 Summit Bridge Rd.	51	52	--
11	H-25	The Maples	North Side of Bunker Hill Rd.	56	65	60
13	H-24	J. Houston House	1000 Jamison Corner Rd.	49	49	--
14	H-19	Fairview	350 Hyetts Corner Rd.	58	60	--
15	H-13	Lovett Farm	1405 Cedar Lane Rd.	(46)	(46)	--
	H-29	T. J. Houston House	1309 Cedar Lane Rd.	(46)	(46)	49
16	H-27	Woodside	1370 Choptank Rd	58	63	55
	H-31	Biggs Farm	1196 Choptank Rd	47	56	50
17	H-18	Idalia Manor	1870 S. Dupont Highway	59	63	63
18	H-1	Shahan Farm	389 Strawberry Ln.	(46)	(46)	--
	H-2	B.F. Hanson House	1102 Middletown Warwick Rd.	61	63	59
	H-3	C. Polk House Estate	929 Middletown Warwick Rd.	56	56	56
	H-4	Rumsey Farm	841 Middletown Warwick Rd.	52	53	52
	H-5	Summerton	840 Middletown Warwick Rd.	62	63	61
	H-6	Hedgelawn	772 Middletown Warwick Rd.	60	60	--
	H-7	Cochran Grange	704 Middletown Warwick Rd.	60	59	--

Notes: *Dark grey shading indicates an impacted receptor (66 dBA or higher).
Light grey shading indicates an impacted receptor (10 dBA or greater than existing noise).
-- indicates that the receptor is not influenced by the alternative traffic (generally > 1,500 feet distant).
(46) indicates value was calculated using comparable receptors in the project area.*

Of the 22 historic properties within the APE of the Green North Alternative, the project will have no effect on seven properties:

- | | |
|------------------------|---------------------------------|
| N00117, Cochran Grange | N05244, Fairview |
| N00121, Weston | N12636, State Bridge Number 383 |
| N00427, Woodside | N14388, Shahan Farm |
| N03930, Achmester | |

The Preferred Alternative will have no adverse effect on three properties:

- | | |
|--------------------------|---------------------|
| N00118, Hedgelawn | N05132, Lovett Farm |
| N05195, J. Houston House | |

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The Preferred Alternative will have adverse effects on 12 historic properties:

N00106, The Maples	N05123, Governor Benjamin T. Biggs Farm
N00107, S. Holton Farm	N05131, T.J. Houston Farm
N00109, Choptank	N05146, Armstrong-Walker House
N00112, Summerton	N05148, Rosedale
N00113, Rumsey Farm	N05221, C. Polk House Estate
N03947, Idalia Manor	N05225, B.F. Hanson House

These 12 historic properties where adverse effects occur will not be directly or physically altered by the Preferred Alternative. All of the potential project effects are indirect. Indirect effects include changes to the setting or context of a resource and the introduction of incompatible visual and/or audible elements in the vicinity of a resource. For each of the 12 properties, a brief description of the resource, its significant characteristics, and why the undertaking will result in an adverse effect on the property is provided below.

(1) CRS No. N00106, The Maples, 1023 Bunker Hill Road

The Maples was listed in the National Register of Historic Places in 1978 under Criterion C for its architectural significance. The property includes a *circa*-1850s dwelling with late Second Empire stylistic elements, a cowshed (currently used as an equipment shed), a milking barn with an attached milk house, a windmill, and a modern pool. The historic farm lane is located to the east of the dwelling. The 186.86-acre farm surrounding the property is planted with mature trees and includes cultivated fields. The National Register boundary includes an area measuring 1.66 acres, the dwelling, and the tree-lined front yard. The significant characteristics of the property include the architectural features and integrity of materials, design, and workmanship of the dwelling, which together display an eclectic range of several nineteenth-century styles, with the Second Empire style predominating. Another significant characteristic is the dwelling's immediate setting, including the tree-lined front yard. The setting amidst active farmlands and viewshed of nearby farmsteads is important to an understanding of the agricultural history of the resource.

In the vicinity of the Maples, the new highway will be visible from the rear of the yard where there is a discontinuation of the tree line that runs along the western edge of the National Register boundary. The Preferred Alternative mainline LOD will be approximately 970 linear feet to the west of the boundary. Bunker Hill Road will be elevated approximately 23 feet above existing ground over US 301 to the west of The Maples, returning to grade approximately 375 feet to the west. With the construction of the Preferred Alternative, The Maples will experience a 4 dBA increase in noise, from 56 dBA (existing) to 60 dBA (predicted 2030). This increase would be perceptible on the property, and therefore, will potentially audibly affect the Maples; however, it does not meet the FHWA criteria for an impact (see **Chapter III.D.1.a**). The new US 301 will be visible from the southwest corner of the National Register boundary. The new highway will also block the view from The Maples to Rosedale, a nearby farm located on the opposite side of Choptank Road. The undertaking will introduce new visual elements into the agrarian setting of the resource and obstruct a historic viewshed. Thus, the undertaking will diminish the integrity of setting, feeling, and association of the farmstead, and have an adverse effect on The Maples.

(2) *CRS No. N00107, S. Holton Farm, 2010 Choptank Road*

The S. Holton Farm (CRS No. N00107) was listed in the National Register of Historic Places in 1985 as part of the multiple property nomination *Rebuilding St. George's Hundred, New Castle County, 1850-1880* under Criterion A for its agricultural significance and under Criterion C for its architectural significance. The property includes a *circa*-1850 dwelling, a *circa*-1880 to 1900 milk house, a modern garage, and a modern shed. The 81.80-acre parcel on which the property lies is planted with mature trees and includes cultivated fields. The 4.40-acre National Register boundary, which includes the house, grounds, and tree-lined lane leading from Choptank Road, follows along either side of the driveway to the north and south and includes the milk house and the location of former outbuildings to the east. The significant characteristics of the property include the architectural qualities of the dwelling, as the majority of its salient exterior features survive from the period of significance, and the property's immediate setting and surrounding grounds, including the tree-lined lane leading from Choptank Road. The farmstead's location in its larger environment of cultivated farmlands conveys the setting and feeling of a mid-nineteenth-century farm in central New Castle County.

In the vicinity of the S. Holton Farm, the new highway LOD will be approximately 15 feet east of the National Register boundary of the resource, amidst open farm fields, resulting in a loss of farmlands associated with the farmstead. The mainline of the roadway will be elevated approximately three to nine feet above the existing ground in this location. The ramp to connect northbound US 301 mainline to the northbound Spur Road will overpass the southbound mainline lanes north of the property in an area that is currently farmland. The ramp will be elevated approximately 35 feet above existing ground and will be located less than 500 feet to the northeast; both the mainline and ramp will be visible from the farm complex. The proposed improvement will compromise historic views of surrounding farmlands to the east and northeast. In addition, with the construction of the Preferred Alternative, the property will experience a significant increase (+13 dBA) in the average daily noise level. The proposed improvements will introduce new visual and audible elements and physical features into the immediate vicinity and larger environment of the resource, thereby diminishing the farm's integrity of setting, feeling, and association. As a result, the Preferred Alternative will have an adverse effect on the S. Holton Farm.

(3) *CRS No. N00109, Choptank, 1542 Choptank Road*

Choptank (CRS No. N00109) was listed in the National Register in 1985 as part of the *Rebuilding St. Georges Hundred, New Castle County, 1850-1880* multiple property nomination under Criterion A for agriculture and under Criterion C for architecture. The property includes a *circa*-1835 dwelling with a *circa*-1850 front block and a *circa*-1900 cow barn and milk house. The dwelling features Greek Revival stylistic elements, and the extant outbuildings stand in good condition and contain little to no modern alterations. Mature walnut, maple, holly, and cedar trees are located in the vicinity of the dwelling, and cultivated fields surround the property to the north and south. The 14.66-acre National Register boundary includes the dwelling, the cow barn, the milk house, the tree-lined drive, the grounds, and sufficient agricultural lands to convey the property's significance. The significant characteristics of the property include the physical

fabric of the dwelling, cow barn, and the milk house. The setting and location of the farmstead amidst agricultural fields is also important to an understanding of the history of the property.

In this location, the LOD of the two-lane Spur Road will be constructed approximately 1,725 feet east of the National Register boundary of the resource across open farm fields. The roadway will be approximately two to five feet above existing ground in this location and within view of the Choptank farm complex. To the southeast of the resource Old School House Road will be reconstructed to cross over the Spur Road and will be approximately 30 feet above existing ground at its highest point over the Spur Road, within view of the farmstead. The improvements will introduce new physical features in the farm's setting and new visual elements that may alter the property's integrity of setting, feeling, and association. Therefore, the proposed improvements will have an adverse effect on Choptank.

(4) CRS No. N00112, Summerton, 840 Middletown-Warwick Road

Summerton (CRS No. N00112) was determined eligible under Criterion C of the National Register for its architectural significance. The dwelling is a well-preserved and typical example of a high style dwelling that was rebuilt by a prosperous farmer of St. Georges Hundred in the mid-nineteenth century. During the time of the nomination, open vistas and cultivated land surrounded the property, which exhibits the remains of a carefully landscaped front yard. This property contains a *circa*-1850 two-and-one-half-story, five-bay, brick dwelling with an original two-and-one-half-story, five-bay service ell extending east from the northeast corner of the main block. The eligible boundary consists of 5.65 acres, and encompasses a small area in the immediate vicinity of the residence that includes the outbuildings and yard. The significant characteristics of the property include the architectural qualities of the dwelling, which retains its original massing, materials, fenestration, and ornamentation. The surrounding yard space, including the trees in the front yard, denotes the dwelling's status and domestic use. The setting amidst active farmlands and retention of the corn crib/granary are important to an understanding of the agricultural history of the property. The cumulative effect of integrity of design, materials, workmanship, location, setting, and association creates the feeling of a mid-nineteenth-century farm.

In this location, the Preferred Alternative will construct an access ramp from Levels Road to a grade-separated interchange located approximately 4,000 linear feet north of Middle Neck Road. The proposed interchange north of Middle Neck Road will be located to the northwest of Summerton, on the opposite side of existing US 301 and approximately 1,530 feet from the National Register boundary of the property. An extension of Levels Road from the interchange will intersect with existing US 301 and relocated (as a part of the Westown transportation improvements) Levels Road adjacent to the north corner of the National Register boundary and a turning lane will be added in this location. The ramp will be within the viewshed and immediate setting of the farm complex associated with Summerton, resulting in a loss of integrity of setting, feeling, and association. Thus, the undertaking will have an adverse effect on Summerton.

(5) *CRS No. N00113, Rumsey Farm, 841 Middletown-Warwick Road*

The dwelling and domestic outbuildings associated with the Rumsey Farm (CRS No. N00113) were listed in the National Register in 1977 under Criterion A for agriculture and Criterion C for architecture. The buildings associated with the Rumsey Farm are located at the end of a tree-lined gravel drive. The domestic complex includes a prominent two-and-one-half-story residential dwelling and frame smoke house and privy from the mid-nineteenth century, which were previously listed in the National Register. In addition, several associated early-twentieth-century agricultural outbuildings (cart shed, corncrib/granary, milk house, and barn) occupy the parcel and are spatially separate from the domestic area, located to the side of the dwelling along the gravel drive. The farm complex occupies a 400-acre parcel that is comprised of agricultural fields; however, the National Register boundary consists of only 2.44 acres that includes the house, nearby outbuildings, and the surrounding area. The significant characteristics of the property include the architectural qualities of the dwelling, as the majority of its exterior features from the period of significance remain intact, as well as the extant domestic outbuildings. The immediate setting, which includes the tree-lined driveway and copse of trees around the house, agricultural outbuildings, and the surrounding farmlands, are significant as they help convey the feeling of a farm. The corn crib/granary, the equipment shed/corn crib, and the surrounding farmlands are also important as they convey the setting and feeling of and association with a mid-nineteenth- to early-twentieth-century farmstead.

In the vicinity of the Rumsey Farm, the Preferred Alternative will include the construction of a grade-separated interchange to the northwest, and an access road that will extend from the interchange to intersect with existing US 301 at Levels Road. The interchange will be located approximately 740 feet to the northwest of the farm complex, across open farm fields. The proposed access road to Levels Road will be approximately 150 feet to the northeast of the National Register boundary. The interchange and access road will be clearly visible from the farm complex and will introduce new physical features in the present-day location of farmlands. These changes will result in a loss of integrity of setting, feeling, and association of the Rumsey Farm. Therefore, the Preferred Alternative will have an adverse effect on Rumsey Farm.

(6) *CRS No. N03947, Idalia Manor, 1870 South DuPont Highway*

Idalia Manor (CRS No. N03947) was listed in the National Register in 1985 as part of the *Rebuilding St. George's Hundred* multiple property nomination under Criterion A for agriculture and Criterion C for architecture. The property includes a side-gabled, brick, Federal-style residence, a granary/crib barn, a late-twentieth-century wagon/cart shed, another modern shed, and a modern decorative well, surrounded by farmland. Contributing features located within the 11.44-acre National Register boundary include the dwelling, the granary/crib barn, and sufficient acreage and setting to convey the architectural and agricultural significance of the resource. The significant characteristics of the property include the physical fabric of the dwelling and outbuildings, the retention of surrounding agricultural crop lands, and landscape features such as the tree lines that flank the driveway and separate the farmstead from the agricultural fields. The rural setting, although somewhat compromised by the introduction of SR 1 to the west and north, is also significant as it helps convey the feeling of a nineteenth-century farm.

The Preferred Alternative will introduce additional visual elements to the west that may diminish the integrity of the historic property. The Preferred Alternative in the vicinity of Idalia Manor will include the tie-in of the new US 301 to SR 1 north of the Biddles Corner Toll Plaza and south of the Senator Roth Bridge over the C&D Canal. Directional ramps will be provided from southbound SR 1 to southbound US 301 and from northbound US 301 to northbound SR 1. The northbound flyover ramp (approximately 30 feet above existing SR 1) will be within view of the dwelling and farm complex associated with Idalia Manor. The viewshed from Idalia Manor to the north and west has already been compromised by the existing roadways (SR 1 and US 13) and bridge over the C&D Canal. The construction of additional physical elements to the north and west of the farm complex will introduce additional visual elements that will result in further loss of integrity of setting, feeling, and association. Therefore, the Preferred Alternative will have an adverse effect on Idalia Manor.

(7) *CRS No. N05123, Governor Benjamin T. Biggs Farm, 1196 Choptank Road*

The Governor Benjamin T. Biggs Farm (CRS No. N05123) was listed in the National Register in 1987 under Criterion A for association with the rebuilding trend, under Criterion B for its association with Governor Benjamin T. Biggs, and under Criterion C for architecture. The property includes an 1846 brick dwelling, a smokehouse, three implement sheds, a small barn, a shop, and a dairy. The 3.97-acre National Register boundary, which also serves as the current tax parcel, includes the dwelling, the outbuildings, and immediate setting to convey its significance under Criteria A, B, and C. The significant characteristics of the property include the physical fabric of the dwelling and outbuildings, the retention of agricultural crop lands, and landscape features such as the mature trees in the front yard and the fence lines that delineate the dwelling and yard space from the surrounding fields. The rural setting of this property is significant as it conveys the association and feeling of a nineteenth-century farm.

In this location, the two-lane Spur Road LOD will be located approximately 1,015 feet east of the National Register boundary, clearly visible from the rear of the property across a vista of open farm fields and gentle slopes. A partial cloverleaf interchange and ramp to an extended Bethel Church Road will be located to the northeast. The interchange and ramp will be partially visible from the farm complex. The undertaking will introduce new physical features and visual elements in the vicinity of the resource in the location of former farmlands. As a result the property will experience a loss of integrity of setting, feeling, and association. Thus, the undertaking will have an adverse effect on the Governor Benjamin T. Biggs Farm.

(8) *CRS No. N05131, T.J. Houston Farm, 1306 Cedar Lane Road*

The T.J. Houston Farm (CRS No. N05131) was determined eligible for listing in the National Register under Criterion C for architecture. The *circa*-1860 front block of the dwelling embodies a combination of the Federal and Greek Revival architectural styles and retains integrity from its secondary period of construction. The property also includes a *circa*-1940 to 1960 milk house, a *circa*-1940 to 1960 shed, and a well cap. A tree-lined gravel drive provides access to the set-back dwelling and the secondary outbuildings. The property is minimally landscaped and is surrounded by active agricultural lands. The 2.76-acre National Register boundary includes the dwelling and the tree-lined gravel drive, providing sufficient setting for

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the architecturally significant dwelling. The significant characteristics of the property include the physical fabric of the dwelling and landscape features such as the trees lining the side of the driveway. The setting of this property amidst active farmlands is also significant as it conveys the historic agricultural association of the dwelling with a former dairying complex that is now largely demolished except for an extant milk house, silo, and shed.

The Preferred Alternative mainline LOD will be visible from the rear of the T.J. Houston Farm property. The mainline roadway will be located approximately 1,445 feet to the west of the National Register boundary of the resource and 1,455 feet from the dwelling, clearly visible across open farm fields. As the undertaking will introduce new visual elements within the viewshed and physical features into the agrarian setting of the resource, integrity of setting, feeling, and association will be compromised. Thus, the undertaking will have an adverse effect on the T. J. Houston Farm.

(9) CRS No. N05146, Armstrong-Walker House, 5036 Summit Bridge Road

The Armstrong-Walker House (CRS No. N05146) was listed in the National Register as part of the multiple property nomination *Rebuilding St. Georges Hundred, New Castle County, 1850-1880* under Criterion A for its agricultural significance and under Criterion C for its architectural significance. The property includes a brick dwelling, a barn, and a shed (all constructed ca. 1870), and a circa-1940 equipment shed. The property is sparsely landscaped with a few mature trees and is surrounded by agricultural land. The 5.00-acre National Register boundary includes the dwelling, the outbuildings, and sufficient setting to convey its significance. The significant characteristics of the property include the physical fabric of the dwelling, barn, and outbuildings as well as landscape features such as the placement of trees to denote the yard space. The setting of this property amidst active farmlands is also significant as it conveys association with agriculture and the feeling of a nineteenth-century mixed farm that was converted to dairying operations in the late-nineteenth and early twentieth centuries.

In the vicinity of the Armstrong-Walker House, the proposed four-lane divided highway will be elevated approximately 24 feet above existing ground to pass over Armstrong Corner Road and the LOD will be located approximately 805 feet northwest of the National Register boundary. There is an existing noise impact (67 dBA), and the resource will not experience a perceptible change in noise level due to the expected reduction of traffic on existing US 301 with the construction of the Preferred Alternative. Despite some limited intervening tree lines, the highway will be visible across farm fields from the northwestern corner of the farm and from the rear of the farm complex. Due to the introduction of physical features within the surrounding agrarian setting and the obstruction of viewsheds, the Preferred Alternative has the potential to detract from the integrity of setting, feeling, and association of the resource. Therefore, the undertaking will have an adverse effect on the Armstrong Walker-House.

(10) CRS No. N05148, Rosedale, 1143 Bunker Hill Road

Rosedale (CRS No. N05148) was listed in the National Register as part of the multiple property nomination *Rebuilding St. Georges Hundred, New Castle County, 1850-1880* under Criterion A for its agricultural significance and under Criterion C for its architectural significance. The

property consists of a *circa*-1790 dwelling, a *circa*-1880 horse barn with an attached training stable and office, a *circa*-1950s brood mare stable, a *circa*-1950s tenant house, and a *circa*-1940 to 1960 loading chute. The dwelling features Georgian stylistic elements, and the historic farm lane provides access from Bunker Hill Road to the agricultural buildings located north of the dwelling. The National Register boundary includes the dwelling, associated outbuildings, and 19.6 acres planted with mature trees and active pastures. The dwelling is significant as an embodiment of the Georgian architectural style; therefore, retention of integrity of design, materials, and workmanship are critical to the eligibility of the resource. The farmstead is also significant as an example of the rebuilding that occurred in the local area during the nineteenth century. The salient characteristics of the property include the physical fabric of the house, barn, and outbuildings, as well as the surrounding pasture land. The setting of this property amidst and within view of other active farms and associated farmlands, including the Maples (CRS No. N00106) to the east, conveys the feeling of and association with a rural landscape.

In this location, the Preferred Alternative mainline will be clearly visible from the farm complex, as the LOD will be located approximately 485 feet to the southeast of the National Register boundary. The intervening space includes open yard, Choptank Road, and farmlands. Potential stormwater management facilities may be located in close proximity to the highway on the west side of the proposed alignment. Additionally, improvements to Bunker Hill Road to provide an overpass of the new US 301 will be visible from the southeast corner of the property's historic boundary. At its highest elevation (approximately 23 feet above existing ground), Bunker Hill Road will be approximately 750 feet from the historic boundary. As a result of the undertaking, the view from Rosedale to the Maples will be obstructed. The undertaking will also introduce new physical features within the surrounding agrarian setting. As the undertaking will diminish the setting, feeling, and association of the resource, it will have an adverse effect on Rosedale.

(11) CRS No. N05221, C. Polk House Estate, 929 Middletown-Warwick Road

The C. Polk House Estate (CRS No. N05221) was determined eligible for listing in the National Register under Criterion C for its architectural significance. The C. Polk House is a typical example of a rural dwelling that was rebuilt by a prosperous farmer in St. Georges Hundred in the mid-nineteenth century. The property currently contains the original farmhouse and barn. The rest of the original buildings were razed, and a number of modern storage structures are located on the property, west of the dwelling. The National Register Boundary encompasses 2.04 acres. The significant characteristics of the property include the physical fabric and integrity of design, materials, and workmanship of the dwelling, and landscape features such as the remnants of the allee of trees that lead from Middletown-Warwick Road to the dwelling. The setting of this property amidst active farmlands is also significant as it conveys the association with and feeling of a former nineteenth-century farmstead.

The Preferred Alternative will introduce visual elements that may diminish the integrity of setting of the historic property. The Preferred Alternative mainline, located approximately 425 feet from the National Register boundary, will be visible from the rear of the C. Polk House Estate dwelling. Approximately 2,800 feet to the north, a grade-separated diamond interchange will be constructed to provide a connection to existing US 301 (Levels Road interchange). The highway and interchange will be clearly visible across open farm fields. A toll plaza is proposed

to be located approximately 1,800 feet to the southwest, south of Middle Neck Road, within view of the C. Polk House Estate. As the undertaking will introduce new visual elements into the viewshed of the C. Polk House Estate and new physical features into the agrarian setting, the integrity of the resource will be diminished. Thus, the Preferred Alternative will have an adverse effect on the C. Polk House Estate.

(12) CRS No. N05225, B.F. Hanson House, 1102 Middletown-Warwick Road

The B.F. Hanson House (CRS No. N05225) was listed in the National Register in 1980 under Criterion C for its architectural significance as one of the best-preserved examples of Greek Revival architecture in Delaware. The 25.00-acre parcel that the dwelling occupies includes the 1843 house, a *circa*-1850 horse barn complex, a *circa*-1910 shed at the north end, and a modern equipment retail facility at the south end. The front lawn of the house is planted with some mature trees and the property is flanked by cultivated fields to the north and east. The National Register boundary includes 5.30 acres and consists of the dwelling, yard space, and outbuildings. The most significant aspects of the property include the integrity of design, materials, and workmanship of the dwelling. Notable features of the dwelling typical of the Greek Revival style include columned porch spanning a portion of the façade, low-pitched roof, heavy cornice with unadorned frieze, emphasis on entrance in the form of transom and sidelights, and corner pilasters. Significant architectural features include the dwelling form. The outbuildings, associated 5.30-acre parcel, and the surrounding farmlands contribute to the setting of the resource, helping the property to retain integrity of association with and convey the feeling of a former nineteenth-century farmstead.

Improvements in the immediate vicinity of the B.F. Hanson House will include the construction of a four-lane, divided, limited access roadway west of and parallel to existing US 301. The LOD of the new roadway will be located approximately 305 feet from the B.F. Hanson House and approximately 75 feet from the National Register boundary. To the northwest of the property, stormwater management facilities may be constructed on both sides of new US 301, and a toll plaza may be constructed approximately 2,000 feet to the north (south of Middle Neck Road). The B.F. Hanson House will experience an imperceptible decrease (- 2 dBA) in noise level following the completion of the Preferred Alternative (see Table III-37 in Chapter III.D.1.c) which can be attributed to the relocation of the main roadway (new US 301, which is expected to carry more traffic than existing US 301) further from the property. Although located across existing U.S. 301, the new roadway will be clearly visible across existing US 301 from the front yard of the dwelling and will introduce a new visual element to the landscape and detract from the agricultural setting of the resource. The undertaking will detract from the integrity of setting, feeling, and association of the B.F. Hanson House, resulting in a finding of adverse effect.

b. Archaeological Resources

In order to evaluate the potential consequences of the retained alternatives and the Preferred Alternative, DelDOT overlaid the archaeological predictive model on the proposed limit of disturbance of each of the alternatives and determined the areas of each sensitivity level affected by the alternatives. The evaluation includes areas that may be affected by potential stormwater

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management facilities as proposed for the project in the DEIS and identified wetland mitigation sites.

The No-Build Alternative would have no impact on historic or prehistoric archaeological resources. The Preferred Alternative will impact one known historic archaeological resource, CRS Number N05191. The site's eligibility for listing in the National Register of Historic Places will be determined prior to construction, and, if determined eligible, a treatment plan will be developed for the resource in accordance with stipulations in the draft MOA.

The Preferred Alternative (including two potential mitigation sites) will impact a low percentage of acres within the high sensitivity zones for both prehistoric (96 acres; 8.2%) and historic (41 acres; 3.5%) sites. The percentages of the Preferred Alternative LOD with moderate (363 acres; 30.8%), low (452 acres; 38.4%) or nil (266 acres; 22.5%) sensitivity to prehistoric sites are similar. The majority of the LOD for the Preferred Alternative (929 acres; 78.9%) is predicted to have a low sensitivity zones for historic sites. The remainder (207 acres; 17.6%) is considered to have a moderate sensitivity to contain historic era sites.

The results of the evaluation of the four build alternatives are shown in *Table III-29*. These results were taken into consideration during the evaluation of the retained alternatives and selection of the Preferred Alternative. This evaluation did not include identified wetland mitigation sites.

Table III-29: Archaeological Potential of the Alternatives within the Limit of Disturbance

Archaeological Potential	Yellow acres % ¹	Purple acres % ¹	Brown North acres % ¹	Brown South acres % ¹	Green North (DEIS) acres % ¹	Green South acres % ¹
Prehistoric-Era Archaeological Predictive Model						
Area in High Sensitivity Zone	16 1.8%	24 2.7%	26 2.9%	28 3.0%	26 2.8%	28 3.1%
Area in Moderate Sensitivity Zone	106 12.1%	212 23.1%	287 31.5%	272 29.9%	238 26.1%	292 32.8%
Area in Low Sensitivity Zone	528 60.3%	552 60.3%	496 54.4%	483 53.1%	558 61.3%	482 54.1%
Area in Nil Sensitivity Zone	225 25.7%	128 14.0%	101 11.1%	127 14.0%	89 9.7%	88 9.9%
Historic-Era Archaeological Predictive Model²						
Area in High Sensitivity Zone	91 10.4%	35 3.8%	30 3.3%	31 3.4%	34 3.7%	32 3.6%
Area in Moderate Sensitivity Zone	272 31.0%	187 20.4%	186 20.4%	182 20.0%	177 19.4%	177 19.8%
Area in Low Sensitivity Zone	513 58.6%	694 75.7%	694 76.3%	696 76.5%	700 76.8%	682 76.6%

1 Indicates percent of total acres within the limit of disturbance; does not include mitigation sites.

2 The historic-era model does not have a nil sensitivity zone.

When considering the differences between the Preferred Alternative and the Green North Alternative presented in the DEIS and in *Table III-29*, the percentages of the LOD likely to contain high, moderate or low sensitivity to historic sites is fairly comparable. Differences in areas of high, moderate, low and nil sensitivity to prehistoric sites may be due to the increased footprint of the LOD following engineering changes for drainage, minor changes in the alignment, and or the addition of the mitigation sites' area to the evaluation. The results of the archaeological sensitivity modeling will be used as a tool when evaluating the LOD for potential archaeological sites prior to construction.

When the prehistoric sensitivity zones of the Yellow, Purple, Brown and Green Alternatives were compared, between 64 and 86 percent of the area of each alternative is within the nil and low probability zones; therefore, large areas of each alternative are not very likely to contain prehistoric sites. The range of variation in the probability of prehistoric sites among the alternatives indicates that the Yellow Alternative is the least likely (13.9 percent high to moderate sensitivity) to affect prehistoric sites. The Purple, Brown and Green Alternatives, while still having a relatively low probability (between 25.7 and 36.0 percent in the high and moderate sensitivity range), are the most likely to affect prehistoric sites. This conclusion is consistent with the characteristics of the alternatives and the nature of the location of prehistoric sites.

The Yellow Alternative, which generally follows existing roadways, would have been located in an area where ground disturbance over the years has reduced the potential for intact subsurface resources from the prehistoric period. Conversely, the Purple, Brown and Green Alternatives, which cross relatively undeveloped areas, would be more likely to encounter undisturbed resources. It is anticipated that the Purple, Brown, and Green Alternatives, including the Preferred Alternative, would have the greatest possibility of destroying or burying prehistoric archaeological sites.

When the alternatives are compared to the historic sensitivity zones, between 58.6 and 76.8 percent of the area of each alternative is within the low probability zones. (The historic component of the model does not include a nil probability zone.) The range of variation in the probability of historic archaeological sites among the alternatives indicates that the Purple, Brown and Green Alternatives (including the Preferred Alternative) would be the least likely (under 25 percent probability for high and moderate sensitivity) to affect historic sites; and the Yellow Alternative, with 41.1 percent within the high or moderate sensitivity zones, would be the most likely to affect historic archaeological sites. Again, this conclusion is consistent with the characteristics of the alternatives and the nature of the location of historic sites.

Historic sites are more likely to be located relatively near historic-period and current roadways; thus, the Yellow Alternative, which would follow existing roadways, had a higher potential to encounter such sites. The Yellow Alternative would have had the greatest possibility of adversely affecting historic archaeological sites by destroying or burying them. Conversely, the Purple, Brown, and Green Alternatives (including the Preferred Alternative), which cross historically undeveloped areas, would be less likely to encounter such resources.

3. Mitigation/Memorandum of Agreement

DelDOT is continuing to consult with FHWA, the SHPO and New Castle County regarding the appropriate steps to further identify archaeological resources and the potential effects of the project on those resources. As is discussed in the draft MOA included in *Appendix H*, DelDOT will conduct appropriate Phase I and/or Phase II testing to identify archaeological resources along the Preferred Alternative alignment. If resources are discovered which are determined eligible for the National Register, DelDOT and FHWA will consult with the SHPO to determine if the sites will be adversely affected, and if so, will look for ways to avoid impacts or minimize effects. If the effects cannot be avoided, various means of mitigation will be employed, including, but not limited to, excavations to recover significant data or alternative mitigation strategies as specified in the MOA.

The MOA outlines the process for determining how effects on architectural resources will be mitigated, including consultation with property owners. Potential treatments may include, but are not necessarily limited to, landscaping, plantings, potential visual berms or fencing appropriate to the historic setting of the property affected.

DelDOT will continue to consult with the Maryland SHPO (Maryland Historical Trust (MHT)) on potential effects to cultural resources within the Maryland portion of the project area. The MHT will also be consulted on potential secondary and cumulative effects that may result from traffic and truck diversions (see *Chapter III, Section G*).

C. Air Quality

The purpose of this air quality section is to describe the regulatory framework for air quality considerations, the pollutants of concern, ambient air quality standards, existing conditions in the project area, predicted changes in air quality that may result from implementation of the project, and possible mitigation efforts where adverse effects are projected.

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

Transportation conformity refers to the extent to which highway and transit expansion projects add to or subtract from regional emission levels. These analyses typically are performed at the system level, which means the particular improvement or sets of improvements are included in a regional travel demand model from which the total emissions for a county are estimated. The product of these analyses 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).

Project level emissions analyses refer to the extent to which highway and transit expansion projects add or subtract to project area emission levels. These studies are typically performed within the area directly adjacent to a proposed improvement, and are often within several

hundred feet of those projects. These studies do not consider regional air quality levels, but are concerned with what affect proposed projects may have on air quality levels adjacent to or in the immediate vicinity of a particular area.

1. Relevant Pollutants

“Air Pollution” is a general term that refers to one or more chemical substances that degrade the quality of the atmosphere. Individual air pollutants degrade the atmosphere by reducing visibility, damaging property, reducing the productivity or vigor of crops or natural vegetation, or by adversely affecting human or animal health.

Eight air pollutants have been identified by the U.S. Environmental Protection Agency (EPA) as being of concern nationwide: carbon monoxide (CO), sulfur oxides (SO_x), hydrocarbons (HC), nitrogen oxides (NO_x), ozone (O₃), lead (Pb), particulate matter with a size of 10 microns or less (PM₁₀), and particulate matter with a size of 2.5 microns or less (PM_{2.5}). These pollutants, with the exception of HC, are collectively referred to as “criteria” pollutants.

The sources of these pollutants, their effects on human health and the nation's welfare, and their final deposition in the atmosphere vary considerably. In the project corridor, ambient concentrations of CO, O₃ and Pb are primarily influenced by motor vehicle activity. Emissions of sulfur oxides are associated mainly with various stationary sources such as power plants and refineries. Emissions of nitrogen oxides and particulate matter come from both mobile and stationary sources.

Carbon monoxide is a colorless and odorless gas, which in the urban environment is associated primarily with the incomplete combustion of fossil fuels in motor vehicles. CO combines with hemoglobin in the bloodstream and reduces the amount of oxygen that can be circulated through the body. High CO concentrations can lead to headaches, aggravation of cardiovascular disease and impairment of central nervous system functions. CO concentrations can vary greatly over comparatively short distances. Relatively high concentrations are typically found near crowded intersections and along heavily used roadways carrying slow-moving traffic. Even under the most severe meteorological and traffic conditions, high concentrations of carbon monoxide are limited to locations within a relatively short distance, 300 to 600 feet, of heavily traveled roadways. Consequently, it is appropriate to evaluate concentrations of CO on a regional and on a localized or microscale basis. In general, CO emissions have been decreasing as a result of the State and Federal Motor Vehicle Control Program, which has mandated increasingly lower emission levels for vehicles manufactured since 1973.

Sulfur oxides (SO_x) constitute a class of compounds of which sulfur dioxide (SO₂) and sulfur trioxide (SO₃) are of great importance. The health effects of SO_x include respiratory illness, damage to the respiratory tract, and bronchioconstriction. Relatively little SO_x is emitted from motor vehicles.

Hydrocarbons (HC) include a wide variety of volatile organic compounds (VOC) emitted principally from the storage, handling and use of fossil fuels. Though hydrocarbons can cause

eye irritation and breathing difficulty, their principal health effects are related to their role in the formation of O₃.

Nitrogen oxides (NO_x) are of concern because of their role as precursors in the formation of O₃. Most of the NO_x emitted by motor vehicles or construction combustion equipment is in the form of nitric oxide (NO), which is not directly harmful to human health. Only a small percentage is emitted as nitrogen dioxide (NO₂), which can cause lung irritation and decrease the capacity of lungs. High levels of NO₂ have been shown to increase the risk of asthma in children living near freeways. Once emitted, NO reacts slowly in the presence of sunlight with O₃ to form NO₂. Since the reactions are slow and occur as the pollutants are diffusing downwind, elevated NO₂ and O₃ levels are often found many miles from their sources. For that reason, the effects of hydrocarbons and nitrogen oxide emissions are generally examined on a regional basis, and not at a localized level.

Ozone is the principal component of photochemical smog. O₃ is a principal cause of lung and eye irritation in the urban environment. It is formed in the atmosphere through a series of reactions involving hydrocarbons and nitrogen oxides in the presence of sunlight. High O₃ concentrations normally occur only in the summer, when insolation is greatest and temperatures are high.

Particulate matter includes both liquid and solid particles of a wide range of sizes and composition. Of particular concern are those particles that are smaller than or equal to 10 microns or 2.5 microns in size (PM₁₀ and PM_{2.5}, respectively). The data collected through several nationwide studies indicate that most PM₁₀ is the product of fugitive dust, wind erosion and agricultural and forestry sources, while a small portion is the product of fuel combustion processes. Conversely, the combustion of fossil fuels accounts for a significant portion of PM_{2.5}. The main health effects of air-borne particulate matter are on the respiratory system.

Lead is a stable compound, which persists and accumulates both in the environment and in animals. In people it affects the blood-forming (hematopoietic) system, the nervous system and the renal system. In addition, lead has been shown to affect the normal functions of the reproductive, endocrine, hepatic, cardiovascular, immunologic and gastrointestinal systems. There is significant individual variability in response to lead exposure. The lead used in gasoline anti-knock additives historically represented a major source of lead emissions to the atmosphere. However, lead emissions have significantly decreased due to the mandated elimination of leaded gasoline, and the replacement of vehicles that burn leaded gasoline with those that cannot. In general, an analysis of lead is only performed for projects that emit significant quantities of the pollutant (e.g., lead smelters) or are near such projects.

In conclusion, of the eight criteria pollutants identified by the EPA as being of nationwide concern, CO is the only pollutant whose localized effects currently require a detailed, microscale mobile source impact evaluation for roadway projects at the EIS level. The regional effects of the project on O₃ levels are considered in the regional CO, NO_x and HC emissions analysis performed by the Wilmington Area Planning Council (WILMAPCO) as part of the Transportation Improvement Plan (TIP) for the region.

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In accordance with the recent (*Federal Register*, Volume 71, Number 47, March 10, 2006) regulations, the referenced final rule requires a qualitative PM_{2.5} hot-spot analysis only for projects of air quality concern, *i.e.*, those that involve significant levels of diesel vehicle traffic. Although the 2030 percentage of total truck traffic (including diesel trucks) on new US 301 is projected to exceed the eight percent guidance maximum (7-9 percent on most segments of the roadway; 20 percent at the state line), the average vehicles per day is less than half the maximum 125,000 AADT recommended for the analysis (the highest ADT is projected at 56,700). Because the new US 301 does not encourage new diesel truck traffic, but merely shifts the diesel truck traffic from existing US 301 to the new roadway, it does not represent a significant increase in diesel truck traffic. Therefore, a PM_{2.5} analysis is not included for the project.

2. National and State Ambient Air Quality Standards

As required by the Clean Air Act Amendments of 1970 (P.L. 91-064, December 31, 1970) and the Clean Air Act Amendment of 1977 (P.L. 95-95, August 7, 1977), the EPA has established National Ambient Air Quality Standards (NAAQS) for the following air pollutants: O₃, CO, NO₂, SO_x, PM₁₀, PM_{2.5}, and Pb. Delaware has also promulgated ambient air quality standards for the same pollutants. Applicable state and federal standards are shown in **Table III-30**.

Table III-30: National and State Ambient Air Quality Standards

Pollutant	Averaging Period	National and State Standards	
		Primary	Secondary
Ozone (O ₃)	1 Hour ^a	0.12 ppm (235 µg/m ³)	Same as Primary Standard
	8 Hour ^b	0.08 ppm (157 µg/m ³)	
Carbon Monoxide (CO)	1 Hour ^c	35 ppm (40 mg/m ³)	---
	8 Hour ^c	9 ppm (10 mg/m ³)	---
Nitrogen Dioxide (NO ₂)	Annual Average	0.053 ppm (100 µg/m ³)	Same as Primary Standard
Sulfur Dioxide (SO ₂)	Annual Average	0.03 ppm (80 µg/m ³)	---
	24 Hour ^c	0.14 ppm (365 µg/m ³)	---
	3 Hour ^c	---	0.5 ppm (1300 µg/m ³)
Suspended Particle Matter (PM ₁₀)	Annual Arithmetic Mean	50 µg/m ³	Same as Primary Standard
	24 Hour ^d	150 µg/m ³	Same as Primary Standard
Suspended Fine Particle Matter (PM _{2.5})	Annual Arithmetic Mean	15 µg/m ³	Same as Primary Standard
	24 Hour ^e	65 µg/m ³	Same as Primary Standard
Lead (Pb)	Calendar Quarter	1.5 µg/m ³	Same as Primary Standard
Total Suspended Particle (TSP)	Annual Geometric Mean	75 µg/m ³	60 µg/m ³
	24-Hour ^c	260 µg/m ³	150 µg/m ³

Source: Delaware Air Quality Management Section, Division of Air and Waste Management, Department of Natural Resources and Environmental Control, "Delaware Annual Air Quality Report 2003" Delaware Air Quality Management Section, "Ambient Air Quality Standards (Regulation 3.)"

- Notes:
- a. Based on a 3-year average of annual averages
 - b. 3-year average of the 4th highest 8-hour concentration may not exceed 0.08 ppm
 - c. Not to be exceeded more than once a year
 - d. Based on a 3-year average of annual 99th percentile values
 - e. Based on a 3-year average of annual 98th percentile values
- ppm: parts per million; µg/m³: micrograms per cubic meter; mg/m³: milligrams per cubic meter

The Primary Standards have been established to protect the public health with an adequate margin of safety. The Secondary Standards are intended to protect the nation's welfare and account for air-pollutant affects on soil, water, visibility, vegetation and other aspects of the general welfare.

3. Air Quality Regulations and Status of the Project Area

Air quality is regulated at the federal level under the Clean Air Act (CAA) and EPA's Final Conformity Rule (40 CFR Parts 51 and 93). Section 107 of the 1977 Clean Air Act Amendment requires the EPA to publish a list of all geographic areas in compliance with the NAAQS, as well as those not attaining the NAAQS. Areas not in compliance with NAAQS are deemed non-attainment areas. Areas which were previously deemed non-attainment areas, but which recently achieved compliance with the NAAQS, are deemed maintenance areas. The designation of an area is based on the data collected by the state-monitoring network on a pollutant-by-pollutant basis.

a. *Monitored Air Quality*

Air pollutant levels throughout Delaware are monitored by a network of sampling stations operated under the supervision of DNREC's Division of Air and Waste Management.

The closest monitoring stations to the project corridor are located in New Castle County at the Brandywine (O₃), Bellefonte (PM_{2.5}), Wilmington (CO, NO₂, PM₁₀, O₃, SO₂, PM_{2.5}), Summit Bridge (O₃, SO₂, PM_{2.5}), and Delaware City (CO, SO₂,) Monitoring Sites. The monitoring of PM_{2.5} began in 1999 at the Bellefonte, Wilmington, and Summit Bridge monitoring sites and at a new monitoring site in Newark. However, the results of the PM_{2.5} monitoring are in the process of being validated.

The highest levels reported for the Brandywine, Wilmington, Summit Bridge and Delaware City stations in 2006 are reported in **Table III-31**. The levels do not exceed the S/NAAQS for all pollutants monitored, with the exception of O₃, which exceeded the 8-hour standard at the Brandywine, Wilmington and Summit Bridge sites. There is no data for the monitoring of lead or TSP in Delaware.

**Table III-31: Air Quality Summary for the Project Corridor
Delaware Air Quality Monitoring Sites Highest Recorded Levels During 2006**

Pollutant	Brandywine	Wilmington	Summit Bridge	Delaware City
Carbon Monoxide (CO)				
1-Hour Maximum	---	3.0 ppm	---	1.5 ppm
Concentrations > 35 ppm	---	0	---	0
8-Hour Maximum	---	2.2 ppm	---	1.2 ppm
Concentrations > 9 ppm	---	0	---	0
Nitrogen Dioxide (NO₂)				
Annual Arithmetic Mean	---	0.018 ppm	---	---
Annual Mean > 0.05 ppm	---	0	---	---

**Table III-31: Air Quality Summary for the Project Corridor
Delaware Air Quality Monitoring Sites Highest Recorded Levels During 2006**

Pollutant	Brandywine	Wilmington	Summit Bridge	Delaware City
Particulate Matter < 10 micrometers (PM₁₀)				
24-Hour Average	---	81 µg /m ³	---	---
Concentrations > 150 µg/m ³	---	0	---	---
Annual Arithmetic Mean	---	23 µg /m ³	---	---
Annual Mean > 50 µg /m ³	---	0	---	---
Ozone (O₃)				
1-Hour Maximum	0.105 ppm	0.101 ppm	0.113 ppm	---
Concentrations > 0.12 ppm	0	0	0	---
8-Hour Maximum	0.093 ppm	0.085 ppm	0.095 ppm	---
Concentrations > 0.08 ppm	2	1	2	---
3-Year Average of 4 th Daily Maximum Eight-Hour Average	0.082 ppm	0.081 ppm	0.078 ppm	
Sulfur Dioxide (SO₂)				
24-Hour Maximum	---	0.016 ppm	0.015 ppm	0.063 ppm
Concentrations > 0.14 ppm	---	0	0	0
3-Hour Maximum	---	0.039 ppm	0.046 ppm	0.158 ppm
Concentrations > 0.50 ppm	---	0	0	0
Annual Arithmetic Mean	---	0.005 ppm	0.003 ppm	0.007 ppm
Annual Mean > 0.03 ppm	---	0	0	0

Source: EPA AIRS Data Website: <http://www.epa.gov/air/data/index.html>

The project corridor is located in southern New Castle County, Delaware. The County is designated as in-attainment for carbon monoxide (CO), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), lead (Pb) and particulate matter (PM₁₀). However, New Castle County is designated as a non-attainment area for ozone (O₃) and fine particulate matter (PM_{2.5}). 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.

b. Conformance with Air Quality Standards

Under the requirements of the CAA, the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), and the Safe, Accountable, Flexible, Efficient Transportation Equity Act of 2005 (SAFETEA-LU), proposed transportation projects must be derived from a Constrained Long Range Transportation Plan (CLRP) that conforms with a state's air quality plans as outlined in a State Implementation Plan (SIP). The SIP sets forth an area's strategies for achieving and maintaining air quality standards.

The most recent air quality analysis applicable for the US 301 project was completed as part of the WILMAPCO *Regional Transportation Plan 2030 Update* (2030 RTP) and its component air quality conformity analysis, as adopted by WILMAPCO's Council on March 22, 2007. A list of improvements within the US 301 corridor (programmed improvements to the local roadways and improvements associated with the Westown project) was included in and assumed to be in-

service for the RTP’s planning horizon years of 2010, 2020, and 2030. The conformity analysis does not yet include the US 301 Project in-service.

The WILMAPCO 2030 RTP demonstrated continued conformity with the *State of Delaware 2005 State Implementation Plan (SIP)* air quality budgets that were applicable at the time the RTP was adopted. (The most recent SIP was submitted to the US Environmental Protection Agency in June 2007.) These applicable budgets and the WILMAPCO RTP conformity analysis of March 2003 were developed and completed under the so-called “one-hour air quality standards” using EPA’s MOBILE 5b emissions model. Note that the applicable budgets have since been updated under the “eight-hour air quality standards” using EPA’s MOBILE 6.2 emissions model; subsequent air quality conformity analyses conducted in the Spring of 2005 for WILMAPCO’s short range Transportation Improvement Program (TIP) indicated total emissions for New Castle County still conform to the Delaware SIP.

DelDOT is currently working with DNREC, WILMAPCO, FHWA, Federal Transit Administration (FTA), and EPA to address broader regional air quality issues for both ozone precursors and PM_{2.5}. WILMAPCO adopted its most recent TIP conformity analyses for FY 2008-2011 on March 22, 2007. Following the Record of Decision, the project will be included in the conformity analysis, and programming of any funds for design, right-of-way or construction will be based on the results of that analysis.

In order for this project to conform to the SIP on a localized (or microscale) basis, an air quality analysis must be conducted that demonstrates that the project will not cause or exacerbate localized violations of the NAAQS. As stated previously, CO is the only criteria pollutant whose localized effects require a detailed impact evaluation.

4. Project Level Emissions Analysis (Microscale Analysis)

A detailed microscale air quality analysis has been performed to determine the local CO impact of the proposed project, as indicated in **Section III.C.1**. The analysis considered the impact of the No-Build, Yellow, Purple, Brown (North and South) and Green (North and South) Alternatives at 25 air quality receptors located throughout the project area and at two signalized intersections, each having 20 air quality receptors. The locations of air quality sensitive receptors used in the analysis are shown on **Figure III-9** and listed in **Table III-32**. The results of the CO concentration analysis are summarized in the following sections.

Table III-32: Air Quality Receptor Locations

Receptor	Address/Location
R1	323 Jessica Drive
R2	318 John Randal Drive
R3	236 Oak Drive
R4	108 Laks Drive
R5	117 Delaware Canal Court East
R6	26 Meadow Lane
R7	523 Creek Lane East

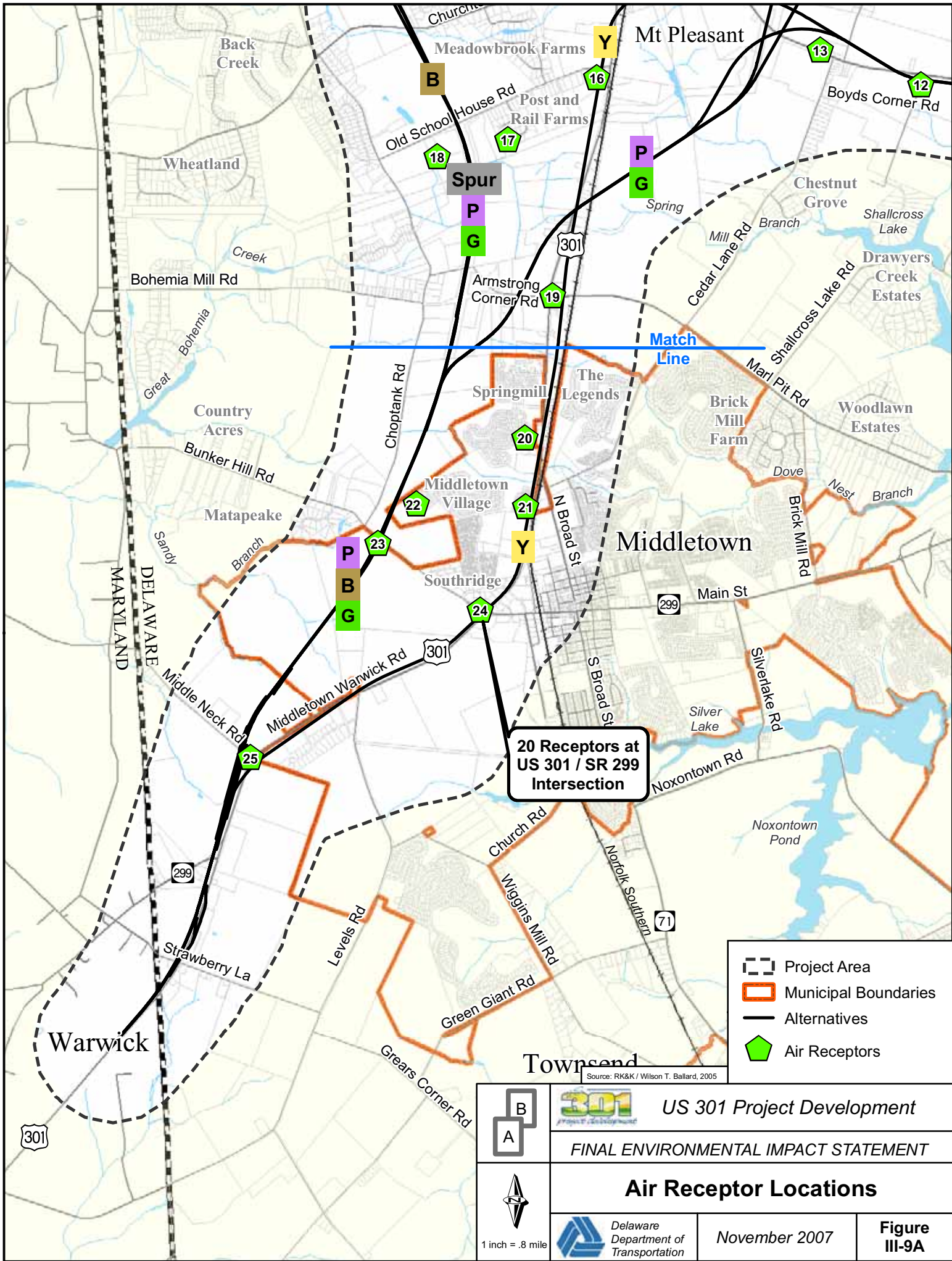
Table III-32: Air Quality Receptor Locations

Receptor	Address/Location
R8	Victoria Drive Entrance
R9	1000 Jamison Corner Road
R10	864 Bullen Drive
R11	203 Milford Drive
R12	West of 404 Emerson Road
R13	Boyds Corner Road at Cedar Lane Road
R14	562 Boyds Corner Road
R15	US 301at Boyds Corner Road
R16	US 301at Old School House Road
R17	116 Saddle Drive
R18	Across from 830 Old School House Road
R19	US 301at Marl Pit Road
R20	US 301at Spring Mill
R21	US 301at Middletown Village
R22	828 Woodline Drive
R23	Across from 1106 Bunker Hill Road
R24	South of 1022 Bunker Hill Road
R25	1963 Middle Neck Road
299-1 thru 299-20	US 301at SR 299 Intersection
896-1 thru 896-20	US 301at SR 896 (Mount Pleasant) Intersection

a. Description of Impacts

The air quality analysis indicates that the carbon monoxide impact from the No-Build Alternative results in no violations of the State/National Ambient 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 carbon monoxide impacts resulting from the implementation of any of the build alternatives, including the Preferred Alternative, would not result in a violation of the 1-hour concentration or the 8-hour concentration, at any air quality receptor location, in any analysis year. The results for the Preferred Alternative do not differ from those for the Green North Alternative.

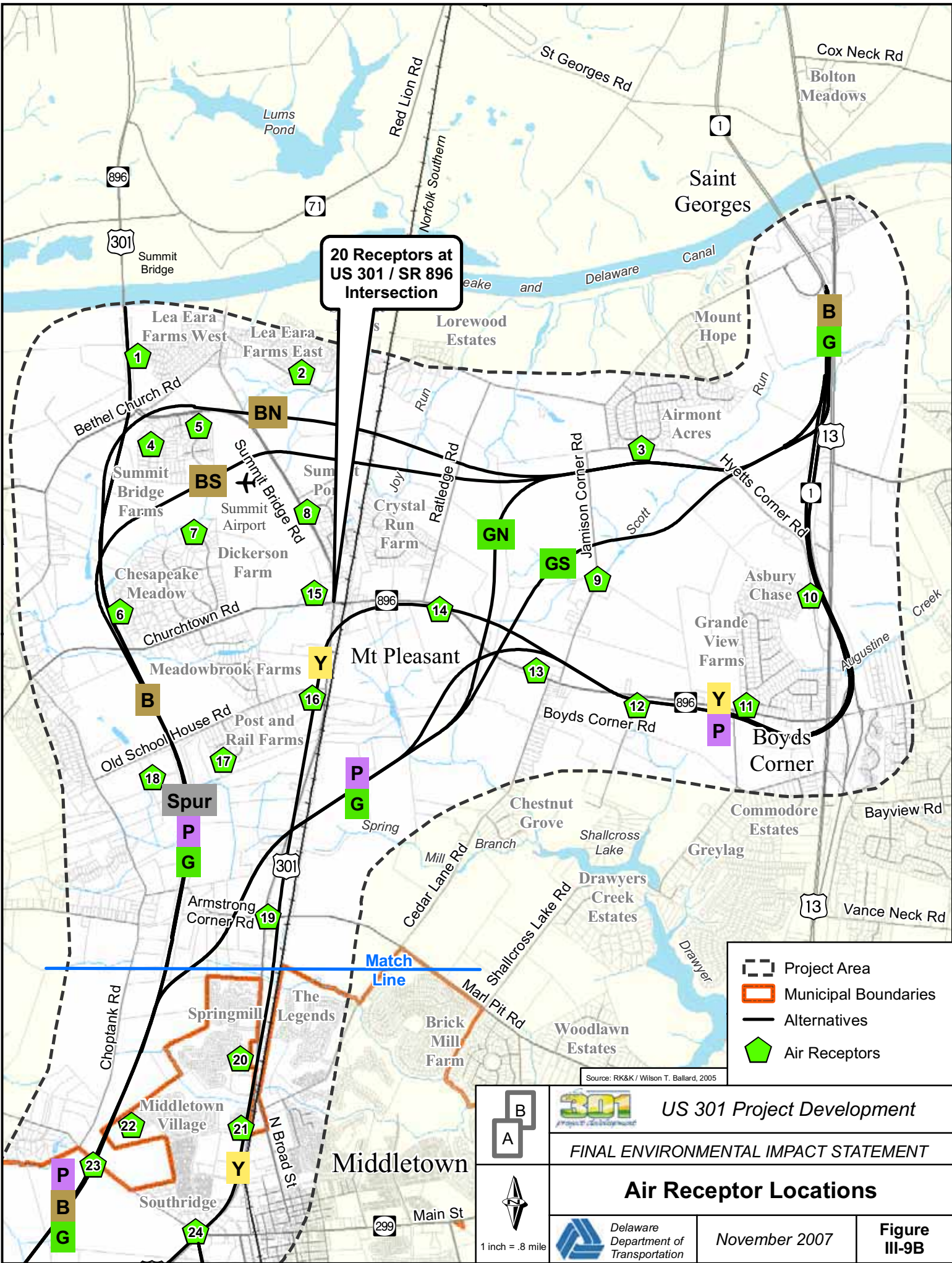
The results of the analyses are presented in *Tables III-33, III-34, and III-35*. The results shown in *Table III-35* represent the worst-case build scenarios for the two intersections: the Purple Alternative for the SR 299 intersection and the Yellow Alternative for the SR 896 intersection.



**20 Receptors at
US 301 / SR 299
Intersection**

- Project Area
- Municipal Boundaries
- Alternatives
- Air Receptors

 1 inch = .8 mile	 US 301 Project Development
	FINAL ENVIRONMENTAL IMPACT STATEMENT
Air Receptor Locations	
	Delaware Department of Transportation
November 2007	Figure III-9A



**20 Receptors at
US 301 / SR 896
Intersection**

- Project Area
- Municipal Boundaries
- Alternatives
- Air Receptors

 1 inch = .8 mile	 US 301 Project Development FINAL ENVIRONMENTAL IMPACT STATEMENT	
Air Receptor Locations		
 Delaware Department of Transportation	November 2007	Figure III-9B

Table III-33: Predicted CO Concentration, 2010

Receptor Number	No-Build		Yellow		Purple		Brown				Green			
							North		South		North (Preferred)		South	
	1-hr.	8-hr.	1-hr.	8-hr.	1-hr.	8-hr.	1-hr.	8-hr.	1-hr.	8-hr.	1-hr.	8-hr.	1-hr.	8-hr.
R1	3.2	1.9	2.9	1.8	3.2	1.8	3.2	1.8	3.2	1.8	3.0	1.8	3.0	1.8
R2	2.3	1.5	2.3	1.4	2.2	1.4	2.4	1.5	2.3	1.5	2.2	1.4	2.2	1.4
R3	2.0	1.3	2.0	1.3	2.0	1.3	2.4	1.5	2.4	1.5	2.5	1.6	2.2	1.4
R4	3.1	1.9	2.9	1.8	3.0	1.9	3.1	1.9	3.0	1.9	3.0	1.8	3.0	1.8
R5	2.6	1.7	2.4	1.6	2.6	1.7	2.9	1.8	2.7	1.7	2.5	1.6	2.5	1.6
R6	2.2	1.4	2.1	1.4	2.2	1.4	2.8	1.7	2.8	1.7	2.1	1.4	2.1	1.4
R7	2.3	1.5	2.2	1.4	2.3	1.5	2.4	1.5	2.4	1.5	2.2	1.4	2.2	1.4
R8	3.6	2.0	3.7	2.1	3.2	1.9	3.2	1.9	3.2	1.9	3.1	1.9	3.1	1.9
R9	2.0	1.3	2.0	1.3	2.2	1.3	2.1	1.3	2.1	1.3	2.2	1.4	2.3	1.5
R10	4.8	2.7	4.5	2.4	4.5	2.4	4.4	2.4	4.4	2.4	4.4	2.4	4.4	2.4
R11	2.6	1.6	2.4	1.6	2.4	1.5	2.4	1.6	2.4	1.6	2.3	1.5	2.3	1.5
R12	2.6	1.6	3.2	1.9	3.4	2.0	2.4	1.6	2.4	1.6	2.4	1.5	2.4	1.5
R13	3.3	1.9	3.3	1.9	3.0	1.9	3.0	1.7	3.0	1.7	2.8	1.7	2.8	1.7
R14	2.9	1.7	3.5	2.1	2.6	1.6	2.5	1.5	2.5	1.5	2.7	1.6	2.6	1.6
R15	4.6	2.7	5.1	2.9	4.6	2.7	4.7	2.7	4.7	2.7	4.4	2.5	4.4	2.5
R16	3.7	2.1	3.9	2.2	2.8	1.8	2.7	1.7	2.7	1.7	2.7	1.7	2.7	1.7
R17	2.0	1.3	2.1	1.3	3.3	1.9	2.7	1.6	2.7	1.6	3.4	1.9	3.4	1.9
R18	2.0	1.3	2.0	1.3	2.3	1.4	2.3	1.5	2.3	1.5	2.3	1.5	2.3	1.5
R19	2.5	1.6	2.6	1.6	2.3	1.5	2.2	1.5	2.2	1.5	2.3	1.5	2.3	1.5
R20	2.3	1.5	2.3	1.5	2.1	1.3	2.2	1.4	2.2	1.4	2.1	1.3	2.1	1.3
R21	3.3	1.9	2.9	1.7	2.3	1.5	2.3	1.5	2.3	1.5	2.3	1.5	2.3	1.5
R22	2.0	1.3	1.9	1.3	2.9	1.7	3.0	1.7	3.0	1.7	2.9	1.8	2.9	1.8
R23	1.9	1.3	1.9	1.3	6.1	3.3	6.3	3.4	6.3	3.4	6.3	3.5	6.3	3.5
R24	2.9	1.8	2.7	1.7	2.3	1.5	2.3	1.5	2.3	1.5	2.3	1.5	2.3	1.5
R25	2.5	1.6	2.5	1.6	2.6	1.7	2.7	1.7	2.7	1.7	2.7	1.7	2.7	1.7

Notes: Maximum 1-hr. CO concentrations include 1.7 ppm background level. Worst-case (AM or PM) shown.
 Maximum 8-hr. CO concentrations include 1.2 ppm background level.
 The S/NAAQS for the maximum 1-hr. CO concentration is 35.0 ppm.
 The S/NAAQS for the maximum 8-hr. average CO concentration is 9.0 ppm.

Indicated background levels (1.7 ppm and 1.2 ppm for 1-hour and 8-hour concentrations, respectively) represent those levels listed on the EPA AIRS website that are closest and most representative of ambient conditions for the project area and were derived from the Delaware City monitoring site.

The CO analysis incorporates the effect of changes/improvements in vehicle emission control system technologies as well as emissions regulations and standards that will be in place in 2030. The result is that vehicles are anticipated to be cleaner in 2030 when compared to 2010, thus reducing the effect on CO. Thus, many of the levels predicted for 2030 will be lower than those predicted for 2010.

Table III-34: Predicted CO Concentration, 2030

Receptor Number	No-Build		Yellow		Purple		Brown				Green			
							North		South		North (Preferred)		South	
	1-hr.	8-hr.	1-hr.	8-hr.	1-hr.	8-hr.	1-hr.	8-hr.	1-hr.	8-hr.	1-hr.	8-hr.	1-hr.	8-hr.
R1	2.7	1.7	2.5	1.6	2.7	1.6	2.7	1.7	2.7	1.6	2.5	1.6	2.5	1.6
R2	2.1	1.4	2.1	1.4	2.1	1.4	2.2	1.4	2.1	1.4	2.1	1.4	2.1	1.4
R3	2.0	1.3	1.9	1.3	1.9	1.3	2.3	1.4	2.3	1.4	2.4	1.5	2.1	1.3
R4	2.7	1.7	2.6	1.6	2.6	1.7	2.7	1.7	2.6	1.7	2.6	1.6	2.6	1.6
R5	2.3	1.5	2.2	1.5	2.3	1.5	2.4	1.6	2.3	1.5	2.2	1.5	2.2	1.5
R6	2.1	1.4	2.0	1.3	2.1	1.4	2.6	1.6	2.6	1.5	2.0	1.3	2.0	1.3
R7	2.2	1.4	2.1	1.4	2.2	1.4	2.2	1.4	2.3	1.4	2.1	1.4	2.1	1.4
R8	3.1	1.8	3.1	1.8	2.9	1.7	2.9	1.7	2.9	1.7	2.7	1.7	2.7	1.7
R9	2.0	1.3	1.9	1.3	1.9	1.3	2.0	1.3	2.0	1.3	2.0	1.3	2.2	1.4
R10	4.0	2.3	3.7	2.1	3.7	2.1	3.7	2.1	3.7	2.1	3.6	2.1	3.6	2.1
R11	2.3	1.5	2.2	1.5	2.2	1.4	2.3	1.5	2.3	1.5	2.2	1.5	2.2	1.5
R12	2.4	1.5	2.9	1.8	2.9	1.8	2.4	1.5	2.4	1.5	2.1	1.4	2.1	1.4
R13	2.9	1.7	2.9	1.7	2.8	1.7	2.7	1.6	2.7	1.6	2.6	1.5	2.6	1.5
R14	2.5	1.6	3.0	1.9	2.3	1.5	2.2	1.5	2.2	1.5	2.3	1.5	2.3	1.5
R15	3.8	2.3	4.2	2.5	3.8	2.3	3.9	2.3	3.9	2.3	3.7	2.2	3.7	2.2
R16	3.0	1.8	3.2	2.0	2.5	1.6	2.5	1.6	2.5	1.6	2.5	1.6	2.5	1.6
R17	1.9	1.3	1.9	1.3	2.7	1.7	2.4	1.5	2.4	1.5	2.8	1.7	2.8	1.7
R18	1.8	1.3	1.8	1.3	2.1	1.4	2.1	1.4	2.1	1.4	2.1	1.4	2.1	1.4
R19	2.3	1.5	2.4	1.5	2.2	1.4	2.1	1.4	2.1	1.4	2.2	1.4	2.2	1.4
R20	2.1	1.4	2.0	1.4	1.9	1.3	2.0	1.3	2.0	1.3	2.0	1.3	2.0	1.3
R21	2.6	1.7	2.5	1.5	2.2	1.4	2.2	1.4	2.2	1.4	2.1	1.4	2.1	1.4
R22	1.8	1.2	1.8	1.2	2.4	1.6	2.5	1.6	2.5	1.6	2.5	1.6	2.5	1.6
R23	1.9	1.2	1.8	1.2	5.0	2.8	5.2	2.9	5.2	2.9	5.2	2.9	5.2	2.9
R24	2.6	1.7	2.4	1.6	2.1	1.4	2.1	1.4	2.1	1.4	2.1	1.4	2.1	1.4
R25	2.5	1.5	2.2	1.5	2.4	1.5	2.4	1.5	2.4	1.5	2.4	1.6	2.4	1.6

Maximum 1-hr. CO concentrations include 1.7 ppm background level. Worst-case (AM or PM) shown.

Maximum 8-hr. CO concentrations include 1.2 ppm background level.

The S/NAAQS for the maximum 1-hr. CO concentration is 35.0 ppm.

The S/NAAQS for the maximum 8-hr. average CO concentration is 9.0 ppm.

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Table III-35: CO Concentration at Signalized Intersections (ppm)

US 301 at SR 299									US 301 at SR 896								
Receptor Number	2010				2030				Receptor Number	2010				2030			
	No-Build		Build		No-Build		Build			No-Build		Build		No-Build		Build	
	1-hr.	8-hr.	1-hr.	8-hr.	1-hr.	8-hr.	1-hr.	8-hr.		1-hr.	8-hr.	1-hr.	8-hr.	1-hr.	8-hr.	1-hr.	8-hr.
299-1	4.8	3.1	3.5	2.4	4.1	2.6	3.0	2.0	896-1	4.8	2.7	4.2	2.4	3.9	2.3	3.4	2.1
299-2	5.1	3.1	3.5	2.1	4.2	2.6	3.0	1.9	896-2	4.8	2.8	4.2	2.5	3.9	2.3	3.5	2.1
299-3	5.1	3.2	3.9	2.5	4.1	2.7	3.3	2.1	896-3	5.4	3.0	5.0	2.5	4.3	2.6	4.1	2.2
299-4	5.0	3.2	4.0	2.6	4.2	2.7	3.5	2.2	896-4	5.2	3.0	4.6	2.6	4.3	2.6	3.8	2.2
299-5	4.5	2.8	3.0	1.9	3.8	2.4	2.9	1.7	896-5	5.5	3.1	5.1	2.6	4.4	2.6	4.1	2.2
299-6	4.6	2.9	3.3	2.1	3.9	2.5	2.9	1.8	896-6	5.3	3.1	4.8	2.6	4.4	2.6	4.0	2.3
299-7	3.7	2.2	2.8	1.7	3.1	2.0	2.5	1.6	896-7	4.8	2.8	4.4	2.5	4.0	2.4	3.7	2.1
299-8	3.6	2.3	2.9	1.8	3.1	2.0	2.5	1.7	896-8	5.3	2.9	4.6	2.6	4.2	2.5	3.8	2.2
299-9	4.1	2.4	3.0	1.8	3.4	2.0	2.7	1.6	896-9	5.1	2.7	4.6	2.2	4.1	2.3	3.8	1.9
299-10	4.4	2.7	3.3	2.1	3.5	2.3	2.9	1.9	896-10	4.7	2.5	4.1	2.0	4.0	2.2	3.6	1.8
299-11	4.2	2.9	3.5	2.1	3.5	2.4	2.9	1.9	896-11	4.8	2.6	4.2	2.1	3.9	2.2	3.5	1.8
299-12	4.0	2.5	3.1	1.9	3.4	2.1	2.8	1.7	896-12	5.1	2.8	4.6	2.3	4.0	2.3	3.7	1.9
299-13	3.8	2.6	3.1	2.0	3.3	2.2	2.7	1.8	896-13	4.6	2.8	4.2	2.4	3.8	2.3	3.5	2.1
299-14	4.4	2.7	3.4	2.1	3.8	2.3	2.9	1.8	896-14	4.4	2.7	4.0	2.4	3.7	2.3	3.3	2.1
299-15	4.5	2.9	3.6	2.3	3.7	2.5	3.1	2.0	896-15	4.8	2.8	4.4	2.6	4.1	2.5	3.7	2.2
299-16	4.3	2.9	3.4	2.3	3.6	2.5	3.0	1.9	896-16	5.1	2.9	4.6	2.6	4.2	2.5	3.7	2.2
299-17	5.0	3.0	3.8	2.2	4.2	2.6	3.4	2.0	896-17	4.7	2.6	4.2	2.2	3.9	2.2	3.6	1.9
299-18	4.0	2.4	2.9	1.8	3.4	2.1	2.6	1.7	896-18	4.6	2.5	3.9	2.1	3.8	2.2	3.3	1.9
299-19	4.9	2.8	3.0	1.9	3.8	2.4	2.7	1.7	896-19	4.5	2.6	4.1	2.2	3.7	2.3	3.5	1.9
299-20	4.9	2.9	3.2	2.0	4.2	2.5	2.9	1.8	896-20	4.4	2.5	3.9	2.1	3.8	2.2	3.3	1.8

*The worst-case (AM or PM) Build scenario is shown.
Maximum 1-hr. CO concentrations include 1.7 ppm background level.
Maximum 8-hr. CO concentrations include 1.2 ppm background level.*

*The S/NAAQS for the maximum 1-hr. CO concentration is 35.0 ppm.
The S/NAAQS for the maximum 8-hr. average CO concentration is 9.0 ppm.*

b. Consequences and Potential Mitigation

The slight increases or decreases in relative CO concentrations under the Preferred Alternative are not considered an impact at any location analyzed. Therefore, no mitigation is required. A relative comparison of the No-Build Alternative to the build alternatives shows that CO concentrations generally remain the same. There are slight increases or decreases in CO concentrations that can be attributed to shifts in the roadway alignments and altered traffic patterns on existing and proposed roadways. Increases are typically seen at receptors that are located near a proposed alignment that are currently located away from major roadways. Differences in CO concentrations at receptors range from 0 to 4.4 ppm. Reductions in CO concentration are typically seen at receptors adjacent to existing roadways that are projected to facilitate less traffic volume when the proposed alignment is constructed. Reductions typically range from 0 to 1.9 ppm.

5. Mobile Source Air Toxics (MSATs)

In accordance with the USDOT FHWA Memorandum *INFORMATION: Interim Guidance on Air Toxic Analysis in NEPA Documents* (February 3, 2006), this document also considers the potential increases of Mobile Source Air Toxics (MSATs) within the project area as a result of a build alternative, when compared to the No-Build Alternative. A qualitative discussion of localized MSAT impacts is provided in *Chapter III.K*.

D. Noise

This section details the evaluation of potential noise impacts caused by the US 301 project. Following a discussion of noise/activity relationships, a summary is presented of existing noise conditions and development of projected noise that may result upon implementation of a build alternative. Impacts to noise sensitive receptors are identified, and potential mitigation for impacts is discussed.

The Federal Highway Administration (FHWA) has issued guidelines for noise evaluation as established in Title 23 of the Code of Federal Regulations (CFR) Part 772, *Procedures for Abatement of Highway Traffic Noise and Construction Noise*. Highway traffic noise studies, noise abatement procedures, coordination requirements and design noise levels in CFR Part 772 constitute the noise standards mandated by 23 U.S.C. 109(i). Design noise levels for various types of activity (land use) categories are summarized in the following section.

1. Existing Conditions

a. Criteria for Determining Noise Impacts

To describe noise environments and to assess impact on noise sensitive areas, a frequency weighting measure that simulates human subjective response to noise is customarily selected. A-weighted ratings of noise sources which reflect the human ear's reduced sensitivity to low

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frequencies have been found to correlate strongly with human perceptions of the annoying aspects of noise, particularly from traffic noise sources. Consequently A-weighted noise levels, described in decibels-A (dBA), are the values cited by FHWA in its noise criteria indicated in *Table III-36*.

Most environmental noise fluctuates from moment to moment. To correlate noise environments with community annoyance, a single-number noise descriptor called the equivalent sound level (L_{eq}), which characterizes the fluctuating sound, is commonly used. The L_{eq} is the value or level of a steady, non-fluctuating sound that represents the same amount of acoustical energy over the same period of time. For traffic noise assessment, L_{eq} is typically evaluated over a one-hour period, $L_{eq}(h)$.

The design noise levels indicated in *Table III-36* have been used to determine highway traffic noise impacts and the need for considering abatement measures associated with different land uses or activities in existence at the time of project design. Noise-sensitive land uses potentially affected by the proposed improvements are in activity categories B and C. The following Noise Abatement Criteria (NAC) are applicable: L_{eq} equals 67 dBA (exterior) for residential areas, churches, schools etc. where outdoor activity is present, and L_{eq} equals 72 dBA (exterior) for industrial areas. When the predicted design-year build alternative noise levels in the project area approach or exceed the NAC, noise impact occurs, and consideration of traffic noise reduction measures is necessary.

Table III-36: FHWA Noise Abatement Criteria/Activity Relationships

Activity Category	Design Noise Level $L_{eq}(h)$	Description of Activity Category
A	57 dBA (Exterior)	Land on which serenity and quiet are of extraordinary significance and serve an important public need, and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 dBA (Exterior)	Residences, motels, hotels, schools, churches, libraries, hospitals, picnic areas, recreation areas, playgrounds, active sports areas, and parks.
C	72 dBA (Exterior)	Developed lands, properties or activities not included in categories A and B above.
D	--	Undeveloped lands.
E	52 dBA (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals and auditoriums.

In December 1993, the FHWA issued a memorandum to provide guidance on interpreting the word “approach” in section 772.5(g) of 23 CFR. The FHWA defined noise levels that “approach” the noise abatement criteria to be 1 dBA less than the Noise Abatement Criteria.

Criteria adopted by DelDOT for the determination of an impacted receptor under the State Noise Abatement Policy are summarized as follows:

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- Loudest hour L_{eq} A-weighted noise levels.
- Design year noise levels approach or exceed the NAC levels.
- Design year noise levels substantially exceed existing noise levels (10 dBA or more).

b. Analysis Procedures and Methodology

This analysis was conducted in accordance with standard FHWA guidelines and current DelDOT procedures and policies. The analysis began with the determination of existing noise levels along the project corridor in order to assess the traffic noise contributions on the neighboring noise sensitive areas. Future proposed design year 2030 alternatives noise calculations and predictions were performed using FHWA-approved methods. The noise predictions were performed with the FHWA Traffic Noise Model (TNM) version 2.5 (FHWA-PD-96-009). The model incorporates vehicle noise emission levels, updated for modern vehicle classification, traffic speed and traffic volume, sound propagation factors from atmospheric absorption, divergence, intervening ground, intervening barriers, and intervening rows of buildings and areas of heavy vegetation.

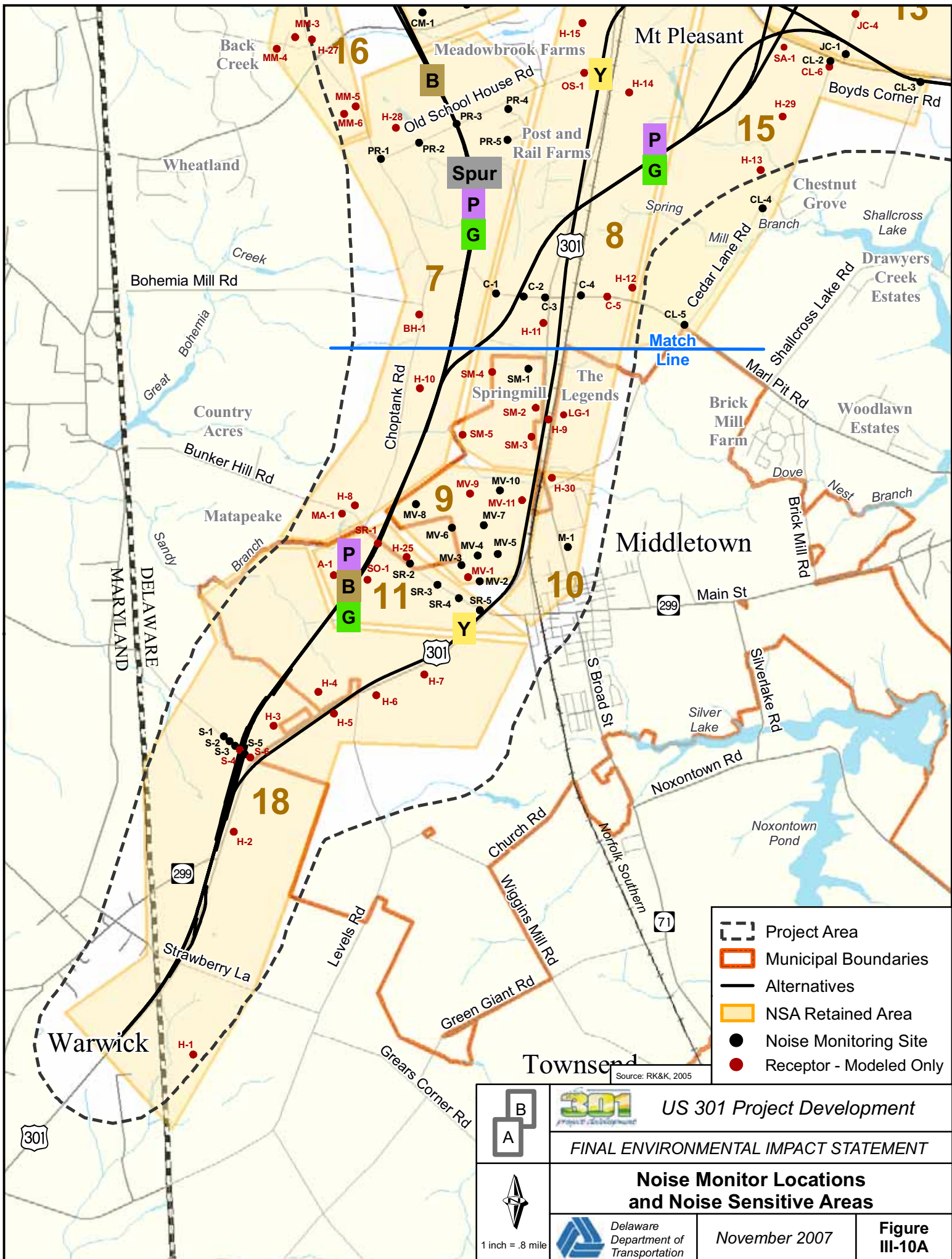
c. Measured and Predicted Existing Noise Levels

In order to determine the existing noise characteristics within the project corridor, ambient noise measurements were recorded in the field during July and August 2005. Short-term ambient noise measurements of 15 minutes were conducted at each noise sensitive area as shown in **Figure III-10** and on the Preferred Alternative mapping in **Appendix B**.

A Noise Sensitive Area (NSA) represents a community of properties (receptors) that could be impacted by traffic noise resulting from the proposed roadway alignments. The NSA could consist of residences, historic properties, schools, churches and other facilities with common outdoor use areas (refer to **Table III-36**, Activity Category B). Several noise monitors were placed in each NSA for a specific period of time, including peak and non-peak periods, in order to establish an accurate representation of the noise environment.

Where appropriate, monitors were positioned in an array configuration to provide a representation of noise levels perpendicular to the mainline traffic source. This allows the ability to interpolate noise levels between receptor sites. Additionally, this array configuration provides sufficient noise information to allow the projection of noise levels along the mainline corridor (where terrain features are similar) to represent other properties within the NSA.

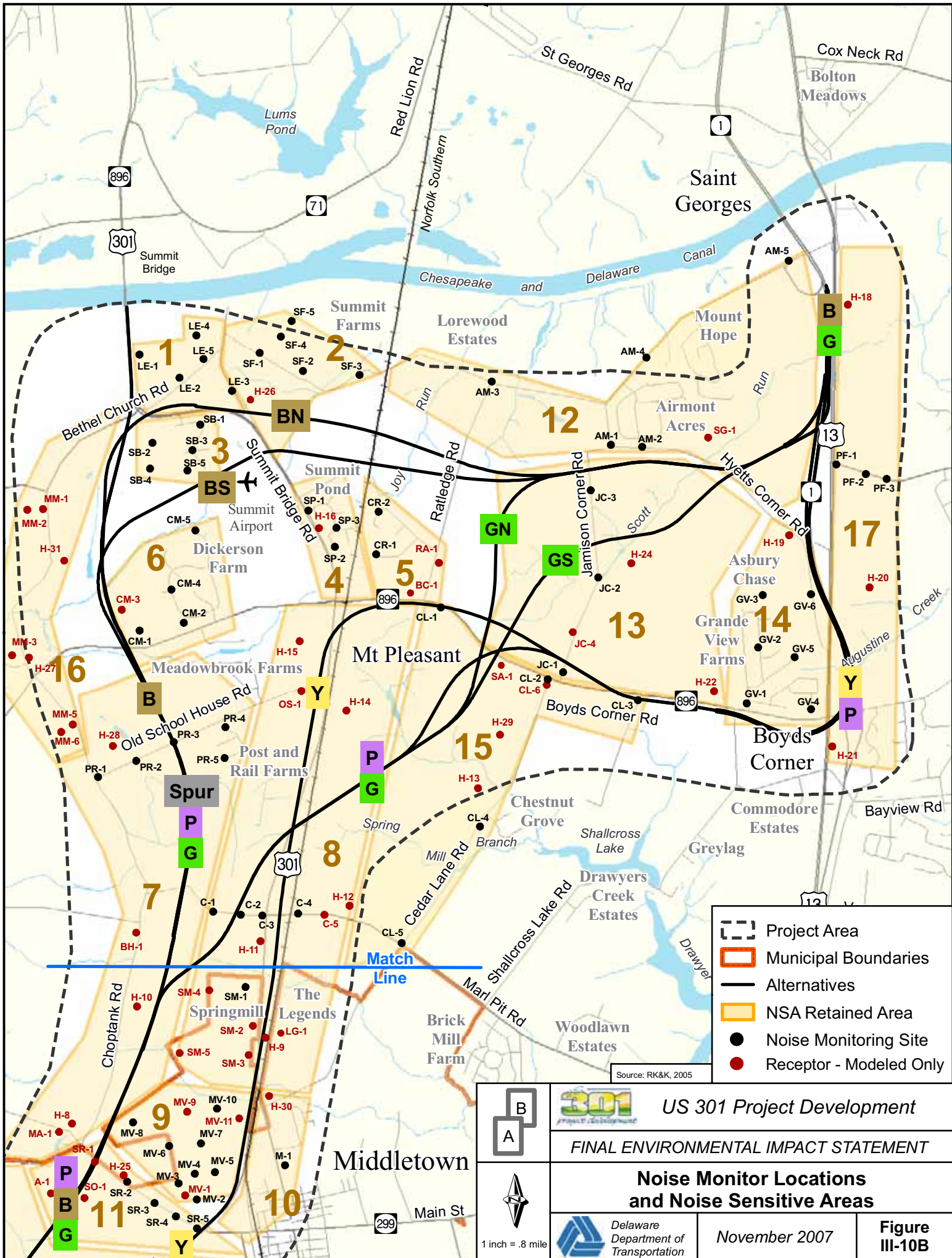
Table III-37 shows measured ambient and predicted peak noise data in one-hour equivalent sound levels (L_{eq}). Predicted noise levels were calculated to 0.1 dBA and then rounded to the nearest whole integer.



- Project Area
- Municipal Boundaries
- Alternatives
- NSA Retained Area
- Noise Monitoring Site
- Receptor - Modeled Only

 1 inch = .8 mile	 US 301 Project Development
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Noise Monitor Locations and Noise Sensitive Areas	
	Delaware Department of Transportation
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Figure III-10A	

Source: RK&K, 2005



- Project Area
- Municipal Boundaries
- Alternatives
- NSA Retained Area
- Noise Monitoring Site
- Receptor - Modeled Only

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FINAL ENVIRONMENTAL IMPACT STATEMENT			
Noise Monitor Locations and Noise Sensitive Areas			
1 inch = .8 mile		November 2007	Figure III-10B

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Table III-37: Existing Noise Levels

Noise Sensitive Area	Receptor	Community or Historic Name	Address	Location Notes	Measured Ambient Leq (dBA)	Existing Peak Hour Leq (dBA)
1	LE-1	Lea Earra Farms	323 Jessica Dr.		57	58
	LE-2	Lea Earra Farms	106 W. Cedarwood Dr.		49	49
	LE-3	Lea Earra Farms	669 Old Summit Bridge Rd.		57	55
	LE-4	Lea Earra Farms	421 Maplewood Dr.		45	44
	LE-5	Lea Earra Farms	121 E. Cedarwood Dr.		45	46
2	SF-1	Summit Farms	Lorewood Grove Rd.	Across from 1520 Lorewood Grove Rd.	56	56
	SF-2	Summit Farms	318 John Randal Dr.		46	46
	SF-3	Summit Farms	1370 Lorewood Grove Rd.		47	47
	SF-4	Summit Farms	210 Sheats Ln.		50	50
	SF-5	Summit Farms	224 Sheats Ln.		48	46
	H-26	S. Rothwell House	669 Old Summit Bridge Rd.		--	58
3	SB-1	Summit Bridge Farms	117 Delaware Canal Ct. E		50	59
	SB-2	Summit Bridge Farms	108 Laks Dr.		48	52
	SB-3	Summit Bridge Farms	133 Delaware Canal Ct. E		45	48
	SB-4	Summit Bridge Farms	120 Laks Dr.		41	45
	SB-5	Summit Bridge Farms	138 Delaware Canal Ct. E		43	44
4	SP-1	Summit Pond	Victoria Dr. Entrance		72	72
	SP-2	Summit Pond	911 Waterlilly Ln.		50	52
	SP-3	Summit Pond	720 Victoria Dr.		46	50
	H-16	A. Eliason House	4353 Summit Bridge Rd		--	70
5	BC-1	Boyds Corner at US 301			--	68
	CR-1	Crystal Run Farm	226 Waterford Dr.		47	47
	CR-2	Crystal Run Farm	135 Crystal Run Dr.		39	38
	RA-1	Ratledge Road	450 Ratledge Road		--	(46)

NOTES: *Shading indicates existing receptor is impacted (66 dBA or higher).*
 -- indicates receptor level is peak calculated-only.
 (46) Indicates value was calculated using comparable receptors in the area.

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Table III-37: Existing Noise Levels

Noise Sensitive Area	Receptor	Community or Historic Name	Address	Location Notes	Measured Ambient Leq (dBA)	Existing Peak Hour Leq (dBA)
6	CM-1	Chesapeake Meadow	208 Deerfield Dr.		47	47
	CM-2	Dickerson Farm	600 Schoonover Ln.		51	51
	CM-3	Chesapeake Meadow	26 Meadow Ln.		--	(47)
	CM-4	Dickerson Farm	313 W. Dickerson Lane		51	51
	CM-5	Dickerson Farm	523 E. Creek Ln.		49	49
7	BH-1	Bohemia Mill Road West	1203 Sharp Ln.		--	60
	MA-1	Matapeake	100 Sassafras Dr.		--	43
	PR-1	Post and Rail Farms	1542 Choptank Rd.		58	58
	PR-2	Post and Rail Farms	1620 Choptank Rd.		54	54
	PR-3	Post and Rail Farms	830 Old School House Rd.		52	52
	PR-4	Post and Rail Farms	102 Saddle Dr.		51	51
	PR-5	Post and Rail Farms	116 Saddle Dr.		47	47
	H-8	Rosedale	1143 Bunker Hill Rd		--	(46)
	H-10	S. Holton Farm	2010 Choptank Rd		--	46
H-28	Choptank	1542 Choptank Rd.		--	(46)	
8	C-1	n/a	416 Armstrong Corner Rd.		54	54
	C-2	n/a	5036 Summit Bridge Rd.		62	62
	C-3	n/a	5036 Summit Bridge Rd.		64	69
	C-4	n/a	617 Marl Pit Rd.		59	59
	C-5	n/a	617 Marl Pit Rd.		--	43
	LG-1	The Legends West	10 Couples Ct.		--	53
	OS-1	Old Schoolhouse Rd. at US 301	626 Old Schoolhouse Rd.		--	48
	SM-1	Springmill	Carter Dr.	Open space around 201 Carter Dr.	57	57
	SM-2	Springmill	Windmill Lane		--	62

NOTES: *Shading indicates existing receptor is impacted (66 dBA or higher).*
 -- indicates receptor level is peak calculated-only.
 (46) Indicates value was calculated using comparable receptors in the area.

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Table III-37: Existing Noise Levels

Noise Sensitive Area	Receptor	Community or Historic Name	Address	Location Notes	Measured Ambient Leq (dBA)	Existing Peak Hour Leq (dBA)
8	SM-3	Springmill	Whispering Trail		--	55
	SM-4	Springmill	Daylily Way		--	41
	SM-5	Springmill	Springmill Drive		--	35
	H-9	R.G. Hayes House	5187 Summit Bridge Rd.		--	66
	H-11	Armstrong-Walker House	5036 Summit Bridge Rd.		--	67
	H-12	Achmester	North Side of Marl Pit Rd.	One mile east of Summit Bridge Rd.	--	(46)
	H-14	Weston; S. Brady Farm	4677 Summit Bridge Rd.		--	51
	H-15	Mt. Pleasant Farm	4564 Summit Bridge Rd.		--	48
9	MV-1	Middletown Village	Liborio Dr.	Next to 203 Liborio Dr.	--	47
	MV-2	Middletown Village	112 Sandhill Rd.		58	58
	MV-3	Middletown Village	110 Sleepy Hollow Dr.		50	50
	MV-4	Middletown Village	766 Marian Dr.		62	62
	MV-5	Middletown Village	Peterson Rd.	Across from 333 Liborio Dr.	55	55
	MV-6	Middletown Village	1106 Bunker Hill Rd.		50	50
	MV-7	Middletown Village	Ash Blvd.	Across from 324 Vincent Circle.	51	51
	MV-8	Middletown Village	828 Woodline Dr.		45	45
	MV-9	Middletown Village	Ash Blvd.	Open space behind Dove Nest Ct.	--	44
	MV-10	Middletown Village	334 E. Harvest Ln.		56	56
	MV-11	Middletown Village	125 Foxtail Ln.		--	57
10	M-1	Middletown	691 Broad St.		54	54

NOTES: *Shading indicates existing receptor is impacted (66 dBA or higher).*
 -- indicates receptor level is peak calculated-only.
 (46) Indicates value was calculated using comparable receptors in the area.

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Table III-37: Existing Noise Levels

Noise Sensitive Area	Receptor	Community or Historic Name	Address	Location Notes	Measured Ambient Leq (dBA)	Existing Peak Hour Leq (dBA)
11	A-1	Appoquinimink High School	1080 Bunker Hill Road		--	46
	SO-1	Southridge	15 Palisade Circle		--	46
	SR-1	n/a	Bunker Hill Rd.	Across from 1106 Bunker Hill Rd.	--	40
	SR-2	n/a	1106 Bunker Hill Rd.		64	64
	SR-3	n/a	Bunker Hill Rd.	Across from 441 Toftrees Dr.	61	61
	SR-4	n/a	Bunker Hill Rd.	Across from 122 Sandhill Dr.	62	62
	SR-5	n/a	Bunker Hill Rd.	South of 1022 Bunker Hill Rd.	61	68
	H-25	The Maples	North Side of Bunker Hill Rd.	0.6 miles NW of Middletown Warwick Rd.	--	56
12	AM-1	Airmont Acres	502 Davis Ct.		52	52
	AM-2	Airmont Acres	236 Oak Dr.		51	51
	AM-3	n/a	Lorewood Grove / Ratledge	Across from 1166 Lorewood Grove Rd.	48	48
	AM-4	Airmont Acres	784 Lorewood Grove Rd.		66	66
	AM-5	n/a	Lorewood Grove Rd.	Across from 1871 S. Dupont Hwy.	68	68
	SG-1	St. Georges Technical High School	555 Hyetts Corner Rd.		--	51
13	JC-1	n/a	Boyds Corner Rd.	Across from 1131 Jamison Corner Rd.	51	51
	JC-2	n/a	1000 Jamison Corner Rd.		49	49
	JC-3	n/a	Jamison Corner Rd.	Across from 100 Scott Run Blvd.	51	51
	JC-4		1075 Jamison Corner Rd.		--	43
	H-22	S.F. Shallcross House	1049 Boyds Corner Rd.		--	55
	H-24	J. Houston House	1000 Jamison Corner Rd.		--	49

NOTES: *Shading indicates existing receptor is impacted (66 dBA or higher).*
 -- indicates receptor level is peak calculated-only.
 (46) Indicates value was calculated using comparable receptors in the area.

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Table III-37: Existing Noise Levels

Noise Sensitive Area	Receptor	Community or Historic Name	Address	Location Notes	Measured Ambient Leq (dBA)	Existing Peak Hour Leq (dBA)
14	GV-1	Grande View Farms	203 Milford Dr.		57	57
	GV-2	Grande View Farms	258 Milford Dr.		55	55
	GV-3	Grande View Farms	203 Red Fox Ct.		47	47
	GV-4	Grande View Farms	149 Jane Ct.		56	56
	GV-5	Grande View Farms	320 Hyetts Corner Rd.		52	52
	GV-6	Grande View Farms	864 Bullen Dr.		62	62
	H-19	Fairview	350 Hyetts Corner Rd.		--	58
15	CL-1	n/a	562 Boyds Corner Rd.		69	69
	CL-2	Cedar Lane Elementary and Middle Schools	1259 Cedar Lane Rd.		68	68
	CL-3	n/a	Emerson Rd.	West of 404 Emerson Rd.	57	57
	CL-4	Chestnut Grove	201 Chestnut Way		51	51
	CL-5	n/a	617 Marl Pit		65	65
	CL-6	Cedar Lane Elementary and Middle Schools	1235 Cedar Lane		--	60
	H-13	Lovett Farm	1405 Cedar Lane Rd.		--	(46)
	H-29	T. J. Houston House	1309 Cedar Lane Rd.		--	(46)
16	SA-1	Cedar Lane Elementary School	1235 Cedar Lane Rd.		--	64
	MM-1	Biggs Farm	Bethel Church Rd.	North of 1151 Choptank Rd.	--	57
	MM-2	Biggs Farm	Bethel Church Rd.	North of 1151 Choptank Rd.	--	42
	MM-3	Back Creek	105 Joshua Ct.		--	49
	MM-4	Back Creek	103 Saint Andrews Ct.		--	38
	MM-5	Fox Hunter Crossing	116 Senator Dr.		--	62
	MM-6	Fox Hunter Crossing	116 Colonel Clayton Dr.		--	44
	H-27	Woodside	1370 Choptank Rd.		--	58
H-31	Gov. Benjamin Biggs Farm	1196 Choptank Rd.		--	47	

NOTES: *Shading indicates existing receptor is impacted (66 dBA or higher).*
 -- indicates receptor level is peak calculated-only.
 (46) Indicates value was calculated using comparable receptors in the area.

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Table III-37: Existing Noise Levels

Noise Sensitive Area	Receptor	Community or Historic Name	Address	Location Notes	Measured Ambient Leq (dBA)	Existing Peak Hour Leq (dBA)
17	PF-1	Penfield Farms	2106 S. Dupont Hwy. N		61	61
	PF-2	Penfield Farms	S. Dupont Hwy. N	East of 336 Port Penn Rd.	57	57
	PF-3	Penfield Farms	381 Port Penn Road		62	62
	H-18	Idalia Manor;	1870 S. Dupont Highway		--	59
	H-20	Retirement Farm	2256 Dupont Hwy N		--	49
	H-21	Elm Grange	2424 S. Dupont Highway		--	64
18	S-1	n/a	1963 Middle Neck Rd.		58	58
	S-2	n/a	1963 Middle Neck Rd.		50	50
	S-3	n/a	1963 Middle Neck Rd.		60	60
	S-4	n/a	1963 Middle Neck Rd.		--	54
	S-5	n/a	1963 Middle Neck Rd.		57	59
	S-6	n/a	1963 Middle Neck Rd.		--	68
	H-1	Shahan Farm	389 Strawberry Ln.		--	(46)
	H-2	B.F. Hanson House	1102 Middletown Warwick Rd.		--	61
	H-3	C. Polk House Estate	929 Middletown Warwick Rd.		--	56
	H-4	Rumsey Farm	841 Middletown Warwick Rd.		--	52
	H-5	Summerton	840 Middletown Warwick Rd.		--	62
	H-6	Hedgelawn	772 Middletown Warwick Rd.		--	60
	H-7	Cochran Grange	704 Middletown Warwick Rd.		--	60

NOTES: *Shading indicates existing receptor is impacted (66 dBA or higher).*
 -- indicates receptor level is peak calculated-only.
 (46) Indicates value was calculated using comparable receptors in the area.

2. Environmental Consequences

a. *Predicted Future Noise Levels*

FHWA requires noise to be analyzed in the “loudest noise hour” of the day. As noted previously, ambient measurements may not reflect the loudest hour of the day. The loudest noise hour traffic condition represents a combination of vehicle volume, classification mix and speed to produce the worst traffic noise condition that would be experienced along the project corridor. For existing conditions within the project area, the loudest noise hour typically occurs during the highest traffic volume conditions along existing US 301.

Future noise levels were predicted at receptor locations within influence of traffic noise for each retained alternative. Peak traffic volumes for the alternatives were predicted for the design year 2030. These volumes consist of peak AM or PM traffic flow, whichever is greater, and do not exceed LOS E. Volumes in excess of LOS E result in an inconsistent noise level, with excessive periods of low speed combined with stop and go movement. For any area where traffic volumes could exceed LOS E, volumes would be capped to create the loudest noise condition.

Predicted existing and future noise levels for the No-Build and the Preferred Alternatives are shown in *Table III-38*. The predicted existing and future noise levels for the retained alternatives, as shown in the DEIS, including the No-Build Alternative are shown in *Table III-39*. Predicted noise levels were calculated to 0.1 dBA and then rounded to the nearest whole integer. The noise levels of the retained alternatives, as shown *Table III-39*, were considered during the evaluation and selection of a Preferred Alternative.

Impacted receptors in the tables are shaded. An impact occurs if a receptor has a design-year predicted noise level of 66 dBA or greater (dark grey shading) or if a receptor experiences an increase of 10 dBA or greater than existing noise levels (light grey shading). For example, a receptor with an existing noise level of 47 dBA that would experience a design-year predicted noise level of 57 dBA or greater would be considered impacted.

Total impacts for each alternative, as shown on *Tables III-38 and III-39*, are not determined by the number of impacted receptors, rather by the number of impacted residences that are represented by those receptors.

Noise impacts were reanalyzed for the Preferred Alternative alignment (Green North) following engineering design refinements described in *Chapter II*. The results shown in *Table III-38* for the Preferred Alternative reflect those changes. The Preferred Alternative will have a total of 133 residential noise impacts. Adjacent to the Southridge community, the alignment was shifted closer to the community and away from the Appoquinimink High School, so that the number of impacted residences at NSA 11 (which represents the Southridge community) increased from 7, as reported in the DEIS, to 75. As stated later in this section (see *Table III-47*), most of these impacts would be mitigated by a proposed visual earth berm.

Table III-38: Predicted Noise Impacts of the Preferred Alternative (before Berms)

Noise Sensitive Area	Receptor	Community	Address	Existing Peak Hour Leq (dBA)	2030	
					No-Build Leq (dBA)	Preferred Alternative Leq (dBA)
1	LE-1	Lea Earra Farms	323 Jessica Dr.	58	61	61
	LE-2	Lea Earra Farms	106 W. Cedarwood Dr.	49	52	52
	LE-3	Lea Earra Farms	669 Old Summit Bridge Rd.	55	58	58
	LE-4	Lea Earra Farms	421 Maplewood Dr.	44	46	47
	LE-5	Lea Earra Farms	121 E. Cedarwood Dr.	46	49	49
3	SB-1	Summit Bridge Farms	117 Delaware Canal Ct. E	59	62	59
	SB-2	Summit Bridge Farms	108 Laks Dr.	52	55	53
	SB-3	Summit Bridge Farms	133 Delaware Canal Ct. E	48	51	49
	SB-4	Summit Bridge Farms	120 Laks Dr.	45	48	51
	SB-5	Summit Bridge Farms	138 Delaware Canal Ct. E	44	48	46
6	CM-1	Chesapeake Meadow	208 Deerfield Dr.	47	47	53
	CM-2	Dickerson Farm	600 Schoonover Ln.	51	51	43
	CM-3	Chesapeake Meadow	26 Meadow Ln.	47	47	60
	CM-4	Dickerson Farm	313 W. Dickerson Lane	51	51	43
7	BH-1	Bohemia Mill Road West	1203 Sharp Ln.	60	68	58
	MA-1	Matapeake	100 Sassafrass Dr.	43	51	48
	PR-1	Fox Hunter Crossing	1542 Choptank Rd.	58	58	60
	PR-2	n/a	1620 Choptank Rd.	54	54	45
	PR-4	Post and Rail Farms	102 Saddle Dr.	51	51	44
	PR-5	Post and Rail Farms	116 Saddle Dr.	47	47	45
	H-8	Rosedale; Mary Del Farm	1143 Bunker Hill Rd.	(46)	51	53
	H-10	S. Holton Farm	2010 Choptank Rd.	46	54	59
H-28	Choptank; J. Clayton Farm	1542 Choptank Road	(46)	48	46	
8	C-1	n/a	416 Armstrong Corner Rd.	54	54	58
	C-2	n/a	5036 Summit Bridge Rd.	62	62	67
	C-3	n/a	5036 Summit Bridge Rd.	69	69	67
	SM-4	Springmill	Daylily Way	(46)	(46)	53
	SM-5	Springmill	Springmill Dr.	35	35	43
	H-11	Armstrong-Walker House	5036 Summit Bridge Rd.	67	67	66
	H-12	Achmester	North side of Marl Pit Rd.	(46)	(46)	--
H-14	Weston	4677 Summit Bridge Road	51	52	--	
9	MV-6	Middletown Village	1106 Bunker Hill Rd.	50	50	46
	MV-8	Middletown Village	828 Woodline Dr.	45	45	57
	MV-9	Middletown Village	Ash Blvd.	41	43	46
11	A-1	Appoquinimink High School	1080 Bunker Hill Rd.	(46)	(46)	59
	SO-1	Southridge	15 Palisade Circle	(46)	(46)	62
	SR-2	n/a	1106 Bunker Hill Rd.	64	64	67
	H-25	The Maples	North Side of Bunker Hill Rd.	56	65	60
12	AM-1	Airmont Acres	502 Davis Ct.	52	52	57
	AM-2	Airmont Acres	236 Oak Dr.	51	51	59
	SG-1	St. Georges Technical High School	555 Hyetts Corner Rd.	51	51	60

Table III-38: Predicted Noise Impacts of the Preferred Alternative (before Berms)

Noise Sensitive Area	Receptor	Community	Address	Existing Peak Hour Leq (dBA)	2030	
					No-Build Leq (dBA)	Preferred Alternative Leq (dBA)
13	JC-3	n/a	Jamison Corner Rd.	51	51	57
	H-24	J. Houston House	1000 Jamison Corner Rd.	49	49	--
14	H-19	Fairview	350 Hyetts Corner Rd.	58	60	--
15	H-13	Lovett Farm	1405 Cedar Lane Rd.	(46)	(46)	--
	H-29	T. J. Houston House	1309 Cedar Lane Rd.	(46)	(46)	49
	SA-1	Cedar Lane Elementary School	1235 Cedar Lane Rd.	64	64	65
16	MM-1	Biggs Farm	Bethel Church Rd.	57	64	54
	MM-2	Biggs Farm	Bethel Church Rd.	42	50	45
	MM-3	Back Creek	105 Joshua Ct.	49	56	47
	MM-4	Back Creek	103 Saint Andrews Ct.	38	46	40
	MM-5	Fox Hunter Crossing	116 Senator Dr.	62	69	59
	MM-6	Fox Hunter Crossing	116 Colonel Clayton Dr.	44	52	44
	H-27	Woodside	1370 Choptank Rd	58	63	55
	H-31	Biggs Farm	1196 Choptank Rd	47	56	50
17	PF-1	Penfield Farms	2106 S. Dupont Hwy. N	61	61	68
	PF-2	Penfield Farms	S. Dupont Hwy. N	57	57	54
	H-18	Idalia Manor	1870 S. Dupont Highway	59	63	63
18	S-1	n/a	1963 Middle Neck Rd.	58	58	54
	S-2	n/a	1963 Middle Neck Rd.	50	50	57
	S-3	n/a	1963 Middle Neck Rd.	60	60	62
	S-6	n/a	1963 Middle Neck Rd.	68	69	67
	H-1	Shahan Farm	389 Strawberry Ln.	(46)	(46)	--
	H-2	B.F. Hanson House	1102 Middletown Warwick Rd.	61	63	59
	H-3	C. Polk House Estate	929 Middletown Warwick Rd.	56	56	56
	H-4	Rumsey Farm	841 Middletown Warwick Rd.	52	53	52
	H-5	Summerton	840 Middletown Warwick Rd.	62	63	61
	H-6	Hedgelawn	772 Middletown Warwick Rd.	60	60	--
	H-7	Cochran Grange	704 Middletown Warwick Rd.	60	59	--
TOTAL Number of Residential Impacts of the Preferred Alternative						133

NOTES: Dark grey shading indicates impacted receptor (66 dBA or higher).
 Light grey shading indicates impacted receptor (10 dBA or greater than existing).
 -- indicates receptor is not influenced by the alternative traffic noise (> 1,500 feet distant).
 (46) indicates value was calculated using comparable receptors in the project area.

Table III-39 includes the noise impacts modeled for all of the historic properties that were assessed for adverse effects (refer to **Chapter III.B**), even though they might not fall within the 1,500-foot distance where there is no influence from traffic on the Preferred Alternative. Noise impacts to historic properties are further discussed in **Chapter III.B**.

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Table III-39: Predicted Design Year 2030 Noise Levels for the Retained Alternatives

Noise Sensitive Area	Receptor	Community or Historic Site Name	Address	Existing Peak Hour Leq (dBA)	Design Year 2030						
					No-Build Leq (dBA)	Yellow Leq (dBA)	Purple Leq (dBA)	Brown-N Leq (dBA)	Brown-S Leq (dBA)	Green-N Leq (dBA)	Green-S Leq (dBA)
1	LE-1	Lea Earra Farms	323 Jessica Dr.	58	61	--	61	62	61	61	61
	LE-2	Lea Earra Farms	106 W. Cedarwood Dr.	49	52	--	52	60	51	52	52
	LE-3	Lea Earra Farms	669 Old Summit Bridge Rd.	55	58	--	58	68	57	58	58
	LE-4	Lea Earra Farms	421 Maplewood Dr.	44	46	--	47	50	46	47	47
	LE-5	Lea Earra Farms	121 E. Cedarwood Dr.	46	49	--	49	54	49	49	49
2	SF-1	Summit Farms	Lorewood Grove Rd.	56	56	--	--	53	46	--	--
	SF-2	Summit Farms	318 John Randal Dr.	46	46	--	--	52	47	--	--
	SF-3	Summit Farms	1370 Lorewood Grove Rd.	47	47	--	--	48	45	--	--
	SF-4	Summit Farms	210 Sheats Ln.	50	50	--	--	48	43	--	--
	SF-5	Summit Farms	224 Sheats Ln.	46	46	--	--	45	42	--	--
	H-26	S. Rothwell House	669 Old Summit Bridge Rd.	58	61	--	--	62	--	--	--
3	SB-1	Summit Bridge Farms	117 Delaware Canal Ct. E	59	62	62	59	59	61	59	59
	SB-2	Summit Bridge Farms	108 Laks Dr.	52	55	55	52	58	55	52	52
	SB-3	Summit Bridge Farms	133 Delaware Canal Ct. E	48	51	51	49	53	52	49	49
	SB-4	Summit Bridge Farms	120 Laks Dr.	45	48	48	49	54	51	49	49
	SB-5	Summit Bridge Farms	138 Delaware Canal Ct. E	44	48	47	47	50	54	47	47
4	SP-1	Summit Pond	Victoria Dr. Entrance	72	75	--	--	--	--	--	--
	SP-2	Summit Pond	911 Waterlily Ln.	52	55	--	--	--	--	--	--
	SP-3	Summit Pond	720 Victoria Dr.	50	53	--	--	--	--	--	--
	H-16	A. Eliason House	4353 Summit Bridge Rd.	70	73	--	--	--	--	--	--
5	BC-1	Boyds Corner at US 301	475 Boyds Corner Road	68	70	70	--	--	--	--	--
	CR-1	Crystal Run Farm	226 Waterford Dr.	47	43	43	--	--	--	--	--
	CR-2	Crystal Run Farm	135 Crystal Run Dr.	38	40	40	--	--	--	--	--
	RA-1	Ratledge Road	450 Ratledge Road	(46)	46	--	--	--	--	62	--

NOTES:

Dark grey shading indicates impacted receptor (66 dBA or higher).

Light grey shading indicates impacted receptor (10 dBA or greater than existing).

-- indicates receptor is not influenced by the alternative traffic noise (> 1,500 feet distant).

(46) indicates value was calculated using comparable receptors in the project area.

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Table III-39: Predicted Design Year 2030 Noise Levels for the Retained Alternatives

Noise Sensitive Area	Receptor	Community or Historic Site Name	Address	Existing Peak Hour Leq (dBA)	Design Year 2030						
					No-Build Leq (dBA)	Yellow Leq (dBA)	Purple Leq (dBA)	Brown-N Leq (dBA)	Brown-S Leq (dBA)	Green-N Leq (dBA)	Green-S Leq (dBA)
6	CM-1	Chesapeake Meadow	208 Deerfield Dr.	47	47	--	52	57	55	52	52
	CM-2	Dickerson Farm	600 Schoonover Ln.	51	51	--	43	47	45	43	43
	CM-3	Chesapeake Meadow	26 Meadow Ln.	47	47	--	60	63	59	60	60
	CM-4	Dickerson Farm	313 W. Dickerson Lane	51	51	--	43	47	46	43	43
	CM-5	Dickerson Farm	523 E. Creek Ln.	49	49	--	--	45	47	--	--
7	BH-1	Bohemia Mill Road West	1203 Sharp Ln.	60	68	61	58	58	58	58	58
	MA-1	Matapeake	100 Sassafrass Dr.	43	51	--	47	47	47	47	47
	PR-1	Fox Hunter Crossing	1542 Choptank Rd.	58	58	--	60	67	67	60	60
	PR-2	n/a	1620 Choptank Rd.	54	54	--	45	49	49	45	45
	PR-3	n/a	830 Old School House Rd.	52	52	--	n/a	n/a	n/a	n/a	n/a
	PR-4	Post and Rail Farms	102 Saddle Dr.	51	51	--	44	48	48	44	44
	PR-5	Post and Rail Farms	116 Saddle Dr.	47	47	--	45	49	49	45	45
	H-8	Rosedale	1143 Bunker Hill Rd.	(46)	51	--	52	52	52	52	52
	H-10	S. Holton Farm	2010 Choptank Rd.	46	54	--	60	58	58	60	60
	H-28	Choptank	1542 Choptank Road	(46)	48	--	46	48	48	44	44
8	C-1	n/a	416 Armstrong Corner Rd.	54	54	--	58	52	52	58	58
	C-2	n/a	5036 Summit Bridge Rd.	62	62	51	67	--	--	67	67
	C-3	n/a	5036 Summit Bridge Rd.	69	69	67	67	--	--	67	67
	C-4	n/a	617 Marl Pit Rd.	59	59	55	--	--	--	--	--
	C-5	n/a	617 Marl Pit Rd.	43	44	47	--	--	--	--	--
	LG-1	The Legends West	10 Couples Ct.	53	53	58	--	--	--	--	--
	OS-1	Old Schoolhouse Rd. at US 301	626 Old Schoolhouse Rd.	48	48	52	--	--	--	--	--

NOTES:

Dark grey shading indicates impacted receptor (66 dBA or higher).

Light grey shading indicates impacted receptor (10 dBA or greater than existing).

-- indicates receptor is not influenced by the alternative traffic noise (> 1,500 feet distant).

(46) indicates value was calculated using comparable receptors in the project area.

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Table III-39: Predicted Design Year 2030 Noise Levels for the Retained Alternatives

Noise Sensitive Area	Receptor	Community or Historic Site Name	Address	Existing Peak Hour Leq (dBA)	Design Year 2030						
					No-Build Leq (dBA)	Yellow Leq (dBA)	Purple Leq (dBA)	Brown-N Leq (dBA)	Brown-S Leq (dBA)	Green-N Leq (dBA)	Green-S Leq (dBA)
8	SM-1	Springmill	Carter Dr.	57	56	55	--	--	--	--	--
	SM-2	Springmill	Windmill Lane	62	62	63	--	--	--	--	--
	SM-3	Springmill	Whispering Trail	55	55	63	--	--	--	--	--
	SM-4	Springmill	Daylily Way	(46)	(46)	--	53	53	53	53	53
	SM-5	Springmill	Springmill Dr.	35	35	--	43	43	43	43	43
	H-9	R.G. Hayes House	5187 Summit Bridge Rd.	66	66	(take)	--	--	--	--	--
	H-11	Armstrong-Walker House	5036 Summit Bridge Rd.	67	67	65	66	66	66	66	66
	H-12	Achmester	North Side of Marl Pit Rd.	(46)	(46)	48	--	--	--	--	--
	H-14	Weston; S. Brady Farm	4677 Summit Bridge Rd.	51	52	54	--	--	--	--	--
	H-15	Mt. Pleasant Farm	4564 Summit Bridge Rd.	48	48	52	--	--	--	--	--
9	MV-1	Middletown Village	Liborio Dr.	47	48	54	--	--	--	--	--
	MV-2	Middletown Village	112 Sandhill Rd.	58	58	59	--	--	--	--	--
	MV-3	Middletown Village	110 Sleepy Hollow Dr.	50	50	50	--	--	--	--	--
	MV-4	Middletown Village	766 Marian Dr.	62	62	52	--	--	--	--	--
	MV-5	Middletown Village	Peterson Rd.	55	55	57	--	--	--	--	--
	MV-6	Middletown Village	1106 Bunker Hill Rd.	50	50	--	46	46	46	46	46
	MV-7	Middletown Village	Ash Blvd.	51	51	52	--	--	--	--	--
	MV-8	Middletown Village	828 Woodline Dr.	45	45	--	57	57	57	57	57
	MV-9	Middletown Village	Ash Blvd.	41	43	47	44	44	44	44	44
	MV-10	Middletown Village	334 E. Harvest Ln.	56	56	53	--	--	--	--	--
	MV-11	Middletown Village	125 Foxtail Ln.	57	58	67	--	--	--	--	--
10	M-1	Middletown	691 Broad St.	54	54	50	--	--	--	--	--

NOTES:

Dark grey shading indicates impacted receptor (66 dBA or higher).

Light grey shading indicates impacted receptor (10 dBA or greater than existing).

-- indicates receptor is not influenced by the alternative traffic noise (> 1,500 feet distant).

(46) indicates value was calculated using comparable receptors in the project area.

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Table III-39: Predicted Design Year 2030 Noise Levels for the Retained Alternatives

Noise Sensitive Area	Receptor	Community or Historic Site Name	Address	Existing Peak Hour Leq (dBA)	Design Year 2030						
					No-Build Leq (dBA)	Yellow Leq (dBA)	Purple Leq (dBA)	Brown-N Leq (dBA)	Brown-S Leq (dBA)	Green-N Leq (dBA)	Green-S Leq (dBA)
11	A-1	Appoquinimink High School	1080 Bunker Hill Rd.	(46)	(46)	--	53	53	53	53	53
	SO-1	Southridge	15 Palisade Circle	(46)	(46)	--	58	58	58	58	58
	SR-1	n/a	Bunker Hill Rd.	40	41	--	n/a	n/a	n/a	n/a	n/a
	SR-2	n/a	1106 Bunker Hill Rd.	64	64	--	67	67	67	67	67
	SR-3	n/a	Bunker Hill Rd.	61	61	--	--	--	--	--	--
	SR-4	n/a	Bunker Hill Rd.	62	62	69	--	--	--	--	--
	SR-5	n/a	Bunker Hill Rd.	68	69	65	--	--	--	--	--
	H-25	The Maples	North Side of Bunker Hill Rd.	56	65	--	58	58	58	58	58
12	AM-1	Airmont Acres	502 Davis Ct.	52	52	--	--	57	56	56	--
	AM-2	Airmont Acres	236 Oak Dr.	51	51	--	--	59	58	59	--
	AM-3	n/a	Lorewood Grove / Ratledge	48	48	--	--	--	--	--	--
	AM-4	Airmont Acres	784 Lorewood Grove Rd.	66	66	--	--	--	--	--	--
	AM-5	n/a	Lorewood Grove Rd.	68	68	--	--	--	--	--	--
	SG-1	St. Georges Technical High School	555 Hyetts Corner Rd.	51	51	--	--	58	58	58	--
13	JC-1	n/a	Boyds Corner Rd.	51	51	--	--	--	--	--	--
	JC-2	n/a	1000 Jamison Corner Rd.	49	49	--	--	--	--	--	51
	JC-3	n/a	Jamison Corner Rd.	51	51	--	--	56	56	57	--
	JC-4		1075 Jamison Corner Rd.	43	43	50	50	--	--	--	50
	H-22	S.F. Shallcross House	1049 Boyds Corner Rd.	55	56	61	61	--	--	--	--
	H-24	J. Houston House	1000 Jamison Corner Rd.	49	49	--	--	--	--	--	58

NOTES:

Dark grey shading indicates impacted receptor (66 dBA or higher).

Light grey shading indicates impacted receptor (10 dBA or greater than existing).

-- indicates receptor is not influenced by the alternative traffic noise (> 1,500 feet distant).

(46) indicates value was calculated using comparable receptors in the project area.

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Table III-39: Predicted Design Year 2030 Noise Levels for the Retained Alternatives

Noise Sensitive Area	Receptor	Community or Historic Site Name	Address	Existing Peak Hour Leq (dBA)	Design Year 2030						
					No-Build Leq (dBA)	Yellow Leq (dBA)	Purple Leq (dBA)	Brown-N Leq (dBA)	Brown-S Leq (dBA)	Green-N Leq (dBA)	Green-S Leq (dBA)
14	GV-1	Grande View Farms	203 Milford Dr.	57	57	63	63	--	--	--	--
	GV-2	Grande View Farms	258 Milford Dr.	55	55	--	--	--	--	--	--
	GV-3	Asbury Chase	203 Red Fox Ct.	47	47	--	--	--	--	--	--
	GV-4	Grande View Farms	149 Jane Ct.	56	56	62	62	--	--	--	--
	GV-5	Grande View Farms	320 Hyetts Corner Rd.	52	52	57	57	--	--	--	--
	GV-6	Asbury Chase	864 Bullen Dr.	62	62	66	66	--	--	--	--
	H-19	Fairview	350 Hyetts Corner Rd.	58	60	64	63	--	--	--	--
15	CL-1	n/a	562 Boyds Corner Road	69	69	--	--	--	--	--	--
	CL-2	Cedar Lane Elementary & Middle Sch.	1259 Cedar Lane	68	68	70	70	--	--	--	--
	CL-3	n/a	Emerson Rd.	57	57	--	--	--	--	--	--
	CL-4	Chestnut Grove	201 Chestnut Way	51	51	--	--	--	--	--	--
	CL-5	n/a	617 Marl Pit	65	65	--	--	--	--	--	--
	CL-6	Cedar Lane Elementary & Middle Sch.	1235 Cedar Land Rd.	60	61	63	63	--	--	--	--
	H-13	Lovett Farm	1405 Cedar Lane Rd.	(46)	(46)	--	--	--	--	--	--
	H-29	T. J. Houston House	1309 Cedar Lane Rd.	(46)	(46)	--	--	--	--	--	45
SA-1	Cedar Lane Elementary School	1235 Cedar Lane Rd.	64	64	65	65	--	--	--	65	
16	MM-1	Biggs Farm	Bethel Church Rd.	57	64	57	54	55	55	54	54
	MM-2	Biggs Farm	Bethel Church Rd.	42	50	44	45	49	49	45	45
	MM-3	Back Creek	105 Joshua Ct.	49	56	50	47	48	48	47	47
	MM-4	Back Creek	103 Saint Andrews Ct.	38	46	40	40	43	43	40	40
	MM-5	Fox Hunter Crossing	116 Senator Dr.	62	69	63	59	60	60	59	59
	MM-6	Fox Hunter Crossing	116 Colonel Clayton Dr.	44	52	46	44	46	46	44	44
	H-27	Woodside	1370 Choptank Rd	58	63	--	55	55	55	55	55
H-31	Biggs Farm	1196 Choptank Rd	47	56	--	49	54	53	49	49	

NOTES:

Dark grey shading indicates impacted receptor (66 dBA or higher).

Light grey shading indicates impacted receptor (10 dBA or greater than existing).

-- indicates receptor is not influenced by the alternative traffic noise (> 1,500 feet distant).

(46) indicates value was calculated using comparable receptors in the project area.

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Table III-39: Predicted Design Year 2030 Noise Levels for the Retained Alternatives

Noise Sensitive Area	Receptor	Community or Historic Site Name	Address	Existing Peak Hour Leq (dBA)	Design Year 2030						
					No-Build Leq (dBA)	Yellow Leq (dBA)	Purple Leq (dBA)	Brown-N Leq (dBA)	Brown-S Leq (dBA)	Green-N Leq (dBA)	Green-S Leq (dBA)
17	PF-1	Penfield Farms	2106 S. Dupont Hwy. N	61	61	--	--	68	68	68	68
	PF-2	Penfield Farms	S. Dupont Hwy. N	57	57	--	--	55	54	54	54
	PF-3	Penfield Farms	381 Port Penn Road	62	62	--	--	--	--	--	--
	H-18	Idalia Manor	1870 S. Dupont Highway	59	63	63	63	63	63	63	63
	H-20	Retirement Farm	2256 Dupont Hwy N	49	53	55	55	--	--	--	--
	H-21	Elm Grange	2424 S. Dupont Highway	64	68	68	68	--	--	--	--
18	S-1	n/a	1963 Middle Neck Rd.	58	58	47	54	54	54	54	54
	S-2	n/a	1963 Middle Neck Rd.	50	50	49	57	57	57	57	57
	S-3	n/a	1963 Middle Neck Rd.	60	60	51	62	62	62	62	62
	S-4	n/a	1963 Middle Neck Rd.	54	54	54	n/a	n/a	n/a	n/a	n/a
	S-5	n/a	1963 Middle Neck Rd.	59	60	57	n/a	n/a	n/a	n/a	n/a
	S-6	n/a	1963 Middle Neck Rd.	68	69	63	67	67	67	67	67
	H-1	Shahan Farm	389 Strawberry Ln.	(46)	(46)	--	--	--	--	--	--
	H-2	B.F. Hanson House	1102 Middletown Warwick Rd.	61	63	58	59	59	59	59	59
	H-3	C. Polk House Estate	929 Middletown Warwick Rd.	56	56	53	56	56	56	56	56
	H-4	Rumsey Farm	841 Middletown Warwick Rd.	52	53	53	52	52	52	52	52
	H-5	Summerton	840 Middletown Warwick Rd.	62	63	(take)	61	61	61	61	61
	H-6	Hedgelawn.	772 Middletown Warwick Rd.	60	60	60	--	--	--	--	--
	H-7	Cochran Grange.	704 Middletown Warwick Rd.	60	59	60	--	--	--	--	--
TOTAL Number of Residential Impacts per Alternative						Yellow 74	Purple 108	Brown N 67	Brown S 64	Green N 77	Green S 63

NOTES:

Dark grey shading indicates impacted receptor (66 dBA or higher).

Light grey shading indicates impacted receptor (10 dBA or greater than existing).

-- indicates receptor is not influenced by the alternative traffic noise (> 1,500 feet distant).

(46) indicates value was calculated using comparable receptors in the project area.

As shown in *Table III-39*, for the Yellow Alternative, NSA 14 (Grande View Farms/Asbury Chase) would have the greatest number of residential impacts. For the Purple Alternative, most impacts would be located at NSA 14, NSA 9 (Middletown Village) and NSA 3 (Summit Bridge Farms). For both Brown and Green Alternatives, NSA 3, NSA 6 (Chesapeake Meadow) and NSA 9 would have the greatest number of noise impacts. Although no other alternatives besides the Preferred Alternative were reanalyzed, the shift at the Southridge community would have applied to the Purple, Brown and Green South Alternatives as well, were they subjected to more detailed engineering.

b. *Impact Assessment/Abatement*

Noise Abatement Criteria

Traffic noise impacts were assessed, and the potential for introducing mitigating measures, such as noise walls or berms, was evaluated. Consideration for mitigation is based on the size of the impacted area, the predominant activity within the area, visual impact, construction practicality, feasibility and reasonableness. The factors considered when determining whether the mitigation would be considered, as outlined in DelDOT's Transportation Noise Policy, are:

- A reasonable and feasible noise mitigation method is available. DelDOT will identify and evaluate impacts that noise abatement measures will have on the social, economic and natural environments when determining the feasibility and reasonableness of a noise barrier project. An attempt will be made to provide noticeable and effective noise reductions of at least **5 dBA** at impacted receptors. This reduction is known as Insertion Loss.
- Noise mitigation is cost-effective – not to exceed **\$20,000 per benefited residence**.
- Noise mitigation is acceptable to the majority of people affected.

When determining the cost-effectiveness of mitigation, all impacted receptors that receive a 5 dBA or more reduction in noise levels are considered to benefit by a noise wall or berm construction. For the purposes of cost evaluation, a total cost of \$25.00 per square foot has been used to estimate the noise wall cost and \$10.00 per cubic yard of berm. These cost figures are based upon current experience and reflect the cost of constructing an earth berm or ground mounted noise wall system.

Impacts and Mitigation Feasibility

Impacts associated with the proposed alternatives and the feasibility of mitigation are shown for each alternative in the following tables. The most frequent mitigation is in the form of a noise barrier or berm. Barrier and berm mitigation are discussed in the following paragraphs and summarized in the accompanying tables.

The Preferred Alternative would impact a total of 133 residences adjacent to the alignment (*Table III-40*). In most cases, barrier or berm mitigation was determined to be not reasonable (exceeded the \$20,000 cost per benefited residence criterion). However, with the construction of proposed visual earth berms, all but 46 of the 133 impacts will be avoided (*Table III-47*).

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Table III-40 shows that barrier mitigation of projected noise impacts with the Preferred Alternative is feasible for NSAs 3, 6, 7, 8, 9 and 11, but is not reasonable due to all costs exceeding \$20K per benefited residence except at Southridge. Berm mitigation is not feasible for NSAs 3, 7 and 8 due to lack of right-of-way, and is not cost effective for NSAs 6 and 9 where berms are feasible. The number of impacted residences at Southridge increased with a shift in the alignment of the Preferred Alternative.

Table III-40: Preferred Alternative Abatement Cost Analysis

NSA/Community	Number of Impacts	Barrier /Berm Height (ft)	Barrier /Berm Length (ft)	Insertion Loss (first row) (dBA)	Barrier /Berm Cost	Benefited Residences	Cost per Benefited Residence	Comment	
Barrier Analysis									
3	Summit Bridge Farms	12	10	1,900	5	\$475,000	12	\$39,583	Barrier along N side only
6	Chesapeake Meadow	11	11	2,190	6	\$602,250	9	\$66,917	2 northernmost impacts can not be benefited
7	Mid Farms	4	8	2,410	8	\$482,000	4	\$120,500	4 flag-lot props being developed on Old School House
7	Midland Farms West	4	13	3,880	8	\$1,261,000	4	\$315,250	1868/1888/1902 Choptank Rd and 2010 Choptank Rd (historic, not Midland Farms).
8	Midland Farms East	6	13	2,950	5	\$958,750	6	\$159,792	3 Armstrong Corner Rd & 3 Bohemia Mill Rd. impacts.
9	Middletown Village	15	16	2,000	6	\$800,000	15	\$53,333	
11	Southridge	75	15	970	5	\$363,750	65	\$5,963	Can not provide -5dBA to 10 impacts
Totals					\$4,942,750	115			
Berm Analysis									
3	Summit Bridge Farms	12	No room for berm between US301 and 1st-Row impacted properties						Mitigation not feasible
6	Chesapeake Meadow	11	11	2,190	6	\$281,050	9	\$31,228	2 northernmost impacts can not be benefited
7	Mid Farms	4	No room for berm between US301 and 1st-Row impacted properties						Mitigation not feasible
7	Midland Farms West	4	No room for berm between US301 and 1st-Row impacted properties						Mitigation not feasible
8	Midland Farms East	6	No room for berm between US301 and 1st-Row impacted properties						Mitigation not feasible
9	Middletown Village	15	16	2,000	6	\$521,481	15	\$34,765	
11	Southridge	75	15	970	5	\$223,639	61	\$16,822	Can not provide -5dBA to 14 impacts – all others mitigated
Totals					\$1,026,170	85			

The analysis of impacts and abatement feasibility for the retained alternatives is presented in the following tables (*Tables III-41 to III-46*). Noise abatement for most locations was deemed not feasible or not reasonable in most NSAs. The abatement potential for the retained alternatives was considered during the evaluation to select the Preferred Alternative.

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As shown in *Table III-41*, barrier mitigation of projected noise impacts with the Yellow Alternative is feasible but not reasonable for NSAs 3, 9 and 14 (Grande View Farms/Asbury Chase I and II) due to cost effectiveness criteria (must be no more than \$20K per benefited residence). Noise mitigation for NSAs 5, 14 (south of Boyds Corner, near US 13) and 17 is not feasible due to extraneous traffic noise from other nearby roadways. Berm construction is not feasible in the space provided between the roadway and those impacted NSAs where barrier mitigation is otherwise feasible.

Table III-41: Yellow Alternative Abatement Cost Analysis

NSA/Community	Number of Impacts	Barrier /Berm Height (ft)	Barrier /Berm Length (ft)	Insertion Loss (first row) (dBA)	Barrier /Berm Cost	Benefited Residences	Cost per Benefited Residence	Comment		
BARRIER ANALYSIS										
3	Summit Bridge Farms	12	10	1,900	5	\$475,000	12	\$39,583	Barrier along N side only	
5	Boyds Corner at US301	11	SR896 traffic negates US301 noise mitigation							Mitigation not feasible
9	Middletown Village	6	11	650	5	\$178,750	6	\$29,792		
14	Grande View Farms/Asbury Chase (GV/AC)	35	9	7,890	5	\$1,775,250	38	\$46,717	Barrier along GV/AC perimeter	
14	S of Boyds Corner, near US13	3	SR896 traffic negates US301 noise mitigation							Mitigation not feasible
17	East of US13, near GV/AC	7	SR1 & US13 traffic negates noise mitigation							Mitigation not feasible
Totals						\$2,429,000	56			
BERM ANALYSIS										
3	Summit Bridge Farms	12	No room for berm between US301 and 1st-Row impacted properties							Mitigation not feasible
5	Boyds Corner at US301	11	SR896 traffic negates US301 noise mitigation							Mitigation not feasible
9	Middletown Village	6	No room for berm between US301 and 1st-Row impacted properties							Mitigation not feasible
14	Grande View Farms/Asbury Chase	35	No room for berm between US13 / SR896 and 1st-Row impacted properties							Mitigation not feasible
14	S of Boyds Corner, near US13	3	SR896 traffic negates US301 noise mitigation							Mitigation not feasible
17	East of US13, near GV/AC	7	SR1 & US13 traffic negates noise mitigation							Mitigation not feasible

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As shown in *Table III-42*, barrier mitigation of projected noise impacts for the Purple Alternative is feasible for all NSAs with the exception of NSAs 14 (S. Boyds Corner, near U.S. 13) and 17. Extraneous traffic noise from other nearby roadways would render mitigation ineffective at these locations. Barrier mitigation is not reasonable for any NSA due to costs per benefited residence exceeding \$20K. Berm mitigation is not feasible for NSAs 3, 7, 8 and 14 (Grandview Farms/Asbury Chase I & II) due to lack of right-of-way. Berm mitigation is not cost effective for NSAs 6, 9 and 11 where berms are feasible.

Table III-42: Purple Alternative Abatement Cost Analysis

NSA/Community	Number of Impacts	Barrier /Berm Height (ft)	Barrier /Berm Length (ft)	Insertion Loss (first row) (dBA)	Barrier /Berm Cost	Benefited Residences	Cost per Benefited Residence	Comment	
Barrier Analysis									
3	Summit Bridge Farms	12	10	1,900	5	\$475,000	12	\$39,583	Barrier along N side only
6	Chesapeake Meadow	11	11	2,190	6	\$602,250	9	\$66,917	2 northernmost impacts cannot be benefited
7	Mid Farms	4	8	2,410	8	\$482,000	4	\$120,500	4 flag-lot props being developed on Old School House
7	Midland Farms West	4	13	3,880	8	\$1,261,000	4	\$315,250	1868/1888/1902 & 2010 (historic, not MF) Choptank Rd.
8	Midland Farms East	6	13	2,950	5	\$958,750	6	\$159,792	3 Armstrong Corner Rd & 3 Bohemia Mill Rd. impacts.
9	Middletown Village	15	16	2,000	6	\$800,000	15	\$53,333	
11	Southridge	7	15	970	5	\$363,750	3	\$121,250	Can not provide -5dBA to 4 impacts
14	Grande View Farms/Asbury Chase	35	9	7,890	5	\$1,775,250	38	\$46,717	Barrier along GV/AC perimeter
14	S of Boyds Corner, near US13	3	SR896 traffic negates US301 noise mitigation						Mitigation not feasible
17	East of US13, near GV/AC	7	SR1 & US13 traffic negates noise mitigation						Mitigation not feasible
					Totals	\$6,718,000	91		
Berm Analysis									
3	Summit Bridge Farms	12	No room for berm between US301 and 1st-Row impacted properties						Mitigation not feasible
6	Chesapeake Meadow	11	11	2,190	6	\$281,050	9	\$31,228	2 northernmost impacts can not be benefited
7	Mid Farms	4	No room for berm between US301 and 1st-Row impacted properties						Mitigation not feasible
7	Midland Farms West	4	No room for berm between US301 and 1st-Row impacted properties						Mitigation not feasible
8	Midland Farms East	6	No room for berm between US301 and 1st-Row impacted properties						Mitigation not feasible
9	Middletown Village	15	16	2,000	6	\$521,481	15	\$34,765	
11	Southridge	7	15	970	5	\$223,639	3	\$74,546	Can not provide -5dBA to 4 impacts
14	Grande View Farms/Asbury Chase	35	No room for berm between US13 / SR896 and 1st-Row impacted properties						Mitigation not feasible
14	S of Boyds Corner, near US13	3	SR896 traffic negates US301 noise mitigation						Mitigation not feasible
17	East of US13, near GV/AC	7	SR1 & US13 traffic negates noise mitigation						Mitigation not feasible
					Totals	\$1,026,170	27		

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As shown in *Table III-43*, barrier mitigation of projected noise impacts with the Brown North Alternative is feasible for NSAs 1, 6, 7, 8, 9 and 11, but is not reasonable due to all costs exceeding \$20K per benefited residence. Berm mitigation is not feasible for NSAs 7 and 8 due to lack of right-of-way, and is not cost effective for the NSAs 1, 6, 9 and 11 where berms are feasible.

Table III-43: Brown Alternative North Option Abatement Cost Analysis

NSA/Community		Number of Impacts	Barrier /Berm Height (ft)	Barrier /Berm Length (ft)	Insertion Loss (first row) (dBA)	Barrier /Berm Cost	Benefited Residences	Cost per Benefited Residence	Comment	
Barrier Analysis										
1	Lea Eara Farms	16	20	2,890	5	\$1,445,000	4	\$361,250	Can only benefit 4 residences	
6	Chesapeake Meadow	15	15	2,160	8	\$810,000	15	\$54,000	2 benefits = non-impacted, 2 impacts can not be benefited	
7	Mid Farms	4	14	2,610	8	\$913,500	4	\$228,375	4 flag-lot props being developed on Old School House	
7	Midland Farms West	4	15	3,940	8	\$1,477,500	4	\$369,375	1868/1888/1902 Choptank Rd and 2010 Choptank Rd (historic, not Midland Farms).	
8	Midland Farms East	3	15	1,800	5	\$675,000	3	\$225,000	3 Bohemia Mill Rd impacts.	
9	Middletown Village	15	16	2,000	6	\$800,000	15	\$53,333		
11	Southridge	7	15	970	5	\$363,750	3	\$121,250	Can not provide -5dBA to 4 impacts	
Totals						\$6,484,750	48			
Berm Analysis										
1	Lea Eara Farms	16	20	2,890	5	\$1,156,000	4	\$289,000	Can only benefit 4 residences	
6	Chesapeake Meadow	15	15	2,160	8	\$498,000	15	\$33,200	2 benefits = non-impacted, 2 impacts can not be benefited	
7	Mid Farms	4	No room for berm between US301 and 1st-Row impacted properties							Mitigation not feasible
7	Midland Farms West	4	No room for berm between US301 and 1st-Row impacted properties							Mitigation not feasible
8	Midland Farms East	3	No room for berm between US301 and 1st-Row impacted properties							Mitigation not feasible
9	Middletown Village	15	16	2,000	6	\$521,481	15	\$34,765		
11	Southridge	7	15	970	5	\$223,639	3	\$74,546	Can not provide -5dBA to 4 impacts	
Totals						\$2,399,120	37			

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As shown in *Table III-44*, barrier mitigation of projected noise impacts with the Brown South Alternative is feasible for NSAs 3, 6, 7, 8, 9 and 11, but is not reasonable due to all costs exceeding \$20K per benefited residence. Berm mitigation is not feasible for NSAs 7 and 8 due to lack of right-of-way, and is not cost effective for the NSAs 3, 6, 9 and 11 where berms are feasible.

Table III-44: Brown Alternative South Option Abatement Cost Analysis

NSA/Community		Number of Impacts	Barrier /Berm Height (ft)	Barrier /Berm Length (ft)	Insertion Loss (first row) (dBA)	Barrier /Berm Cost	Benefited Residences	Cost per Benefited Residence	Comment	
Barrier Analysis										
3	Summit Bridge Farms	18	12	3,700	5	\$1,110,000	18	\$61,667	10' North wall plus 15' SE wall	
6	Chesapeake Meadow	11	14	2,470	6	\$864,500	9	\$96,056	2 impacts can not be benefited	
7	Mid Farms	4	14	2,610	8	\$913,500	4	\$228,375	4 flag-lot props being developed on Old School House	
7	Midland Farms West	4	15	3,940	8	\$1,477,500	4	\$369,375	1868/1888/1902 Choptank Rd and 2010 Choptank Rd (historic, not Midland Farms).	
8	Midland Farms East	3	15	1,800	5	\$675,000	3	\$225,000	3 Bohemia Mill Rd impacts.	
9	Middletown Village	15	16	2,000	6	\$800,000	15	\$53,333		
11	Southridge	7	15	970	5	\$363,750	3	\$121,250	Can not provide -5dBA to 4 impacts	
Totals						\$6,204,250	56			
Berm Analysis										
3	Summit Bridge Farms	18	15	1,800	5	\$415,000	6	\$69,167	Berm feasible on SE side only	
6	Chesapeake Meadow	11	14	1,893	6	\$382,807	9	\$42,534	2 impacts can not be benefited	
7	Mid Farms	4	No room for berm between US301 and 1st-Row impacted properties							Mitigation not feasible
7	Midland Farms West	4	No room for berm between US301 and 1st-Row impacted properties							Mitigation not feasible
8	Midland Farms East	3	No room for berm between US301 and 1st-Row impacted properties							Mitigation not feasible
9	Middletown Village	15	16	2,000	6	\$521,481	15	\$34,765		
11	Southridge	7	15	970	5	\$223,639	3	\$74,546	Can not provide -5dBA to 4 impacts	
Totals						\$1,542,927	33			

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As shown in *Table III-45*, barrier mitigation of projected noise impacts with the Green North Alternative is feasible for NSAs 3, 5, 6, 7, 8, 9 and 11, but is not reasonable due to all costs exceeding \$20K per benefited residence. Berm mitigation is not feasible for NSAs 3, 7 and 8 due to lack of right-of-way, and is not cost effective for the NSAs 5, 6, 9 and 11 where berms are feasible.

Table III-45: Green Alternative North Option Abatement Cost Analysis

NSA/Community	Number of Impacts	Barrier /Berm Height (ft)	Barrier /Berm Length (ft)	Insertion Loss (first row) (dBA)	Barrier /Berm Cost	Benefited Residences	Cost per Benefited Residence	Comment	
Barrier Analysis									
3	Summit Bridge Farms	12	10	1,900	5	\$475,000	12	\$39,583	Barrier along N side only
5	Ratledge Road	14	10	2,280	5	\$570,000	6	\$95,000	
6	Chesapeake Meadow	11	11	2,190	6	\$602,250	9	\$66,917	2 northernmost impacts can not be benefited
7	Mid Farms	4	8	2,410	8	\$482,000	4	\$120,500	4 flag-lot props being developed on Old School House
7	Midland Farms West	4	13	3,880	8	\$1,261,000	4	\$315,250	1868/1888/1902 Choptank Rd and 2010 Choptank Rd (historic, not Midland Farms).
8	Midland Farms East	6	13	2,950	5	\$958,750	6	\$159,792	3 Armstrong Corner Rd & 3 Bohemia Mill Rd. impacts.
9	Middletown Village	15	16	2,000	6	\$800,000	15	\$53,333	
11	Southridge	7	15	970	5	\$363,750	3	\$121,250	Can not provide -5dBA to 4 impacts
Totals					\$5,512,750	58	\$95,047		
Berm Analysis									
3	Summit Bridge Farms	12	No room for berm between US301 and 1st-Row impacted properties						Mitigation not feasible
5	Ratledge Road	14	10	2,280	5	\$244,889	6	\$40,815	
6	Chesapeake Meadow	11	11	2,190	6	\$281,050	9	\$31,228	2 northernmost impacts can not be benefited
7	Mid Farms	4	No room for berm between US301 and 1st-Row impacted properties						Mitigation not feasible
7	Midland Farms West	4	No room for berm between US301 and 1st-Row impacted properties						Mitigation not feasible
8	Midland Farms East	6	No room for berm between US301 and 1st-Row impacted properties						Mitigation not feasible
9	Middletown Village	15	16	2,000	6	\$521,481	15	\$34,765	
11	Southridge	7	15	970	5	\$223,639	3	\$74,546	Can not provide -5dBA to 4 impacts
Totals					\$1,542,927	33			

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As shown in *Table III-46*, barrier mitigation of projected noise impacts with the Green South Alternative is feasible for NSAs 3, 6, 7, 8, 9 and 11, but is not reasonable due to all costs exceeding \$20K per benefited residence. Berm mitigation is not feasible for NSAs 3, 7 and 8 due to lack of right-of-way, and is not cost effective for the NSAs 6, 9 and 11 where berms are feasible.

Table III-46: Green Alternative South Option Abatement Cost Analysis

NSA/Community		Number of Impacts	Barrier /Berm Height (ft)	Barrier /Berm Length (ft)	Insertion Loss (first row) (dBA)	Barrier /Berm Cost	Benefited Residences	Cost per Benefited Residence	Comment	
Barrier Analysis										
3	Summit Bridge Farms	12	10	1,900	5	\$475,000	12	\$39,583	Barrier along N side only	
6	Chesapeake Meadow	11	11	2,190	6	\$602,250	9	\$66,917	2 northernmost impacts can not be benefited	
7	Mid Farms	4	8	2,410	8	\$482,000	4	\$120,500	4 flag-lot props being developed on Old School House	
7	Midland Farms West	4	13	3,880	8	\$1,261,000	4	\$315,250	1868/1888/1902 Choptank Rd and 2010 Choptank Rd (historic, not Midland Farms).	
8	Midland Farms East	6	13	2,950	5	\$958,750	6	\$159,792	3 Armstrong Corner Rd & 3 Bohemia Mill Rd. impacts.	
9	Middletown Village	15	16	2,000	6	\$800,000	15	\$53,333		
11	Southridge	7	15	970	5	\$363,750	3	\$121,250	Can not provide -5dBA to 4 impacts	
Totals						\$4,942,750	53			
Berm Analysis										
3	Summit Bridge Farms	12	No room for berm between US301 and 1st-Row impacted properties							Mitigation not feasible
6	Chesapeake Meadow	11	11	2,190	6	\$281,050	9	\$31,228	2 northernmost impacts can not be benefited	
7	Mid Farms	4	No room for berm between US301 and 1st-Row impacted properties							Mitigation not feasible
7	Midland Farms West	4	No room for berm between US301 and 1st-Row impacted properties							Mitigation not feasible
8	Midland Farms East	6	No room for berm between US301 and 1st-Row impacted properties							Mitigation not feasible
9	Middletown Village	15	16	2,000	6	\$521,481	15	\$34,765		
11	Southridge	7	15	970	5	\$223,639	3	\$74,546	Can not provide -5dBA to 4 impacts	
Totals						\$1,026,170	27			

c. Impact Assessment/Abatement Conclusions

For the Preferred Alternative, many of the noise impacts have been avoided with the construction of visual screening earth berms to be included in the design for many of the communities adjacent to the proposed roadway. *Table III-47* provides a summary of the noise impact reduction that will occur with the visual screening berms in place.

Table III-47: Summary of Noise Impact Reduction from Visual Screening Berms

Community	Number of Noise Impacts Preferred Alternative		Aesthetic Berm Description
	without Berms	with Visual Berms	
Airmont	0	0	6' x 1670' aesthetic berm
Boyd's Corner @ US 301	2	2	None - aesthetic berm not feasible
Chesapeake Meadow	11	0	11' x 1600' berm reduces all increases to 8 dBA or less.
Midland Farms	9	9	None - aesthetic berm not feasible
Middletown Village	15	0	16' x 2000' berm reduces all noise increases
Southridge	75	14	10' x 2,840' berm prevents impacts to all but 14 residences at southern end
Springmill	0	0	6' x 2200' aesthetic berm
Summit Bridge Farms	12	12	None - berm not feasible on North side
Additional Individual Residences	9	9	None
TOTAL IMPACTS	133	46	

Noise mitigation for the remaining impacted residences/communities was found to not meet DelDOT's criteria for cost-effectiveness, which is no more than \$20,000 per benefited residence, or was found to be not feasible due to either lack of right-of-way (if an earthen berm) or traffic noise influence from nearby or surrounding roadways.

3. Construction Noise

Temporary noise impacts may occur from construction activity. Areas around the construction zone will experience varied periods and degrees of noise that differ from that of surrounding ambient community noise levels. Temporary Construction noise impacts are discussed in *Section III.1.3*.

E. Hazardous Materials Sites

1. Existing Conditions

Two environmental databases maintained by DNREC, the Site Investigation and Restoration Branch Environmental Navigator and the Tank Management Branch Environmental Information System, were reviewed in order to identify known contaminated sites that are located adjacent to or within the vicinity of the project area. The DNREC databases include coverage of sites with contaminant releases that have been listed by EPA under CERCLA and RCRA. The potential risk of subsurface contamination to the project area was evaluated based upon information derived from the database review.

Sites identified as sources of contamination consisted of a combination of commercial, railroad and state-owned properties. Property uses in the vicinity of the project area included gasoline stations; industrial, commercial, and retail facilities; an airport; auto and farm equipment repair

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shops; and railroad support operations. Leaking underground petroleum storage tanks (LUSTs) accounted for most of the documented contamination. DNREC has issued rulings of No Further Action for most of these sites; however, residual levels of localized petroleum contamination probably remain. Sites identified as potential sources of contamination to the project area are identified in *Table III-48* and *Table III-49* and shown on *Figure III-11*.

**Table III-48:
DNREC LUST Sites with Documented or Suspected Contamination**

Site Map #	Site of Concern	Property Use	Potential Type of Contamination	Contaminant of Concern
1	King General Store, Formerly Shore Stop #260, 4296 DuPont Highway, Townsend, DE 19734	Gas Station	Soil	Petroleum
2	Shore Stop #227, 4235 South DuPont Parkway, Townsend, DE 19734	Gas Station	Soil	Petroleum
4	Bell Atlantic Cell Site, 3925 South DuPont Highway, Townsend, DE 19734	Cell Tower Generator	Soil	Petroleum
6	DELDOT ROW, Al's Place, 3783 DuPont Highway, Townsend, DE 19734	Former Gas Station	Soil	Petroleum
7	Fieldsboro Amoco, 3622 South DuPont Highway, Townsend, DE 19734	Gas Station	Soil	Petroleum
8	Former Blue Star Texaco – US 301 South of Strawberry Lane, Middletown	Former Gasoline Station	Soil	Petroleum SIRB File
9	Valero Gasoline Station – 137 Strawberry Lane, Middletown, 19709	Gasoline Station	Soil	Petroleum
10	StarDel, Inc., Former Harris Property 1330 Warwick Road, Middletown.	Gasoline Station	Soil	Petroleum SIRB File
11	Coastal Mart – 1228 Middletown Warwick Road, Middletown	Gasoline Station	Soil	Petroleum
12	Hooper, Inc., Former Whiteman & Sons Property – 1130 Middletown Warwick Rd, Middletown, DE 19709	Farm Equipment Dealer	Soil	Petroleum
13A	301 Truck Plaza – 921 Middletown Warwick Rd, Middletown	Truck Stop/ Gasoline Station	Soil	Petroleum
13B	Shore Stop #235, 400 W. Main Street, Middletown, DE 19709	Gas Station	Soil	Petroleum
13C	Shore Stop #263, 308 W. Main Street, Middletown, DE 19709	Gas Station	Soil	Petroleum
14	Johnson Controls Battery Group, Inc. 700 North Broad Street, Middletown	Battery Manufacturing Facility	Soil	Petroleum
15	Southern States – 900 N. Broad Street, Middletown	Former Fuel Distributor	Soil	Petroleum
16	Nucar Middletown Chevrolet, Formerly Shallcross Chevrolet – 5221 Summit Bridge Road, Middletown	Auto Dealer	Soil	Petroleum
17	MaryDel Farm – 1542 Choptank Road, Middletown	Farm	Soil	Petroleum
18	Summit Bridge Shopping Center – 4466 Summit Bridge Road, Middletown	Shopping Center	Soil	Petroleum
21	Summit Airport	Aircraft Fueling/ Maintenance	Soil	Petroleum, Solvents
22	Huber's Nursery – 2424 S. DuPont Highway N., Boyd's Corner	Nursery	Soil	Petroleum

**Table III-48:
DNREC LUST Sites with Documented or Suspected Contamination**

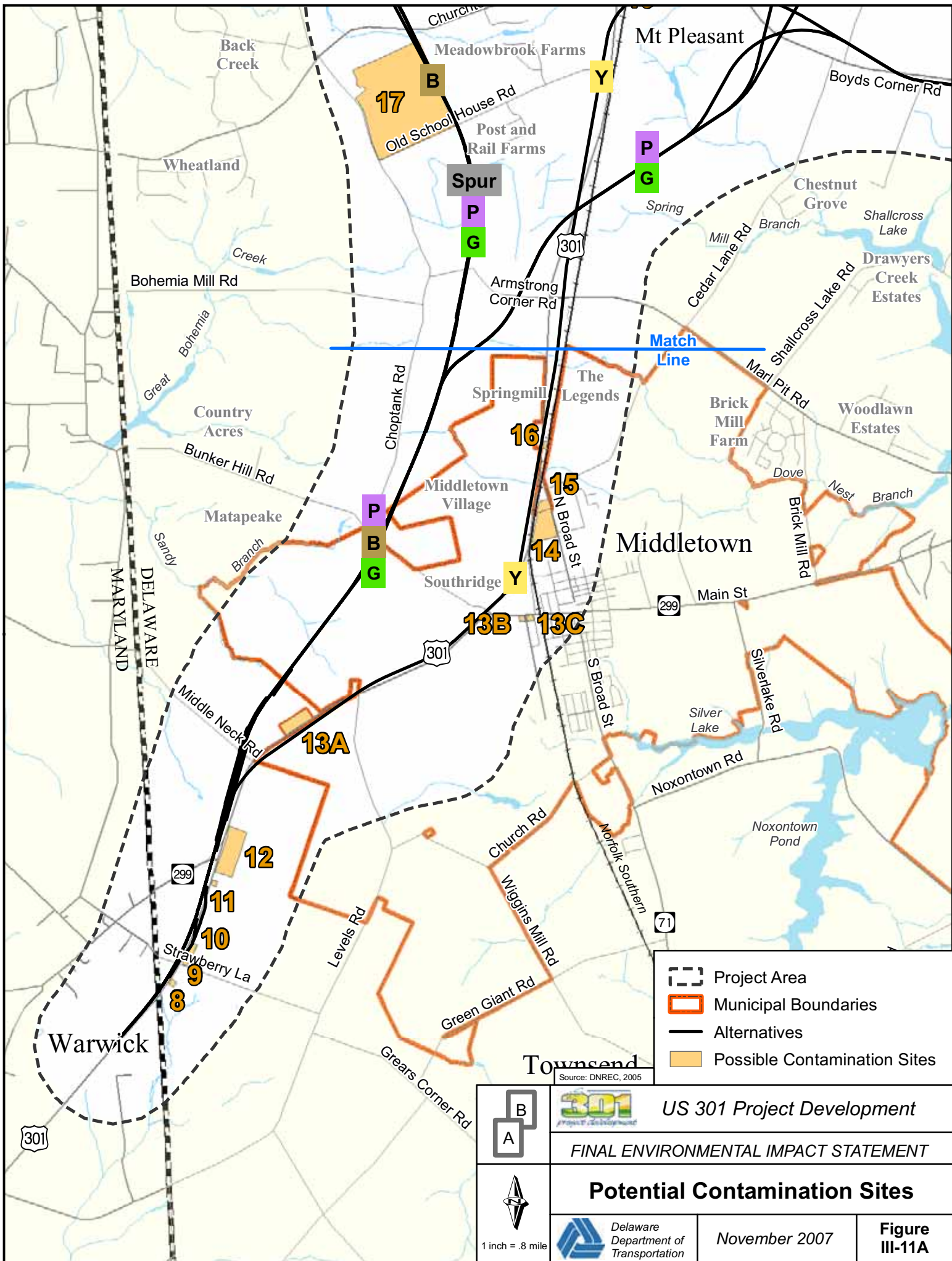
Site Map #	Site of Concern	Property Use	Potential Type of Contamination	Contaminant of Concern
23	Meyer Property – Pole Bridge Rd. East of SR 1, Biddles Corner	Current DELDOT Property	Soil	Petroleum
24	DELDOT ROW, Former Harvey Newton Texaco – DuPont Hwy at Port Penn Road	Former Gasoline Station	Soil	Petroleum
25	DELDOT ROW, Former M. Madic, Inc. – 2085 S. DuPont Parkway	Former Vehicle Repair Shop	Soil	Petroleum

Table III-49: DNREC Site Investigation and Restoration Sites

Site Map #	Site of Concern	Property Use	Potential Type of Contamination	Contaminant of Concern
3	Drake Auto Salvage Yard, 4195 DuPont Parkway, Townsend, DE 19734	Auto Salvage	Soil	None Confirmed. (No further action recommended)
5	Pine Tree Auto Salvage Yard, 352 Pine Tree Rd, Townsend, DE 19734	Auto Salvage	Soil	None Confirmed.
14	Johnson Controls Battery Group, Inc. 700 North Broad Street, Middletown	Battery Manufacturing Facility	Soil	Lead (RCRA) (No Further Action Required)
19	Sea Land Mt. Pleasant Facility – SR 896 at Norfolk Southern Railroad	Former Waste Oil Recycling Facility	Soil & Groundwater	Petroleum, PAHs, Toxic Metals – Former CERCLA, current SIRB site
20	Mt. Pleasant Railroad Dump – East of Norfolk Southern Railroad, North of SR 896	Debris Disposal Area	Soil	Rail Ties, Tires, Trash, Inert Debris
26	DELDOT Borrow Pit – West of SR 1/US 13, south of Scott Run	Borrow, Debris Disposal	Soil	Recycled Contaminated Soil

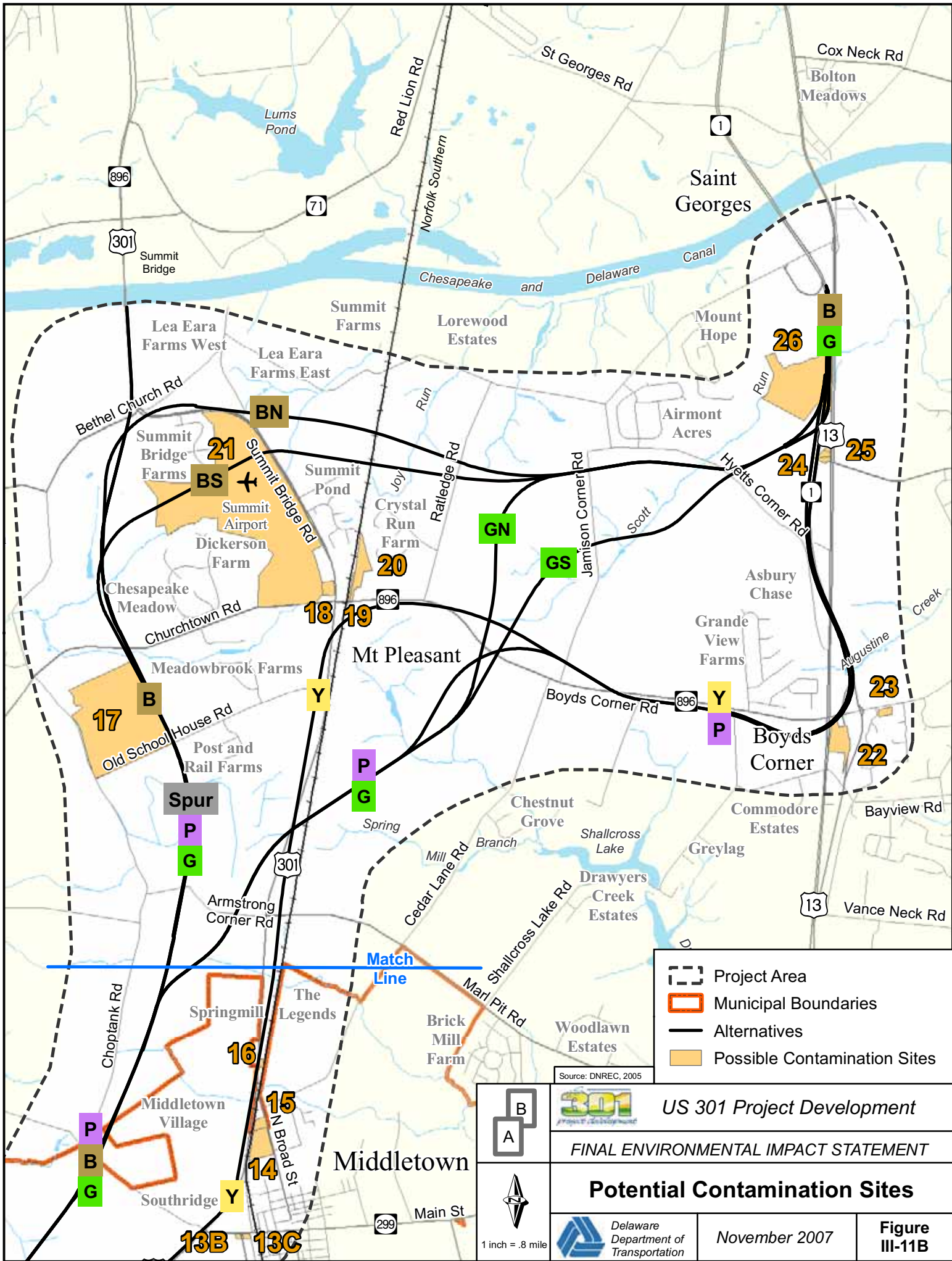
2. Environmental Consequences and Mitigation

Upon review of the DNREC regulatory database, a variety of properties with minor contamination problems were located in the project area. The proposed build alternatives, except for the Preferred Alternative and the Green South Alternative, cross several properties where limited areas of subsurface contamination may be present within the proposed right-of-way. *Table III-50* summarizes the results of the database search by alternative. The Preferred Alternative will not cross any known hazardous waste site.



Source: DNREC, 2005

	<p>US 301 Project Development</p>			
<p>FINAL ENVIRONMENTAL IMPACT STATEMENT</p>				
<p>Potential Contamination Sites</p>				
	<table border="1"> <tr> <td data-bbox="950 1984 1177 2060"> <p>Delaware Department of Transportation</p> </td> <td data-bbox="1185 1984 1437 2060"> <p>November 2007</p> </td> <td data-bbox="1445 1984 1588 2060"> <p>Figure III-11A</p> </td> </tr> </table>	<p>Delaware Department of Transportation</p>	<p>November 2007</p>	<p>Figure III-11A</p>
<p>Delaware Department of Transportation</p>	<p>November 2007</p>	<p>Figure III-11A</p>		



- Project Area
- Municipal Boundaries
- Alternatives
- Possible Contamination Sites

Source: DNREC, 2005

		US 301 Project Development FINAL ENVIRONMENTAL IMPACT STATEMENT
Potential Contamination Sites		
	Delaware Department of Transportation	November 2007
		Figure III-11B

Table III-50: Summary of Contaminated Sites by Build Alternative

Alternative	Contaminated Sites within Proposed Right-Of-Way	Additional Site Investigations Recommended
No-Build	0	0
Yellow	4	4
Purple	3	3
Brown	1	1
Green	0	0

The Yellow and Purple Alternatives will cross properties with documented releases from petroleum USTs, including three current or former gasoline stations. The Brown Alternative will cross a property with documented releases of petroleum and paint solvents in localized areas. The subsurface contamination on these properties is likely of limited extent, but even minor levels of contamination will require appropriate management of contaminated materials if encountered during construction. The Green Alternatives will not cross any documented hazardous materials sites.

The most significant incidence of subsurface contamination within the project area is the Sea Land site, which is located along the Norfolk Southern right-of-way north of SR 896 and east of US 301. The abandoned waste oil recycling facility at this site was the subject of an emergency cleanup by EPA in 1984. Residual contamination by petroleum products, polynuclear aromatic hydrocarbons (PAHs), creosote, and toxic metals remains beneath the soil cap. DNREC continues to require groundwater monitoring for PAHs and nickel in the drinking water aquifer.

Immediately north of the Sea Land site is the Mt. Pleasant Railroad Dump site, where Norfolk Southern cleaned up a debris dump under DNREC supervision. This site presents no significant risk of contamination for the proposed construction. A slight risk of contamination may result from other railroad activities within the Norfolk Southern right-of-way. Railcars are used for the transportation of many types of hazardous chemical products and waste materials. Soil and groundwater contamination has been documented along other rail corridors as a result of hazardous materials spills as well as small, incremental releases of fuel, lubricants, and cargo products.

The Johnson Controls Battery Group, Inc. property, located between US 301 and Broad Street in Middletown, was the site of RCRA corrective action administered by EPA and DNREC. In 1984, a rupture in the air pollution control baghouse released an estimated 75 pounds of lead and arsenic with resulting contamination of the facility roof and surface soils on-site and off-site.

Subsequent remedial efforts included structure cleanup, soil removal, and risk assessment. EPA issued a Statement of Basis recommending no further action, dated July 2005. Considering the low level of off-site contamination, the site does not appear to present a significant risk of contamination to the proposed construction.

Although severe contamination is not anticipated, the proposed construction will need to accommodate appropriate management and disposal of contaminated soil or groundwater that

may be encountered during construction. Only the Sea Land site, which is located within approximately 500 feet of portions of the Yellow Alternative, contains significant contamination levels. The documented contamination is unlikely to impact the proposed construction unless the proposed alignment is moved to cross over or very near the contaminated site.

Additional site investigation efforts are warranted at five sites before property acquisition. The level of investigation may range from review of regulatory documents to formal Phase I Environmental Site Assessments or Phase II Site Investigations, depending on site conditions and the likelihood of property purchase. Changes to the alternative alignments will change the need for site specific investigations.

The types of contaminants that may be encountered include petroleum contamination in soil and groundwater, toxic metals, PAHs, and volatile organic compounds (VOCs, typically solvents). These contaminants may occur both as soil contaminants and as dissolved groundwater contaminants. If the proposed construction encounters any of these contaminants of concern, appropriate excavation and disposal of contaminated materials in accordance with all applicable state and local regulations would be required.

F. Natural Environment

This section discusses natural resources in the project area, including topography; geology; soils; groundwater; surface water and water quality; waters of the United States, including wetlands; floodplains; vegetation and wildlife; rare, threatened and endangered species; wild and scenic rivers; coastal zone management areas; and unique, sensitive and other natural areas. Impacts to these resources were previously detailed in the DEIS for the four retained alternatives (Yellow, Purple, Brown and Green) and are summarized herein.

Since the recommendation of the Green North Alternative as the Preferred Alternative was published in the DEIS, four refinements have been undertaken that have contributed to an increase in some resource impacts for the Preferred Alternative shown on the plan sheets in *Appendix B*. It is estimated that these refinements would have brought about a similar increase in the levels of impacts for all of the build alternatives if they had all been subjected to a similar level of design refinement.

- **Alignment Changes:** The design of the Preferred Alternative was refined as a result of comments received on the DEIS and during the Public Hearings (refer to *Chapter IV Sections A.I.g* and *D*) to include Ratledge Road Area Option 4B Modified and a local connection between Strawberry Lane and existing US 301.
- Refinements in planning-level engineering included additional alignment modifications, refined sections based on topography, and refined stormwater management design based on the identification of existing drainage patterns. This combination of refinements resulted in the elevation of the roadway being raised in some areas to provide adequate drainage, resulting in an expanded Limit of Disturbance (LOD). Prior to refined engineering, the LOD for the Green North Alternative was 897 acres; the Preferred Alternative LOD encompasses