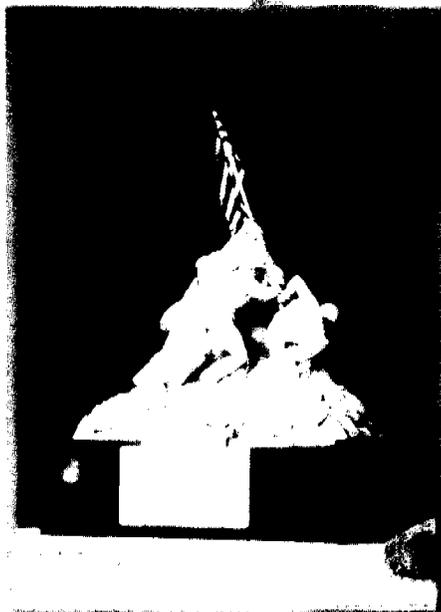
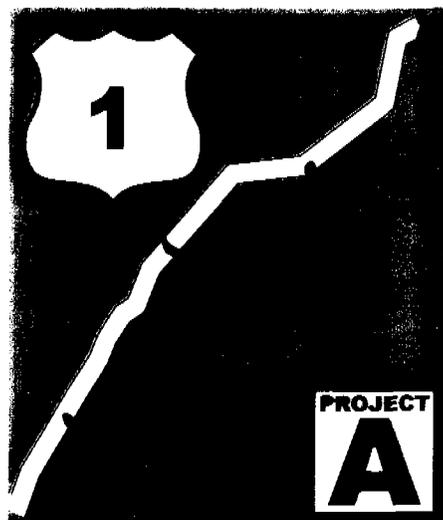


# Route 1 Improvements Project A

## ENVIRONMENTAL ASSESSMENT

Project A  
State Project # 14-100-0000-0000  
Federal Project # 14-100-0000-0000  
From State Route 14-100-0000-0000  
To Route 14-100-0000-0000 Interchange



**Route 1 Improvements - Project A**  
State Project: 0001-96A-103, PE-100; PPMS No. 18857  
Federal Project: STP-96A-9 (008)  
From: Stafford County Line To: Route 123 Interchange  
Prince William County  
**ERRATA FOR ENVIRONMENTAL ASSESSMENT**

Please note the following corrections in the Environmental Assessment for the subject project:

Page 3-1, second paragraph, second to last sentence:

“...approximately 67.4 to 74.3 acres...” should read: **73.1 to 80.0** acres

Page 3-4, Table 3-2, Comparative Summary of Environmental Effects:

The numbers for right of way acres, right of way cost, construction cost, tax revenue loss, homes displaced, and businesses displaced should read as shown in the table on the next page. Corrected numbers are indicated by bold and underlining.

Page 3-7, first paragraph under “3.2.1 Residential,” first sentence:

“...would displace 73 families occupying 5 single-family...” should read: **75** families occupying **7** single...

Page 3-7, fourth paragraph under “3.2.1 Residential,” second, third, and fourth sentences:

“The Triangle Option 1 alignment ...” should read: The Triangle Option 1 alignment would increase the number of homes displaced by **one** relative to the Location Study Alignment. The Triangle Option 2 alignment would **have two fewer** residential displacements relative to the Location Study Alignment. The Brady’s Hill Option 1 would **have the same number of displacements as** the Location Study Alignment.

Page 3-7, bottom of page, first sentence under “3.2.2 Commercial”:

“...Study Alignment would displace 129 businesses.” should read: **136** businesses.

Page 3-7, bottom of page, third sentence under “3.2.2 Commercial”:

“Of the 129 businesses, 17 are owner...” should read: Of the **136** businesses, **20** are owner...

Page 3-8, first full paragraph:

“The Locust Shade Option 1...” should read: The Locust Shade Option 1 would have an identical number of commercial displacements to the Location Study Alignment. The Triangle Option 1 alignment through Triangle would result in a reduction of commercial displacements by **nine**, to **127**. The Triangle Option 2 alignment would reduce the number of commercial displacements to **126**, **ten** less than the Location Study Alignment. **The Brady’s Hill Option 1, the Dumfries Option 1, Possum Point Option 1, Civil War Option 1, and the Dale Boulevard Option 1 all would have the same number of commercial displacements as the Location Study Alignment.**



U.S. DEPARTMENT OF TRANSPORTATION  
FEDERAL HIGHWAY ADMINISTRATION  
and  
VIRGINIA DEPARTMENT OF TRANSPORTATION

**ENVIRONMENTAL ASSESSMENT**

---

**Route 1 Improvements  
Project A**

Prince William County  
State Project: 0001-96A-103, PE100  
Federal Project: STP-96A-9 (008)  
From: Stafford County Line  
To: Route 123 (Gordon Boulevard) Interchange

Submitted Pursuant to 42 U.S.C. 4332(2)(C),  
49 U.S.C. 303(c) and 16 U.S.C. 470f

Approved for Public Availability:

2/20/03  
Date

Edward J. Vindia  
For the Division Administrator

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## SECTION 1

### PROJECT DESCRIPTION AND NEED FOR ACTION

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#### 1.1 PROJECT DESCRIPTION

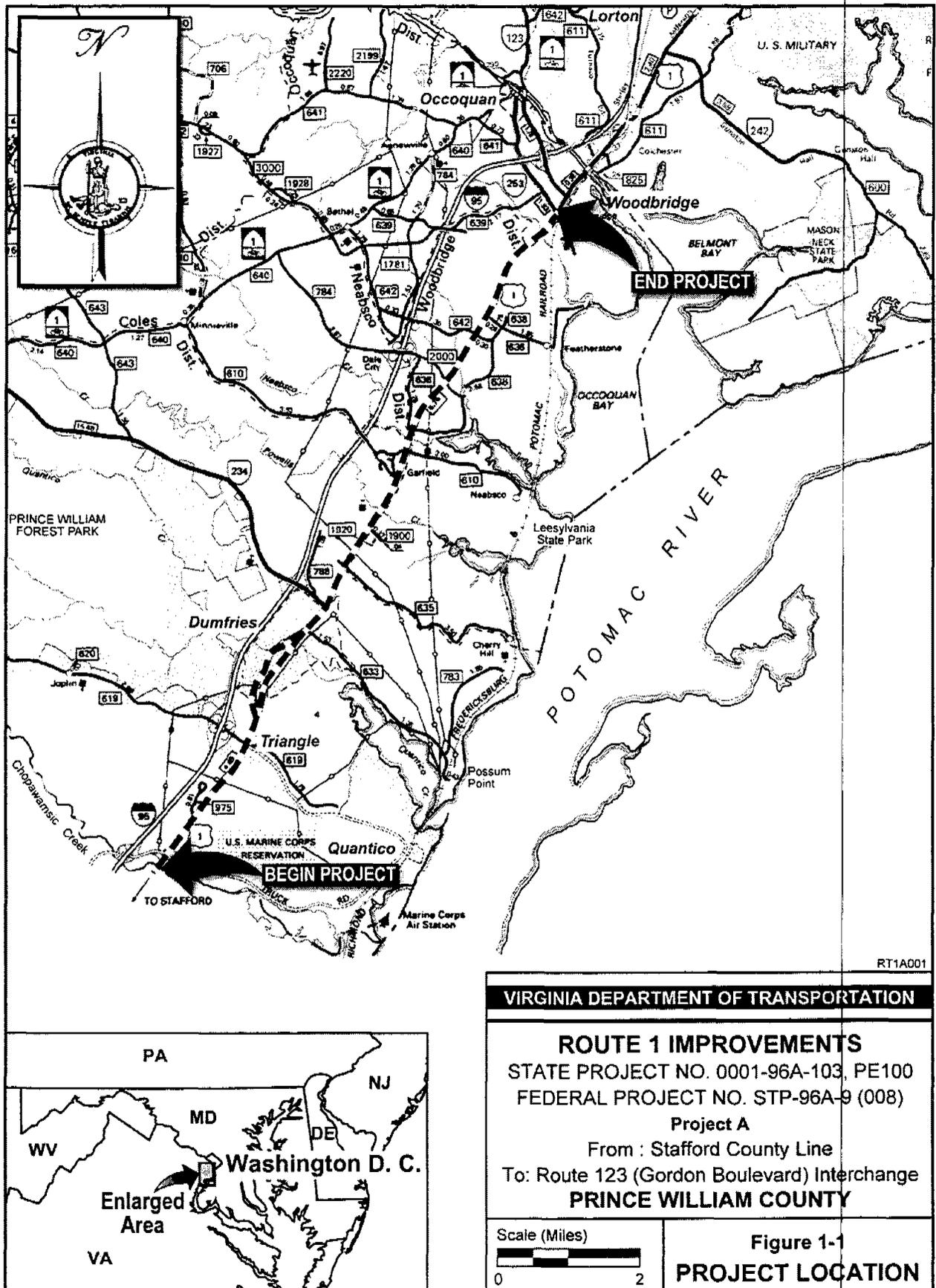
The proposed project is located in Prince William County, as shown on **Figure 1-1**. It begins at the Stafford County line (just south of the Russell Road interchange), then proceeds northward approximately 11.4 miles along the existing Route 1 alignment, and ends at the Route 123 interchange at Woodbridge proposed under a separate project. As shown on **Figure 1-2**, the project generally would consist of widening the existing four-lane undivided highway to a six-lane divided highway. Opposing lanes would be separated by a raised median approximately 16 feet wide, except at intersections where turn lanes would occupy part of the median area. Curb and gutter would be installed along the outside edges; a sidewalk approximately 6 feet wide would be installed along one side; and a trail approximately 10 feet wide would be installed along the other side. The existing right of way width of approximately 110 feet would be expanded to approximately 140 to 150 feet to accommodate the proposed improvements. Other proposed design features include turn lanes at intersecting roadways, improvements to portions of cross streets to properly connect them to the Route 1 improvements, landscaping, and improved lighting and signing. In Dumfries, where northbound and southbound Route 1 currently are split on separate roadways, the project would bring those movements back together again, allowing Main Street to revert to a local town street.

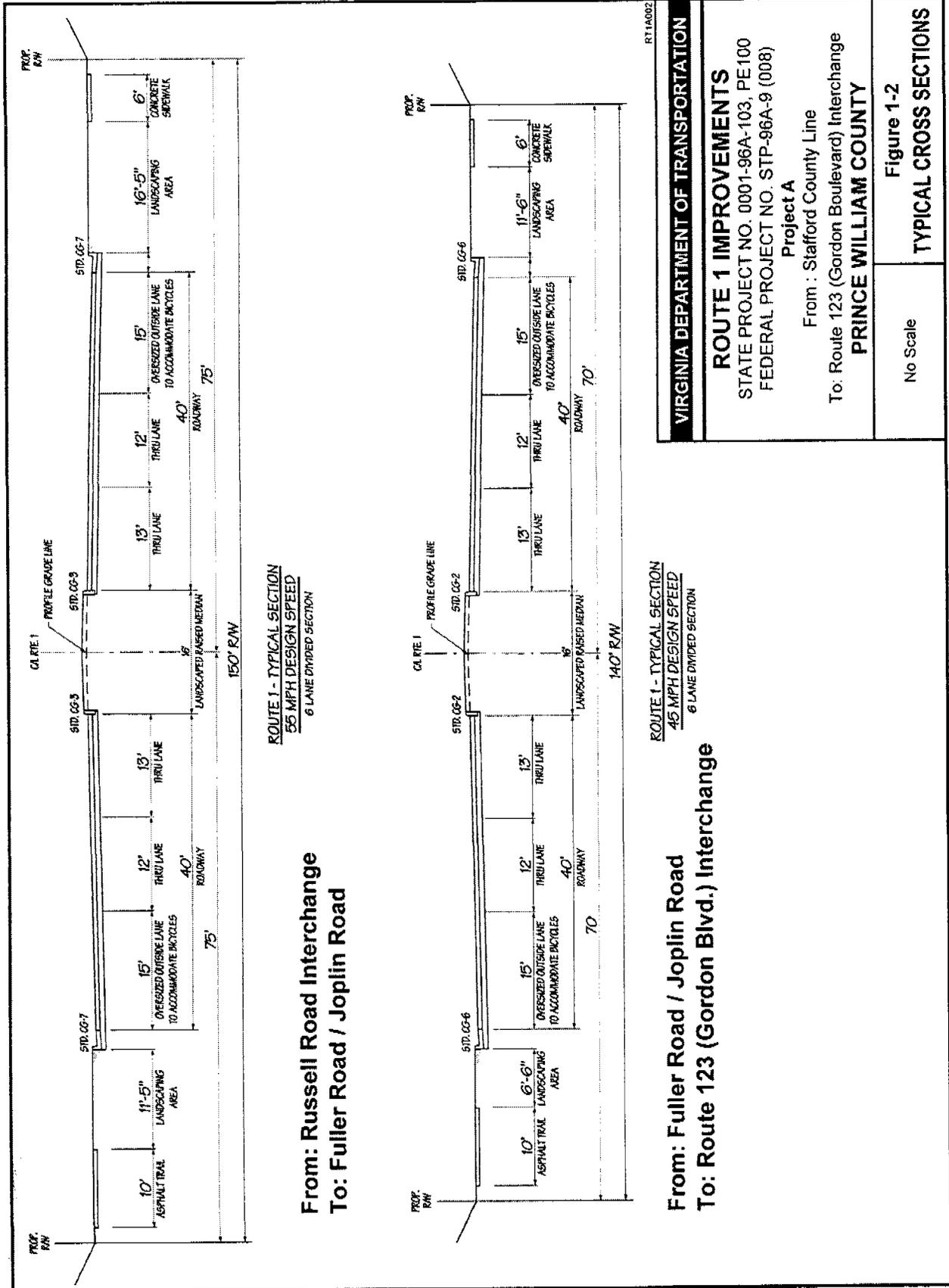
U.S. Route 1 is an urban arterial highway. With no access controls, it allows direct ingress and egress for commercial and residential developments along its length. A number of intersecting streets connect Route 1 with other lands beyond the immediate corridor. Route 1 also serves as a major commuter route, a route for shopping and other general-purpose local trips, and an alternate route for nearby I-95. Russell Road at the southern terminus provides a direct connection to I-95 and access into Marine Corps Base Quantico (Combat Development Command). Route 123 at the northern terminus also provides a direct connection to I-95 and access into other developed portions of Prince William and Fairfax counties. The termini of the proposed project are logical because Russell Road at the south end and Route 123 at the north end represent substantial breaks in traffic - projected 2025 traffic volumes on Route 1 are 38% higher south of Russell Road than north of Russell Road, and 22% higher on Route 1 south of Route 123 than north of Route 123.

#### 1.2 PURPOSE AND NEED

##### 1.2.1 Existing Transportation System

Existing Route 1 is a four-lane undivided highway with no access controls and posted speed limits ranging from 35 mph to 55 mph. It is the principal north-south route for local traffic in eastern Prince William County. It provides direct access to numerous business and residential developments and indirect access via intersecting roads to other developments in the area. The parallel I-95 is the principal north-south route for long-distance East Coast travel and for regional commuting to employment centers. The section of Route 1 covered by this project has a connection with I-95 via major crossroads at either end (Russell Road on the south and Route 123 on the north). Three other main intersecting roads - Joplin Road (Route 619), Dumfries Road (Route 234), and Dale Boulevard (Route 784) - also provide connections to I-95 and access to the interior of Prince William County.





RT1A002

**VIRGINIA DEPARTMENT OF TRANSPORTATION**

**ROUTE 1 IMPROVEMENTS**  
 STATE PROJECT NO. 0001-96A-103, PE100  
 FEDERAL PROJECT NO. STP-96A-9 (008)  
 Project A  
 From : Stafford County Line  
 To: Route 123 (Gordon Boulevard) Interchange  
**PRINCE WILLIAM COUNTY**

No Scale	Figure 1-2
<b>TYPICAL CROSS SECTIONS</b>	

Other projects within the corridor and at the northern terminus are being advanced independently to enhance overall system connectivity. Those projects entail construction of a new interchange at Route 234 north of Dumfries (including improvements on Route 1 from Stage Coach Road to Wayside Lane), Neabsco Creek bridge replacement (including widening of Route 1 from Neabsco Road to Neabsco Mills Road), and construction of an interchange at Route 123 (including Route 1 improvements from Occoquan Road to Annapolis Way). Beyond the Route 123 interchange project, Route 1 Improvements, Project B, would include widening Route 1 from four lanes to six lanes. Beyond that, another separate project would widen Route 1 from four lanes to seven lanes between Armistead Road and Telegraph Road (including improvements to Telegraph Road and its intersection with Route 1). And beyond that, Route 1 Improvements, Project C, would widen Route 1 to six and eight lanes between Telegraph Road and the Capital Beltway. In light of these other system improvements, and based on the traffic patterns and connections to other major roadways, the proposed Route 1 Improvements, Project A, (1) has logical termini, (2) is of sufficient length to evaluate environmental concerns on a broad scale, (3) has independent utility because it would be a useable facility and a reasonable investment even if the other planned transportation improvements in the area are delayed or do not go forward, and, (4) will not restrict consideration of alternatives for these other reasonably foreseeable transportation improvements.

### 1.2.2 Deficiencies of Existing Route 1

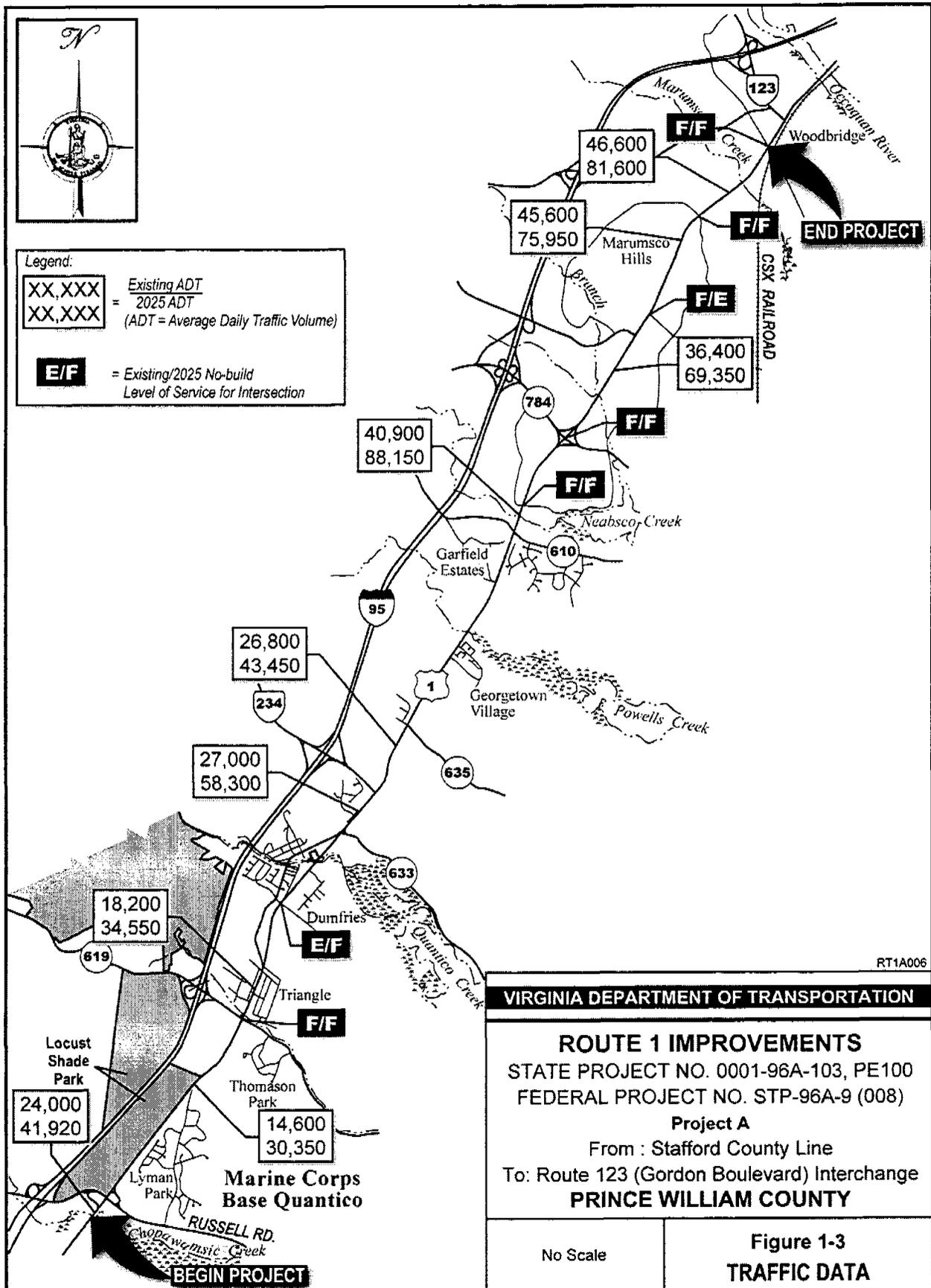
Although the horizontal and vertical alignments of existing Route 1 are generally satisfactory, there are some locations where sight distance is less than desirable, and the existing cross section provides no median to separate opposing traffic. Turn lanes are typically inadequate to accommodate turning movements, particularly for left turns. The spacing and inconsistency of access points (driveways and commercial entrances) contribute to operational inefficiencies. There are limited and discontinuous accommodations for pedestrians and bicyclists and few facilities for transit users.

### 1.2.3 Capacity

The existing four lanes of Route 1 provide insufficient capacity for projected traffic volumes. Likewise, the existing turn lane configurations provide insufficient capacity for projected turning volumes at cross streets. **Figure 1-3** shows the existing (2000) average daily traffic volumes and the projected average daily demand traffic volumes for the year 2025. Several intersections that already experience deficient levels of service during peak hours will experience even worse levels of service in the future, as indicated on Figure 1-3. [Level of service is a measure of traffic performance through a grading system ranging from A to F. In general, level of service A represents excellent traffic operations with minimal delays, and level of service F represents breakdown conditions and substantial delays.]

### 1.2.4 Economic and Aesthetic Revitalization

The physical characteristics of Route 1 reflect its gradual, often piecemeal, development over several decades. The inconsistent cross section, disorganized development patterns, overhead utilities, and visual clutter present a chaotic appearance that detracts from civic pride and the ability to attract new desirable development. Landscaping and other visual amenities are needed to enhance the aesthetics of the corridor, which in turn would make the corridor more attractive and marketable for economic development.



### 1.2.5 Modal Interrelationships

Bus transit service is available to areas of greatest need, but users must endure inadequate bus stop conditions that can discourage transit patronage. The transit services are oriented primarily to the Pentagon and Washington, D.C. core areas. The Virginia Railway Express operates the Quantico Station approximately 3.4 miles east of the south end of the project, the Rippon Station approximately 1.7 miles east of the Route 1/Dale Boulevard intersection, and the Woodbridge Station at the north end of the project corridor. However, the intermodal connectivity to these stations is less than desirable, with no provisions for pedestrian or bicycle travel within the corridor or along connecting roadways.

### 1.2.6 Safety

Route 1 exhibits a higher accident rate than other similar roadways in Virginia. Six locations along Project A have been identified as high-accident locations. The biggest factors in the high accident rate are uncontrolled turning movements to and from driveways and inadequate turn lanes and signalizations. The lack of separation between opposing directions of travel, the inconsistent cross section, and poor sight distance at some locations also represent conditions that pose safety concerns on the existing roadway.

### 1.2.7 Relationship to State, Regional, and County Plans

VDOT's *Virginia Transportation Six-Year Program*, The National Capital Region Transportation Planning Board's 2002 *Update to the Financially Constrained Long-Range Transportation Plan for the National Capital Region*, the FY 2003-2008 *Transportation Improvement Program (TIP)*, and the Northern Virginia Transportation Coordinating Council's *Northern Virginia 2020 Transportation Plan* all include the proposed project. The proposed design elements are consistent with those recommended in Prince William County's *1998 Comprehensive Plan*.

---

**SECTION 2  
ALTERNATIVES**

---

**2.1 ALTERNATIVES DEVELOPMENT**

Although the existing road fixes the general alignment for the project, a number of variations are possible along that alignment. For example, the proposed widening could be done all on one side of the road or the other, along both sides equally, or along whichever side would result in the least overall damage to sensitive environmental resources. In addition, the typical cross section could assume any number of design configurations involving median variations, lane separations, curbing, shoulders, etc. The proposed design configuration (six lanes, raised median, curb and gutter) is based on its advantages with respect to traffic operations, safety, engineering standards, community impacts, and input from local officials and technical staff. The Location Study Alignment initially was based on the centerline of the existing road, and then adjusted where possible to avoid and minimize adverse effects on parks, neighborhoods, historic properties, and other resources. For most of the length of the project, the Location Study Alignment represents an optimum configuration, meeting sound engineering principles while minimizing adverse environmental consequences. Several localized alignment or design options also are being considered through areas with sensitive environmental or community resources. These options generally involve slight shifts of the alignment for short distances or variations in design features at intersecting roads. The No-build Alternative also is being considered.

**2.2 NO-BUILD ALTERNATIVE**

The No-build Alternative would leave the road in its existing configuration (i.e., four lanes undivided). Regular maintenance would be performed to preserve the structural integrity of the roadway. This alternative is not compatible with statewide, regional, or local transportation plans and would not meet the needs discussed in Section 1. This alternative would not displace any families, businesses, farms, or nonprofit organizations, and would not significantly affect any natural, ecological, cultural, or scenic resources.

**2.3 BUILD ALTERNATIVES****2.3.1 Location Study Alignment**

This alternative establishes the centerline of the proposed widening mostly along the centerline of existing Route 1.

**2.3.2 Locust Shade Park Option 1**

Locust Shade Park Option 1 entails shifting the centerline of the road to the east to avoid use of land in the County-owned Locust Shade Park for a distance of approximately 10,000 feet.

**2.3.3 Triangle Option 1**

Triangle Option 1 entails a westward shift of the alignment to limit impacts to the east side of the road through Triangle for a distance of approximately 3,550 feet.

**2.3.4 Triangle Option 2**

Triangle Option 2 entails an eastward shift of the alignment to limit impacts to the west side of the road through Triangle for a distance of approximately 2,680 feet.

### **2.3.5 Brady's Hill Option 1**

Brady's Hill Option 1 consists of realigning the south end of Main Street at Dumfries with Brady's Hill Road and achieves a perpendicular crossing of Route 1.

### **2.3.6 Dumfries Option 1**

Dumfries Option 1 entails flattening the curve of Route 1 for a distance of approximately 1,400 feet to reduce impacts to the Triangle Shopping Center.

### **2.3.7 Possum Point Option 1**

Possum Point Option 1 entails realigning the north end of Main Street in Dumfries with Possum Point Road and achieves a perpendicular crossing of Route 1.

### **2.3.8 Civil War Option 1**

Civil War Option 1 was developed to avoid potential encroachments onto a Civil War earthworks site before the boundaries of the site were confirmed. Subsequent research and coordination with the Virginia Department of Historic Resources established the boundaries of the site well outside the Area of Potential Effects of the project. This option also avoids displacement of a major communications tower. This option entails shifting the alignment to the east for a length of approximately 3,650 feet.

### **2.3.9 Dale Boulevard Option 1**

Dale Boulevard Option 1 consists of constructing a grade-separated interchange by raising Route 1 to overpass Dale Boulevard (Route 784) and adding interchange exit and entrance ramps.

## **2.4 ALTERNATIVES CONSIDERED AND ELIMINATED**

### **2.4.1 Mass Transit**

Although transit expansions are necessary and desirable elements of the overall regional transportation system, and in fact are being developed independently of this highway project, there are none that would preclude the need to construct the proposed Route 1 highway improvements. Indeed, the proposed highway improvements would allow transit usage in the corridor to be more fully realized by reducing congestion, providing space for more user-friendly transit facilities such as bus stop pullouts and shelters, and improving pedestrian mobility and safety with the addition of continuous sidewalks.

### **2.4.2 Transportation System Management**

Transportation system management generally involves minor improvements to the existing system. These measures could include intersection improvements, signal timing optimization, and other steps that would incrementally improve the overall operating efficiency and safety of the existing highway. In this instance, such measures would not sufficiently meet the transportation needs in the corridor because they would not provide the needed highway capacity and pedestrian and bicycle facilities, nor would they provide the corollary enhancements needed to improve the visual and economic attractiveness of the corridor.

### **2.4.3 Other Highway Build Alternatives**

Alternatives widening entirely to the west side of Route 1 along Locust Shade Park were not considered because of the protections afforded publicly owned public parks under Section 4(f) of the 1966 Department of Transportation Act. Similarly, widening to the west side in the vicinity

of Cecil W. Garrison Park in the Town of Dumfries was eliminated from consideration. Options that would involve use of land from the Williams Ordinary historic property also were eliminated. Widening entirely to one side or the other was eliminated in several other segments because of the obviously greater levels of displacements of homes and businesses.

## SECTION 3

### ENVIRONMENTAL CONSEQUENCES

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**Table 3-1** lists environmental issues with remarks indicating their relationship to the project. **Figure 3-1** shows the major environmental features within the corridor. Among them are several parks and recreation areas, stream crossings, and communities. **Table 3-2** lists a comparative summary of the physical features, costs, and environmental effects of the alternatives. The following sections provide more details on environmental constraints along the corridor and the project's effects on them.

#### 3.1 LAND USE AND SOCIOECONOMICS

Land uses along the Route 1 corridor in eastern Prince William County include a spectrum of military, recreational, residential, commercial, and industrial activities, as well as blocks of undeveloped woodlands. Large forested tracts are present, particularly along the southern portion of the alignment along Locust Shade Park on the west and Marine Corps Base Quantico on the east. Residential uses include military housing on the Marine Corps Base, mobile homes, apartments, condominiums, and single-family units. Commercial land use includes light industrial sites, car dealers, shopping centers, automobile service centers, professional offices, restaurants, and specialty shops. Based on Census data, it is estimated that, within the area bounded by I-95 on the west, the Stafford County line on the south, the Potomac River on the east, and the Occoquan River on the north, there are nearly 17,000 housing units and more than 1,200 business establishments employing more than 15,000 people. Existing land uses generally are consistent with zoning and future land use patterns proposed in the County's Comprehensive Plan. The additional right of way needed to construct the project (approximately 67.4 to 74.3 acres) would be converted from its various existing uses to transportation use. This conversion is compatible with local land use planning and the Comprehensive Plan.

The proposed project would not disrupt any established community or planned development. At the time of preparation of this document, no organized opposition to the project has occurred and none is expected. According to Prince William County officials, the project is consistent with community goals. Because the proposed project follows the existing road alignment, no neighborhoods would be split and community cohesion should not be materially affected. The proposed aesthetic enhancements to be provided by the project would improve the appearance of the corridor and its overall attractiveness for residential and commercial activities, thereby enhancing opportunities for economic revitalization in the corridor.

Access to some neighborhoods and roadside businesses or individual homes may be reduced somewhat because of the installation of a raised median. Because the existing road is undivided and has no obstacles in the middle, motorists are free to turn left at any point. With the proposed raised median in place, however, turning traffic would be channeled to the next available crossover to make left turns, in most cases in a separate left-turn lane that would enable motorists to get out of the main flow of traffic to make their turns. Thus, while convenience may be slightly reduced, safety and traffic flow efficiency would be enhanced. Overall vehicular travel patterns along the corridor are not expected to change. Travel choices for residents along the corridor would be expanded and enhanced by the proposed installation of a sidewalk, a trail, an over-wide right lane to accommodate bicyclists, and enhancements to bus stops.

**TABLE 3-1  
ENVIRONMENTAL ISSUES**

Issue	Remarks
Home Displacements, Community Impacts, Property Damage	Many homes and businesses located along corridor.
Noise	High traffic volumes, many potential noise receptors along corridor. Citizens typically recognize noise impacts as an important consideration in highway studies.
Air Quality	High traffic volumes in congested area with numerous points of human exposure (residential yards and other outdoor activity areas). Region is nonattainment for ozone.
Parks and Recreation Areas	Important parks and recreational properties adjacent to corridor. High level of protection under Section 4(f) regulations.
Visual Character	Urbanized area with few visual attractions. One of the project purposes is to enhance overall visual appearance of the corridor.
Streams/Water Resources/Wetlands	Urbanization already has degraded some water resources and increased runoff quantities. Wetlands are mostly small isolated patches or narrow strips along streams; however, high level of protection under Clean Water Act. Environmental review agencies requested avoidance, minimization, and compensation of adverse effects.
Land Use/Secondary & Cumulative Effects	Some highway improvements can have potential to stimulate development. One project purpose is to help promote economic revitalization of Route 1 corridor.
Wildlife and Habitat	Though much of corridor is urbanized, some areas of natural habitat remain.
Hazardous Material Sites	Some sites containing potentially hazardous materials are situated along Route 1. The potential human health effects of such materials and the potentially high costs of acquiring and cleaning up such sites make them a concern.
Cultural Resources	Two prehistoric archaeological sites (44PW1226 and 44PW1227) are potentially eligible for National Register. The Williams Ordinary (VDHR #212-0001) and the Neabsco Civil War Earthworks (44PW1229) are located outside the proposed construction limits.
Forest Land	This is an urbanizing corridor where forest products production is limited to nonexistent. No substantial harvestable forest resources along corridor.
Navigable Waterways	None.
Farmland/Ag-Forestal Districts	This is an urban area with no farmland and no agricultural and forestal districts.
Environmental Justice Populations	No low-income or minority populations along corridor that would suffer disproportionate adverse effects from the project.
Threatened and Endangered Species	Surveys were conducted in suitable habitat for small whorled pogonia, a federally listed threatened species, as suggested by U.S. Fish and Wildlife Service and Virginia Division of Natural Heritage. No occurrences of the species were found.
Public Water Supplies	No surface or groundwater public water supplies in corridor.
Marine Corps Base Quantico	Important national defense and homeland security missions are carried out on Quantico lands. None of these occur on lands adjacent to the project; however, several military housing areas are near the project. The Marine Corps Heritage Center site also is adjacent to the project.
Scenic Rivers/Scenic Byways	None in corridor.
Coastal/Marine Resources	None in corridor.

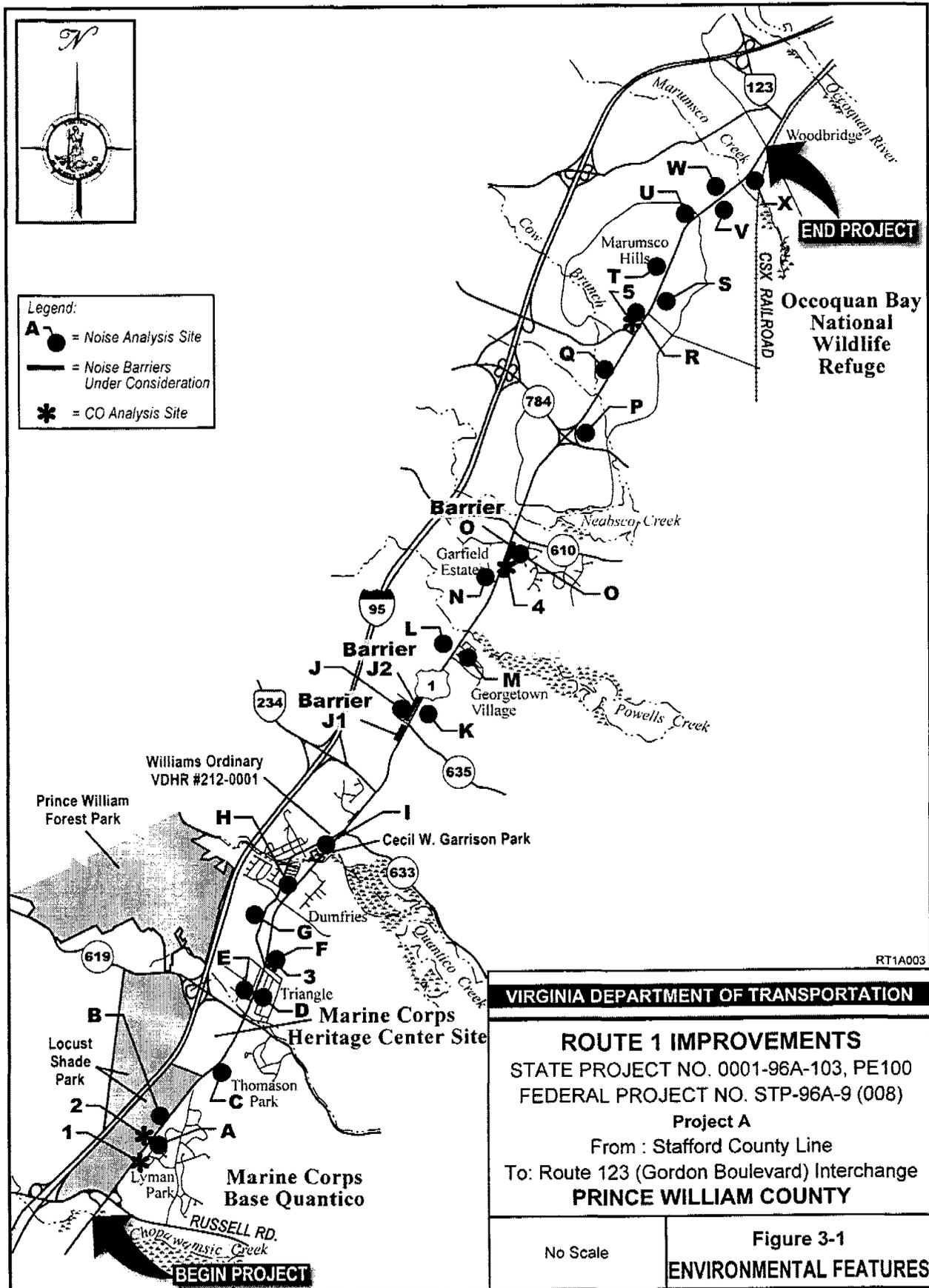


TABLE 3-2  
COMPARATIVE SUMMARY OF ENVIRONMENTAL EFFECTS

Category	No-build Alternative	Location Study Alignment	Location Study Alignment in Combination with									
			Locust Shade Park Option 1	Triangle Option 1 (Widen West)	Triangle Option 2 (Widen East)	Brady's Hill Option 1	Dumfries Option 1	Poosum Point Option 1	Civil War Option 1	Dale Blvd Option 1		
Length (miles)	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4
Additional Right of Way Required (acres)	0	67.8	69.4	69.9	69.0	69.0	69.0	67.4	68.6	67.5	74.3	
Estimated Right of Way & Relocation Costs, Including Utility Adjustments (millions of \$, 2002)	0	90.2	89.6	92.1	90.3	92.2	90.0	90.0	91.1	87.5	91.0	
Estimated Construction Cost (millions of \$, 2002)	0	57.6	59.0	60.2	60.2	58.1	57.6	57.6	57.9	60.7	65.5	
Annual Real Estate Tax Revenue Loss (millions of \$, 2002)	0	0.57	0.57	0.58	0.57	0.58	0.57	0.57	0.57	0.57	0.57	
Homes Displaced	0	73	73	76	73	74	73	73	77	74	73	
Businesses Displaced	0	129	129	122	122	131	129	129	129	129	129	
Schools Displaced	0	0	0	0	0	0	0	0	0	0	0	
Churches Displaced	0	1	1	1	2	1	1	1	1	1	1	
Cemeteries Displaced	0	0	0	0	0	0	0	0	0	0	0	
Other Community Facilities Displaced (rescue squads, fire stations, etc.)	0	0	0	0	0	0	0	0	0	0	0	
Noise Receptors Impacted	55	82	82	82	82	82	82	82	82	82	82	

TABLE 3-2  
COMPARATIVE SUMMARY OF ENVIRONMENTAL EFFECTS

Category	No-build Alternative	Location Study Alignment	Location Study Alignment in Combination with											
			Locust Shade Park Option 1	Triangle Option 1 (Widen West)	Triangle Option 2 (Widen East)	Brady's Hill Option 1	Dumfries Option 1	Possum Point Option 1	Civil War Option 1	Dale Blvd Option 1				
Design-Year Carbon Monoxide Concentrations (parts/million)														
National Standard 1-hr	6.1 - 6.9	6.2 - 7.4	6.1 - 7.4	6.2 - 7.4	6.2 - 7.4	6.2 - 7.4	6.2 - 7.4	6.2 - 7.4	6.2 - 7.4	6.2 - 7.4	6.2 - 7.4	6.2 - 7.8	6.2 - 7.4	
8-hour	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	
National Standard 8-hr	3.1 - 3.7	3.1 - 4.3	3.1 - 4.3	3.1 - 4.3	3.1 - 4.3	3.1 - 4.3	3.1 - 4.3	3.1 - 4.3	3.1 - 4.3	3.1 - 4.3	3.1 - 4.3	3.1 - 4.5	3.1 - 4.3	
	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	
Section 4(f) Properties														
Number of Properties Used:	0	1	0	1	1	1	1	1	1	1	1	1	1	1
Acres of Land:	0	4.24	0	4.24	4.24	4.24	4.24	4.24	4.24	4.24	4.24	4.24	4.24	4.24
Facilities Displaced:	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Length of Streams Disturbed (feet)	0	5,380	5,925	5,340	5,065	5,315	5,380	5,380	5,380	5,380	5,380	5,380	5,380	5,380
Wetlands Displaced (acres)	0	2.40	2.59	2.39	3.22	2.40	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39
Floodplains Filled (acres)	0	3.46	3.46	3.46	3.46	3.46	3.46	3.46	3.46	3.46	3.46	3.46	3.46	3.46
Cultural Resource Properties Affected	0	3	3	3	3	3	3	3	3	3	3	3	3	3
Forest Land Displaced (acres)	0	59.40	58.99	59.40	58.05	60.78	60.57	60.57	60.57	59.40	59.40	57.54	65.75	
Marine Corps Base Quantico Land Used (acres)	0	10	16	10	10	10	10	10	10	10	10	10	10	10
Farmland Displaced (acres)	0	0	0	0	0	0	0	0	0	0	0	0	0	0

\* NOTE: Impacts may change during final design when more detailed design data are available.

\* Right of way and construction cost estimates are in current dollars and do not reflect any escalation between now and time of construction.

The project would not have disproportionately high and adverse human health or environmental effects on minority and low-income communities under the purview of Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. This conclusion is supported by information in the following paragraphs.

Based on 2000 U.S. Census data, minority group members comprised 34.9% of the county's total population. However, within the Census Block Groups that border Route 1, minority group members comprise 48.0% of the population, exceeding the countywide proportion by 13.1 percentage points. These data suggest that there are minority communities present along the project in a proportion greater than that of the county as a whole. Review of Census Block Group data indicates the locations of these populations: areas east of Route 1 through Dumfries, areas on both sides of Route 1 north of Dumfries, areas east of Route 1 near Dale Boulevard, areas on both sides of Route 1 between Opitz Boulevard and Occoquan Road. A majority of the project's residential displacements would occur in two of these areas, one on the east side of Route 1 just south of Powell Creek (43 displacements, 36 of them in a single apartment building), and one on the west side of Route 1 a short distance north of Opitz Boulevard (10 mobile homes and a single-family dwelling). It is not known how many of these specifically house minority families, although visual observation in the Powells Creek area suggests that at least some of them at that location may.

U.S. Census data from 2000 show that the incomes of 4.4% of the Prince William County population are below the poverty level. Along most of the project corridor, the proportion of population below the poverty level is comparable to the countywide level. However, there are a few locations where the proportion is meaningfully higher, suggesting the presence of low-income populations. In Census Block Groups lying east of Route 1 in Triangle and Dumfries, the proportion of population below the poverty level is 10.9 to 12.5 percentage points greater than the countywide level. These areas contain mobile home parks and multi-family housing. The section of the project in Triangle, between Joplin Road and Main Street at the south end of Dumfries, would displace 18 to 22 families, depending on the alternative. All of these would be apartments or single-family dwellings. The estimated household incomes of the families that would be displaced are well above the poverty level, indicating that no low-income population would be affected.

According to CEQ guidelines, a disproportionately high and adverse effect is one that, (1) would be borne predominantly by a minority or low-income population, or (2) would be suffered by the minority or low-income population at a magnitude that is appreciably more severe or greater than the adverse effect that would be suffered by the non-minority or non-low-income population. Although a majority of the residential displacements would occur in areas that appear to contain minority populations, it is not known at this time whether the residents of the individual displaced units are minorities. However, there is no evidence suggesting that the residential displacement impacts of the project would be borne predominantly by minorities, or that such impacts would be more severe for minority populations than for nonminority populations. Moreover, all displaced families would be relocated in a manner that assures adequate, decent, safe, and sanitary replacement housing for all.

Among the other direct adverse effects discussed in other sections of this Environmental Assessment are effects on air quality, noise levels, and natural resources. None of these effects are considered significant, and none are expected to be borne predominantly or disproportionately by minority or low-income populations. Likewise, minority or low-income

populations are not subject to greater risks or rates of exposure from any known cumulative or multiple environmental hazards in the study area than are non-minority or non-low-income populations.

### 3.2 RELOCATIONS

#### 3.2.1 Residential

It is estimated that the **Location Study Alignment** would displace 73 families occupying 5 single-family homes, 7 condominiums, 51 apartments, and 10 mobile homes. The displacements would be concentrated in three areas: in Triangle (19 single-family homes or apartments), in an area on the east side of Route 1 just south of Powells Creek (36 apartments in The Woods at Potomac Mills apartment complex and 7 condominiums in the Village Gate development), and in an area along Sandra Drive, a section of which would be relocated to line up with Featherstone Road (10 mobile homes and 1 single-family home).

The number of family members is estimated to range from 1 to 4. Approximately 27% of the displacees are owner-occupants with the remainder tenant-occupants. The owner-occupants are estimated to have annual incomes ranging from \$55,000 to \$65,000. It is not evident how many of the displacees may be minorities, elderly, or disabled. Because no individual contacts were made with the displacees, it is not known if any of them would have any special relocation needs, such as provisions for the disabled.

There are several newer residential complexes as well as older subdivisions along Route 1 and connecting roads. These include new construction, older homes, and rental properties. While it appears that there is ample housing on the open real estate market within the general area of this project that will meet the needs of the displacees, it is anticipated that housing of last resort may have to be found to satisfactorily relocate 10 of the 73 families displaced by this alternative. The occupants of the condominiums and apartments may be able to relocate in the same complex.

The **Locust Shade Option 1** alignment would have an identical number of displacements to the **Location Study Alignment**. The **Triangle Option 1** alignment would increase the number of homes displaced by three, relative to the **Location Study Alignment**. The **Triangle Option 2** alignment would not increase the number of residential displacements relative to the **Location Study Alignment**. The **Brady's Hill Option 1** would result in one additional relocation relative to the **Location Study Alignment**. The **Dumfries Option 1** would not result in any increase in residential displacements relative to the **Location Study Alignment**. The **Possum Point Option 1** would result in the relocation of an additional four families relative to the **Location Study Alignment**. The **Civil War Option 1** alignment shift would result in the loss of one additional residential unit relative to the **Location Study Alignment**. The **Dale Boulevard Option 1** interchange would result in no additional residential relocation relative to the **Location Study Alignment**.

#### 3.2.2 Commercial

It is estimated that the **Location Study Alignment** would displace 129 businesses. These include a variety of small stores (e.g., books, carpets), auto service centers, restaurants, convenience stores, personal care shops (e.g., hair, nails, and tattoos), and professional offices. Of the 129 businesses, 17 are owner/operators and the others are tenants. The number of employees may exceed 2,000. Most (93) of the displaced businesses are concentrated along the northernmost 2.4-mile section of Route 1, between Delaware Drive and Occoquan Road, which

also happens to be the most heavily developed section of the route. Another large portion (25) of the displacements would be in Triangle, which also is a densely developed portion of the route, with many businesses very close to the road. The remainder are scattered along Route 1 through Dumfries and north of Dumfries.

The **Locust Shade Option 1** would have an identical number of commercial displacements to the Location Study Alignment. The **Triangle Option 1** alignment through Triangle would result in a reduction of commercial displacements by seven, to 122. The **Triangle Option 2** alignment similarly would reduce the number of commercial displacements to 122, seven less than the Location Study Alignment. The **Brady's Hill Option 1** would result in an increase of two commercial displacements relative to the Location Study Alignment. The **Dumfries Option 1**, **Possum Point Option 1**, **Civil War Option 1**, and the **Dale Boulevard Option 1** would have the same number of commercial displacements as the Location Study Alignment.

### 3.2.3 Non-Profit Organizations

The **Location Study Alignment** would displace one non-profit organization, a tenant-occupied storefront church in Triangle.

The **Locust Shade Park Option 1**, **Triangle Option 1**, **Brady's Hill Option 1**, **Dumfries Option 1**, **Possum Point Option 1**, **Civil War Option 1**, and **Dale Boulevard Option 1** all would be identical to the Location Study Alignment in terms of the displacement of non-profit organizations. The **Triangle Option 2** alignment would displace a second church in Triangle.

### 3.2.4 Relocation Plan

Upon completion of more detailed design for the project, VDOT will develop a detailed relocation plan to ensure that an orderly and satisfactory relocation of all displacees can be accomplished. The acquisition of right of way and the relocation of displacees will be undertaken in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended. Assurance is given that adequate decent, safe, and sanitary housing will be available or will be provided. Each person will be given sufficient time to negotiate for and obtain possession of replacement housing. All housing will be fair housing available to all persons regardless of race, color, religion, sex, or national origin and will be within the financial means of the displacees.

## 3.3 CULTURAL RESOURCES

Pursuant to Section 106 of the National Historic Preservation Act, all historic properties in the project's area of potential effects (APE) have been identified and coordinated with the Virginia Department of Historic Resources (VDHR). Information also was distributed to consulting parties in accordance with 36 CFR 800.2(c)(3) and 800.2(c)(5). The consulting parties include the National Trust for Historic Preservation, Ms. Martha Catlin, and Mr. Ronald Chase.

Two archaeological sites on Marine Corps Base Quantico land were identified and recommended as potentially eligible for the National Register of Historic Places (NRHP). VDHR concurred with the recommendation on October 17, 2001. **Site 44PW1226** contains prehistoric Middle Archaic/Woodland Period stone artifacts. This site is potentially eligible for the NRHP under Criterion D for its potential ability to yield important information on prehistory. Further testing will be conducted to evaluate whether the site retains those elements that would make it eligible for the NRHP. Both the **Location Study Alignment** and the **Locust Shade Park Option 1**

alignment would encroach on the west side of this site, with the Option 1 alignment displacing nearly half of the site. **Site 44PW1227** contains prehistoric stone artifacts of an undetermined time period. This site too is potentially eligible for the NRHP under Criterion D for its potential ability to yield important information on prehistory. Further testing will be conducted to evaluate whether the site retains those elements that would make it eligible for the NRHP. Both the **Location Study Alignment** and the **Locust Shade Park Option 1** alignment would encroach on the west side of this site, with the Option 1 alignment displacing more than  $\frac{3}{4}$  of the site. VDHR concurred on October 24, 2002 that further evaluation of both sites, if needed, could be conducted following identification of a preferred alternative. Because both archaeological sites are important chiefly for the information they may contain, they are not subject to Section 4(f) with respect to its application to archaeological sites.

The Neabsco **Civil War Earthworks** site (**44PW1229**), which includes trenches and a potential gun emplacement, is located on the west site of Route 1. None of the alternatives would affect this site and VDHR concurred on October 24, 2002 that the site is outside the APE.

**Williams Ordinary** (VDHR #212-0001), an 18<sup>th</sup> century Georgian-style building located on a 0.287-acre lot on the west side of Main Street in the town of Dumfries, is listed in the NRHP and the Virginia Landmarks Register. The **Location Study Alignment** would not entail any construction within 300 feet of this property, and it would have limited, if any, visual effect. The project actually should have a beneficial effect on the property because the redirection of traffic from Main Street (currently serving as southbound Route 1) would remove a large volume of traffic (more than 20,000 vehicles per day in 2025) from passing in front of the property. **Possum Point Road Option 1** would entail construction on existing Main Street up to about 20 feet from the property line to complete a reconfiguration of the Possum Point Road/Main Street intersection with Route 1. This option would provide a more perpendicular (approximately 80-degree angle, compared to approximately a 40-degree angle with the Location Study Alignment), and hence safer and more efficient, intersection at this location than would the Location Study Alignment. This alternative, while bringing construction closer to the property, should have little if any permanent visual effect, particularly with the redirection of the large volume of traffic that otherwise would be passing in front of the property. The effects of the project on this property will be coordinated in more detail with VDHR following the public hearing and receipt of additional input from the public and the Town of Dumfries local government.

### 3.4 PARKS AND RECREATION

Under Section 4(f) of the 1966 Department of Transportation Act, land in publicly owned public parks and recreation areas cannot be used for highway right of way unless it can be demonstrated that there is no feasible and prudent alternative. Two parks abut the Route 1 right of way. **Locust Shade Park** is located on the west side of Route 1. The land within this park originally was acquired by Prince William County from the federal government under the Federal Lands to Parks program. In addition, portions of the property were developed for recreational uses with Land and Water Conservation Funds (Section 6(f), Land and Water Conservation Fund Act). The **Location Study Alignment** would encroach upon a portion of this park but would not affect any of the structures or improvements thereon. The **Locust Shade Park Option 1** would avoid use of land in the Park by shifting the alignment eastward such that all the additional right of way requirements would fall on Marine Corps Base Quantico. The Programmatic Section 4(f) Evaluation in Appendix A discusses involvement with the park in greater detail. **Cecil W.**

**Garrison Park** is located in Dumfries on the west side of Route 1 in the floodplain of Quantico Creek. None of the proposed improvements would affect this park. The project would not encroach on the property and would cause no noise, visual, or other proximity effects that could be construed as constructive use of the recreational fields located in the park.

### 3.5 AGRICULTURE AND ECOLOGY

Because of ongoing urbanization along the project corridor, no farmlands are present. Consequently, there would be no adverse effects under the Farmland Protection Policy Act. No prime or unique farmland or agricultural activities would be affected.

The **Location Study Alignment** would displace approximately 59.40 acres of forest. These areas consist mostly of mixed hardwoods. Conversion of these forest areas would not substantially affect long-term forest productivity. All merchantable timber would be disposed of in accordance with VDOT specifications. Because the project is located along an existing road corridor, no additional fragmentation of forested or other wildlife habitats would occur.

Generally, the various options are similar in magnitude of forest displacement to the **Location Study Alignment**, ranging from 57.54 acres to 65.75 acres of displacement. The **Locust Shade Park Option 1** alignment would displace slightly less forest (58.99 versus 59.40 acres) than the **Location Study Alignment**. The **Triangle Option 1** alignment would have forest impacts identical to those of the **Location Study Alignment**. The **Triangle Option 2** alignment would displace approximately 1.35 acres less forest than the **Location Study Alignment**. The **Brady's Hill Option 1** alignment would displace approximately 1.38 acres more forest than the **Location Study Alignment**. The **Dumfries Option 1** would displace approximately 1.17 acres more forest than the **Location Study Alignment**. The **Possum Point Option 1** alignment's forest displacements would be identical to those of the **Location Study Alignment**. The **Civil War Option 1** alignment would have the least forest displacement of the various build options, totaling approximately 57.54 acres, 1.86 acres less than the **Location Study Alignment**. The **Dale Boulevard Option 1** alignment would involve the greatest amount of forest displacement, 65.75 acres, approximately 6.35 acres more than the **Location Study Alignment**.

Occoquan Bay National Wildlife Refuge and Featherstone National Wildlife Refuge are two wildlife refuges east of the project corridor but well outside of any direct effect from the proposed improvements.

No federally listed threatened or endangered species would be affected by the project. A survey conducted for the small whorled pogonia (*Isotria medioloides*) found none. According to state and federal wildlife agencies, there is no potential for occurrences of other federally listed species or their critical habitat.

All stream crossing locations along the project were surveyed for wood turtles (*Clemmys insculpta*), a state-listed threatened species, as requested by the Virginia Division of Natural Heritage. No live or dead turtles, carcasses, carapaces, or plastrons of wood turtle were observed.

In accordance with Executive Order 13112, *Invasive Species*, construction of the proposed improvements will minimize the potential for the establishment of invasive terrestrial or aquatic animal or plant species by following provisions in VDOT's *Road and Bridge Specifications*. These provisions require prompt seeding of disturbed areas with seeds that are tested in

accordance with the Virginia Seed Law and VDOT's standards and specifications to ensure that seed mixes are free of noxious species. While the right of way is vulnerable to the colonization of invasive plant species from adjacent properties, implementation of the stated provisions will reduce the potential for the establishment and proliferation of invasive species.

### 3.6 AIR QUALITY

The proposed project is not expected to be a major source of air pollution. The project comes from both a financially constrained long-range transportation plan and a Transportation Improvement Program found to conform to the State Implementation Plan (SIP). Estimation of carbon monoxide (CO) concentrations under build and no-build conditions revealed no scenarios in which the National Ambient Air Quality Standards for CO would be violated. The temporary air quality effects from construction are not expected to be significant because construction activities will be performed in accordance with VDOT's *Road and Bridge Specifications*, which are approved as conforming to the SIP and require compliance with all applicable local, state, and federal regulations pertaining to air quality. Appendix B contains details about the CO analysis.

### 3.7 NOISE

For noise analysis purposes, all of the build alternatives are essentially identical. A noise analysis prepared for the project showed that:

- 2025 noise levels for the No-build Alternative would be 0 to 3 dBA higher than existing noise levels.
- 2025 noise levels for the build alternatives would be 1 to 8 dBA higher, remain the same, or decrease by up to 8 dBA when compared to existing noise levels.
- 2025 noise levels for the build alternatives would be 0 to 6 dBA higher or 0 to 10 dBA lower than the No-build noise levels.
- Noise receptors in 10 of the 23 Noise Sensitive Areas studied would experience noise levels under the build alternatives in 2025 that approach or exceed FHWA's Noise Abatement Criterion (NAC). At those locations, 4 apartment buildings, 15 townhouses, 38 single-family homes, and 25 mobile homes would be impacted in the design year under the Location Study Alignment Alternative, as compared to the design-year No-build Alternative, under which 2 apartment buildings, 15 townhouses, 37 single-family homes, and a pool and 2 tennis courts at a community center would have noise levels approaching or exceeding the NAC.
- Of the 10 Noise Sensitive areas in which noise levels for the build alternatives in the design year would approach or exceed the NAC, 6 (60%) already experience noise levels approaching or exceeding the NAC and also would experience such noise levels under the No-build Alternative.

Noise barriers appear to be feasible and reasonable at three locations, which are shown on Figure 3-1:

- Barrier J1, approximately 318 feet long and 14 to 16 feet high on the west side of Route 1 south of Allen Dent Road, would protect five ground-level apartments in one apartment building at a cost of \$104,522 (\$20,904 per receptor).

- Barrier J2, approximately 922 feet long and 8-16 feet high, on the west side of Route 1 north of Allen Dent Road, would protect 10 single-family homes at a cost of \$278,982 (\$27,898 per receptor).
- Barrier O, approximately 1,327 feet long and 10 feet high on the east side of Route 1 between Newport Drive and Neabsco Road, would protect 16 single-family homes in The Harbors of Newport subdivision at a cost of \$291,918 (\$18,245 per receptor).

At all other impact locations, barriers are not feasible because they would block access to adjacent properties or would otherwise be unable to provide acceptable noise abatement.

Land uses that would be sensitive to vehicular noise also would be sensitive to construction noise. A method of controlling construction noise is to establish maximum levels of noise that construction operations can generate. VDOT has developed, and FHWA has approved, a special contract provision that establishes construction noise limits. This provision will be included in the contract for this project. Appendix C contains details on the noise analysis.

### 3.8 VISUAL QUALITY AND AESTHETICS

A driver in the existing Route 1 corridor views an urbanizing landscape containing an uncoordinated mix of industrial, commercial, residential, recreational, and forested land covers. The appearance of the existing roadway cross section is inconsistent, and there are few aesthetic amenities or attractive roadside design features. An observer looking at the existing highway sees a four-lane undivided expanse of pavement, uninterrupted with vegetated median spaces, and with few to no aesthetic amenities, such as landscaping or attractively designed road features. In contrast, the proposed project would provide a consistent cross section, landscaping, and other visual amenities to enhance the aesthetics of the corridor, which in turn would make the corridor more attractive and marketable for economic development.

### 3.9 WATER QUALITY

No public water supplies would be affected by the proposed project. Some water supply lines may have to be adjusted to accommodate the proposed construction. Such adjustments are routine for these types of construction projects and no substantial disruptions of service are anticipated.

The project crosses five named streams (Little Creek, Quantico Creek, Powells Creek, Cow Branch, and Marumsco Creek) and several of their small unnamed tributaries, along with several small tributaries of Chopawamsic Creek and Neabsco Creek. All are in the Middle Potomac-Anacostia-Occoquan watershed. Chopawamsic Creek, Quantico Creek, Powells Creek, and Marumsco Creek are all direct tributaries to the Potomac River. Cow Branch is a tributary to Neabsco Creek.

The **Location Study Alignment** would directly affect approximately 5,380 linear feet of stream. Generally, all the build alternatives would affect a similar length of stream corridor, with the impacts ranging from 5,065 to 5,925 linear feet. Crossings of the waterways would be via bridges or culverts similar in structure and design to those currently in place. Consequently, direct effects on these streams are expected to be minor. The majority of the stream effects would be associated with small, unnamed tributary streams paralleling existing Route 1. The streams affected by widening or realignment of Route 1 cannot be entirely avoided, but

realignment/relocations of these streams using principles of natural channel design will minimize adverse effects and the need for compensation.

Temporary siltation may occur during construction. Minor long-term effects on water quality could occur as a result of an incremental increase in pollutant loads in highway runoff from impervious surfaces. Such pollutants include particulates, metals, oil and grease, organics, nutrients, and other harmful substances. However, temporary and permanent stormwater management measures, including vegetative controls, detention basins, and filtration systems would be implemented on this project to minimize potential short-term and long-term effects on water quality. These measures would reduce or detain discharge volumes and remove pollutants. The project design would incorporate erosion and sediment control measures as specified in the VDOT *Road Design Manual*. The requirements and special conditions of any required permits for work in and around surface waters would be incorporated into construction contract documents. The construction contractor will be required to comply with pollution control measures specified in the VDOT *Road and Bridge Specifications*.

### 3.10 WETLANDS

Wetlands along the corridor consist of a combination of palustrine forested (PFO) and palustrine emergent (PEM) wetlands, with a smaller proportion of palustrine scrub-shrub (PSS) wetlands. The PEM and PSS wetlands generally are located in small depressions along the roadside, in areas adjacent to streams, and in the disturbed edges of forested wetlands immediately adjacent to existing Route 1. The areas of PFO wetlands are associated with the floodplains of the larger streams crossed by Route 1 and stream-side depressions associated with smaller tributary streams. Their functions include floodflow attenuation, sediment trapping, wildlife habitat, and nutrient reduction. Most of the forested wetlands in the study area provide habitat for wildlife, particularly in areas that are close to commercial and residential development. The larger forested wetland areas provide important floodflow attenuation functions, while all forested wetlands in the study area provide nutrient reduction. The few PSS wetlands in the study area contribute to the diversity of wildlife habitat in natural and suburban landscapes, stabilize or trap sediments along stream corridors, and reduce nutrients in runoff.

The wetland impacts of all the build alternatives would be similar, with the Location Study Alignment affecting approximately 2.40 acres of wetland, while the various alternative alignments have been estimated to have areas of encroachment ranging from 2.39 to 3.76 acres. Table 3-2 lists the acreages of wetland impacts for the various build alternatives. These wetland encroachments typically involve additional narrow areas of wetlands previously affected by Route 1 or adjacent activities (e.g., utilities, commercial development, etc.). Of the numerous locations where the build alternatives would affect existing roadside wetlands, individual encroachments would be smaller than 0.1 acre at all but a few locations. The most notable wetland encroachments would be associated with the forested wetland floodplains of Quantico and Powells Creeks, Cow Branch, and the Dale Boulevard interchange improvements. The loss of these roadside fragments of larger forested wetlands would not substantially affect wetland or aquatic ecosystems.

### 3.11 FLOODPLAINS

The Federal Emergency Management Agency (FEMA) mapping of floodplains in the corridor show designated 100-year floodplains at Chopawamsic Creek, at the intersection of Route 1 and

Joplin/Fuller Road (headwater of Little Creek, a direct tributary to the Potomac River), Quantico Creek, Powells Creek, Cow Branch, an unnamed tributary to Marumsco Creek, and Marumsco Creek. All of the build alternatives are estimated to have the same areas of floodplain fill, approximately 3.46 acres, with depths of fill from 1 to 20 feet. In each instance, Route 1 already crosses the floodplain, and no significant effects on natural and beneficial floodplain values are expected to result from the proposed improvements. The project would not measurably increase flood levels or the risks of flooding, and would not induce incompatible floodplain development. Therefore, the project is in accordance with Executive Order 11988, *Floodplain Management*.

### 3.12 HAZARDOUS MATERIALS

Sites potentially containing hazardous materials include several gas stations along the corridor. There are no known contaminated soils within the project limits. There are no Superfund or National Priority List hazardous waste sites along the project. According to the Virginia Department of Environmental Quality's database, there are no open cases of leaking underground storage tanks along the corridor. Demolition of residential housing associated with the project may require testing for asbestos-containing material. Also, soil testing and/or groundwater testing for petroleum products may be required if it is determined that underground storage tanks (UST) are or were present within the proposed right of way.

### 3.13 FEDERAL LANDS, MARINE CORPS BASE QUANTICO

The **Location Study Alignment** would require additional right of way from Marine Corps Base Quantico lands along the east side of Route 1 from the beginning of the project to Fuller Road (Route 619). The strip of land would range from approximately 25 to 50 feet wide and would amount to approximately 10 acres. No facilities on the base would be displaced. The replica Iwo Jima monument on the corner of Route 1 and Fuller Road would be relocated slightly farther from the intersection. There are no known national defense activities or training functions that occur on the affected lands. Several military housing areas are nearby, but would not be directly affected.

The **Locust Shade Park Option 1** also would require additional right of way from Marine Corps Base Quantico lands along the east side of Route 1 from the beginning of the project to Fuller Road (Route 619). The strip of land would range from approximately 35 to 95 feet wide and would amount to approximately 16 acres. A masonry storage building on the Quantico land would be displaced. The replica Iwo Jima monument on the corner of Route 1 and Fuller Road would be relocated slightly farther from the intersection. There are no known national defense activities or training functions that occur on the affected lands. Several military housing areas are nearby, but would not be directly affected.

Both alternatives would require additional right of way from land along the west side of Route 1 on which the Marine Corps Heritage Museum is to be located. The 134.6 acres of land, formerly part of Prince William County's Locust Shade Park, were transferred from County ownership to the federal government for use as museum site (deed recorded January 25, 2002). Both alternatives would need a strip of land approximately 25 to 35 feet wide amounting to approximately 2 acres from the site. The proposed project would beneficially affect the museum site by providing a better-quality route to the site and by providing safer and better-controlled ingress and egress than could be provided on the current undivided highway.

### 3.14 INDIRECT AND CUMULATIVE EFFECTS

#### 3.14.1 Indirect Effects

Indirect (or secondary) effects are those that are caused by the proposed action, but occur later in time or farther in distance than the direct effects discussed elsewhere in this document. Indirect effects may include growth-inducing effects and other effects related to induced changes in patterns of land use, population density or growth rate, and related effects on air, water, natural systems, or the human environment. Quantification of these effects is difficult for this project because Route 1 is already a major transportation route in the corridor, so the project will not introduce new access into presently undeveloped lands. However, as one of the purposes of the project is to help promote the revitalization of the economy along Route 1, there obviously is some expectation that the proposed improvements would be one factor in future development decisions of landowners along the corridor. Other factors would include overall economic conditions, availability of other infrastructure such as water and sewer systems, growth policies and plans of local governments, and inclinations of individual landowners. So, the project could contribute to, but not be solely responsible for, increased development along or near the Route 1 corridor. However, such development would be fully compatible with land use planning and goals of the local governments, rather than unintended and undesirable sprawl.

In discussions of this issue during project development, Technical Committee members suggested that the secondary effects of the project probably would be limited to a band approximately 1,000 feet at most on either side of Route 1. Route 1 is one of the major county thoroughfares upon which the County has established a Highway Corridor Overlay District within its zoning code. Among the purposes of such designation are cooperative preparation, with VDOT and the private sector, of landscape plans to improve scenic quality; and establishment of guidelines for corridors in need of redevelopment, recovery, and increased economic activity because they have become less competitive.

Thus it appears that any potential growth-inducing effects of the project are likely to occur within areas along Route 1 that (1) already have experienced disturbances in the past, (2) already contain business development that may be struggling to keep tenants or retain trade due to less than adequate transportation facilities, and (3) already are planned and zoned for development by the County as part of its overall comprehensive planning efforts.

#### 3.14.2 Cumulative Effects

The Council on Environmental Quality defines the cumulative effect of a project as the "impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions." The assessment of cumulative effects requires a review of past human actions in the study area, other current ongoing actions, and other actions that may be reasonably foreseeable in the future. The focus of this assessment is primarily on the effects of these other actions on the same resources that would be affected by the proposed project (e.g., surface waters, wetlands, cultural resources, parks and recreation areas).

***Status of Settlement and Development.*** Humans have inhabited lands now within Prince William County for more than 12,000 years. During the earliest habitation of record, the Paleo-Indian population density was very low and people lived in small, mobile bands as hunter-gatherers who collected wild foods and hunted the animals living in the cool, moist environment of the early postglacial period. By 2500 B.C., the rise in sea level had dramatically altered the Atlantic coast, creating large estuaries and tidal wetlands, which, in turn, vastly increased coastal

resources such as fish and shellfish. With this environmental change came marked adaptation by human populations, with habitations along estuaries and river valleys. Still later (1200-300 B.C.), habitations tended to become more sedentary, with intentional clearing of vegetation to permit rudimentary agriculture.

European contacts with the project area began in 1608. Land patents were issued along the Occoquan River in the 1650s and settlers began moving into the area. The confluence of Quantico Creek and the Potomac River created a good harbor that the plantations of the early 18<sup>th</sup> century used to transport their goods. Tobacco in particular was a valuable commodity upon which the economy of Dumfries thrived, until the harbor filled with silt as a result of the farming activities. As the population increased, the Potomac Path was a convenient Native American trail that settlers soon began attempting to develop into a road, which ultimately became the general corridor for Route 1. A ferry across the Occoquan River was established several hundred feet east of the present-day Route 1, and in the mid 1700s, settlements were established around the ferry landings on both sides of the river (on the south, what later became Woodbridge; on the north, the town of Colchester).

During the Civil War, major battles were fought only in the western part of the county, although considerable military activity, troop movements, and minor skirmishes also occurred in the eastern part. The county's location between the warring sides resulted in the virtual devastation of the county and the postwar effects were substantial. After the end of the Civil War, Prince William County residents returned to a primarily agricultural way of life. The severely depressed local economy relied on dairying, stock and poultry farming, flour milling, and the cultivation of fruit, vegetables, and flowers. Even though the demands for these products increased with the growth of the national capital in the District of Columbia, Prince William County remained a depressed agricultural community. By 1900, the population of Prince William County stood at 11,000, about the same as it was in 1790. During the first several decades of the twentieth century, dairying and lumbering were mainstays of the Prince William County economy. The establishment of the Marine Corps Base at Quantico in 1917 provided some impetus for paving of roads. As Prince William County emerged from the Depression, the increase of government workers employed in the war effort led to an increase in the population of the county, and by 1950, it had reached 21,000. The county continued to participate in the regional suburbanization, and today, with a population nearing 300,000, Prince William County is one the most populous counties in Virginia.

***Cumulative Effects Analysis.*** Several other public or private developments are currently under construction or recently completed in the geographic area surrounding the project. In addition, several other public or private developments known to be in the active planning stages are reasonably expected to occur in the future. **Table 3-3** at the end of this section summarizes the effects of these other activities on resources that also would be affected by Project A.

After centuries of human disturbances, water quality in the streams crossed by the project understandably has been somewhat degraded from pristine conditions, to the extent that the Virginia Department of Environmental Quality has designated certain surface waters within and downstream of the project area as "impaired waters." For example, a 5-mile segment of Powells Creek exhibits impairment due to fecal coliform contamination and the presence of polychlorinated biphenyls (PCBs) and polycyclic aromatic hydrocarbons (PAHs) in fish tissues. Also, an 8.8-mile segment of Neabsco Creek exhibits impairment due to fecal coliform contamination. Neabsco Bay is impaired due to the presence of PCBs in fish tissues. The

sources of these contaminants are unknown at this time, but probably can be attributed in part to ongoing urbanization and suburbanization in upstream areas of Prince William County. These impairments are being offset to some extent by Prince William County's efforts to protect stream corridors under the Chesapeake Bay Preservation Act program and other initiatives to buffer streams from the effects of future development.

For most of its history, Prince William County was dominated by forest, much of which has now been displaced by ongoing development to accommodate a growing population. Substantial portions of the county remain forested, particularly in areas of public ownership (Prince William Forest Park, Locust Shade Park, Marine Corps Base Quantico, Leesylvania State Park, Occoquan Bay National Wildlife Refuge, etc.). The forest also serves as wildlife habitat and the vegetation helps buffer streams from water quality degradation. The losses of vegetative cover to human development have led to losses of wildlife populations and changes to wildlife species composition over time. Species inhabiting most areas along Route 1 now are those adapted to fragmented habitats and proximity to human activities.

Although natural resources in the immediate project area have experienced considerable disturbance over time, County officials now recognize the importance of protecting and restoring them to the extent possible. Much of the land east and west of Project A has been protected from intensive development by public ownership, and most of these public lands remain forested, serving as important large blocks of wildlife habitat. The County's Comprehensive Plan includes action strategies to maintain and enhance the quality of the natural environment, even while accommodating expected future development.

The proposed project would displace roughly 58 to 66 acres of forest. Some of the wildlife habitat functions of the forest would be replaced by the landscaping that is proposed as part of the project. In addition, the protective measures to be incorporated into the proposed Route 1 improvements (such as stormwater management, erosion and sediment controls, rapid stabilization of disturbed areas, etc.) will help minimize the incremental degradation of resources that might arise from the project.

The project comes from a conforming constrained long-range transportation plan and TIP and, as such, the project's effect on regional ozone concentrations has been cumulatively considered as part of the regional air quality conformity process, along with all other proposed regionally significant highway and mass transit improvements. The results of that analysis demonstrated that, when taken cumulatively, the transportation projects in the region would not exceed the emissions budget for ozone that has been established by the Virginia Department of Environmental Quality.

As indicated in Table 3-3, none of the other reasonably foreseeable projects would cumulatively affect the cultural resources along Project A. There are other cultural resources along those other projects, including archaeological sites of various types and, most notably, Woodlawn Plantation, a National Historic Landmark. However, there are no consistent themes linking the various historic properties, by either time or historic association. Further, only two architectural properties, Pohick Church (at the Telegraph Road intersection) and Woodlawn Plantation (straddling Route 1, Project C), would definitely be physically encroached upon. In both cases, extensive coordination was undertaken with the property owners and with VDHR to minimize and mitigate the effects. None of the other known or foreseeable actions in the project corridor would use any of the publicly owned public park or recreation lands in the vicinity.

Notwithstanding the dramatic changes in the landscape that have occurred over time due to human settlement in Prince William County, the intensity of the incremental impacts of the project on natural resources, when viewed in the context of other past, present, and reasonably foreseeable future impacts from other sources, would be relatively small and are not expected to rise to a level that would cause significant cumulative impacts.

**TABLE 3-3  
SUMMARY OF CUMULATIVE EFFECTS**

Project	Impact on Resources Along Project A Corridor
<b>VDOT Transportation Projects</b>	
Previous roadway projects.	Previous construction of existing Route 1 and adjoining roadways have displaced unknown quantities of streambed and wetlands and contributed to vegetation removal and habitat fragmentation.
Route 1 Improvements, Project B - widen the existing four-lane Route 1 to six lanes from the Route 123 interchange to Armistead Road.	None, all impacts would be well beyond the area affected by Project A.
Route 123 interchange - construct a grade-separated interchange to replace the at-grade signalized intersection of Route 123 and Route 1.	Runoff from this project would flow to Occoquan River. Environmental Assessment for this project identified no significant impacts (no effects on historic resources, no uses of Section 4(f) properties, only minor wetland impacts, no adverse air quality impacts).
Route 1 widening - widen existing four-lane Route 1 to seven lanes from Armistead Road to Telegraph Road.	None, all impacts would be well beyond the area affected by Project A.
Route 1 Improvements, Project C - widen the existing four-lane and six-lane Route 1 to six lanes and eight lanes from Telegraph Road to the Route 1/Capital Beltway interchange.	None, all impacts would be well beyond the area affected by Project A.
<b>Federal Projects</b>	
Marine Corps Base Quantico, possible land-disturbing activities for future facilities construction. No specific projects identified at this time in vicinity of the Route 1 Improvements.	Runoff from portions of Marine Corps Base drains to Chopawamsic Creek.
Marine Corps Heritage Center, to be located on west side of Route 1 south of Joplin Road	Approximately 135 acres of land formerly part of Locust Shade Park transferred to the U.S. Navy for use as the Heritage Center. Approximately 100 acres of forest cover would be replaced by buildings, roads, parking lots, exhibit areas, and landscaping. No cultural resources affected.
<b>County Projects</b>	
Sewerage facilities	Ensure that new developments within development areas are connected to public sewer. Require existing structures with failing septic systems to connect to public sewerage.
County office and services buildings	The Prince William County Government Office Annex at Route 1 and Cardinal Drive and associated parking lots take up about 34 acres of land adjacent to Route 1.
<b>Private Projects</b>	
Previous private developments.	Previous developments of homes and businesses in areas surrounding Route 1 have contributed to removal of vegetated land cover, increased runoff into Quantico Creek, Powells Creek, Cow Branch, and Marumsco Creek upstream and downstream of Project A, and contributed to habitat fragmentation.

**TABLE 3-3  
SUMMARY OF CUMULATIVE EFFECTS**

Project	Impact on Resources Along Project A Corridor
Recent 326-acre mixed-use town-center-style Belmont Bay development east of Woodbridge. Housing, marina, golf course, offices, retail shops, hotel and convention center, and science museum.	Runoff from developments into Occoquan River, beyond limits of Project A.
Future private development permitted by the current zoning and the Prince William Comprehensive Plan.	Future developments of homes and businesses in areas surrounding Route 1 would contribute to further removal of vegetated land cover, increased runoff into Quantico Creek, Powells Creek, Cow Branch, and Marumco Creek upstream and downstream of Project A, and contribute to further habitat fragmentation.
Possible future development on Cherry Hill Peninsula east of Route 1 between Quantico Creek and Powells Creek.	There have been several proposals for development of this large area (nearly 2,300 acres) of mostly undeveloped land, which could entail construction of more than 4,000 homes and associated commercial and service facilities. However, economic and environmental conditions (such as unstable soils and hilly landscape) have forestalled the development to date. Prince William County's Comprehensive Plan includes a "Cherry Hill Sector Plan" outlining restrictions, protective measures, development guidelines, and action strategies in response to the environmental concerns. Besides the direct displacements of forested habitat, runoff would flow to Quantico Creek and Powells Creek.
Dominion Virginia Power, power plant & transmission lines.	A large power plant on Possum Point at the confluence of Quantico Creek and the Potomac Creek. Formerly coal-fired units have been converted to gas-fired units, and oil-fired units have been taken out of service, resulting in reductions in pollutant emissions (particulates, nitrogen oxides, and sulfur dioxide) to the atmosphere. The transmission lines from the plant fan out over the Cherry Hill Peninsula in three directions.
Possible future development on Neabsco Peninsula east of Route 1 between Powells Creek and Neabsco Creek.	Developers recently proposed construction of 930 homes on 410 acres of land in this area
Sources: 2002 VDOT Six-Year Program, Prince William County and Fairfax County Comprehensive Plans, Finding of No Significant Impact dated 1/4/00 for Route 123 Interchange Project, Finding of No Significant Impact dated 4/20/99 for Route 1 widening from Armistead Road to north of Telegraph Road, visual observation.	

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**SECTION 4  
COORDINATION**

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**4.1 AGENCY COORDINATION**

Agency coordination began early in project development with the State Environmental Review Process and continued throughout preparation of the Environmental Assessment via contact letters and presentations at an Interagency Coordination Meeting. Agencies consulted included:

- Prince William County Executive
- Prince William County Planning Director
- Prince William County Transportation Division
- Prince William County Health Department
- Prince William County Park Authority
- Prince William County Local Emergency Planning Coordinator
- Prince William County Office of Housing and Community Development
- Prince William County Superintendent of Schools
- Virginia Department of Agriculture and Consumer Services
- Virginia Department of Conservation and Recreation
  - Natural Heritage Division
  - Soil and Water Conservation Division
  - Parks and Recreation Division
- Virginia Department of Environmental Quality
  - Air Division
  - Waste Division
  - Water Division
- Virginia Department of Forestry
- Virginia Department of Game and Inland Fisheries
- Virginia Department of Health
- Virginia Department of Historic Resources
- Virginia Department of Mines, Minerals, and Energy
- Virginia Marine Resources Commission
- Virginia Museum of Natural History
- Virginia Outdoors Foundation
- U.S. Coast Guard
- U.S. Army Corps of Engineers
- U.S. Environmental Protection Agency
- U.S. Fish and Wildlife Service
- National Marine Fisheries Service
- Marine Corps Base Quantico

**4.2 TECHNICAL AND STEERING COMMITTEES**

Throughout project development, regular meetings have been held with a Technical Committee and a Steering Committee, whose functions were to provide guidance and direction on environmental and other constraints, design features to be provided, and other technical and policy considerations. The Technical Committee is comprised of citizen representatives and staff from regional and local planning agencies, VDOT, and FHWA. The Steering Committee is comprised of a Fort Belvoir representative and elected representatives from the Virginia General Assembly and the Prince William and Fairfax County Boards of Supervisors.

**4.3 PUBLIC INVOLVEMENT**

Citizen information meetings were held in June 1996, October 1996, and June 1997. Maps, displays, and other information were available for review at the meetings. VDOT and consultant personnel were available to discuss issues and concerns of citizens, and to receive suggestions on design concepts. Citizens will have another opportunity to review the project at the Location Public Hearing to be held prior to a decision being made on the proposed improvements.

**APPENDIX A**  
**PROGRAMMATIC SECTION 4(f) EVALUATION**

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**Route 1 Improvements**  
**Project A**

Prince William County

State Project: 0001-96A-103, PE100

Federal Project: STP-96A-9 (008)

From: Stafford County Line

To: Route 123 (Gordon Boulevard) Interchange

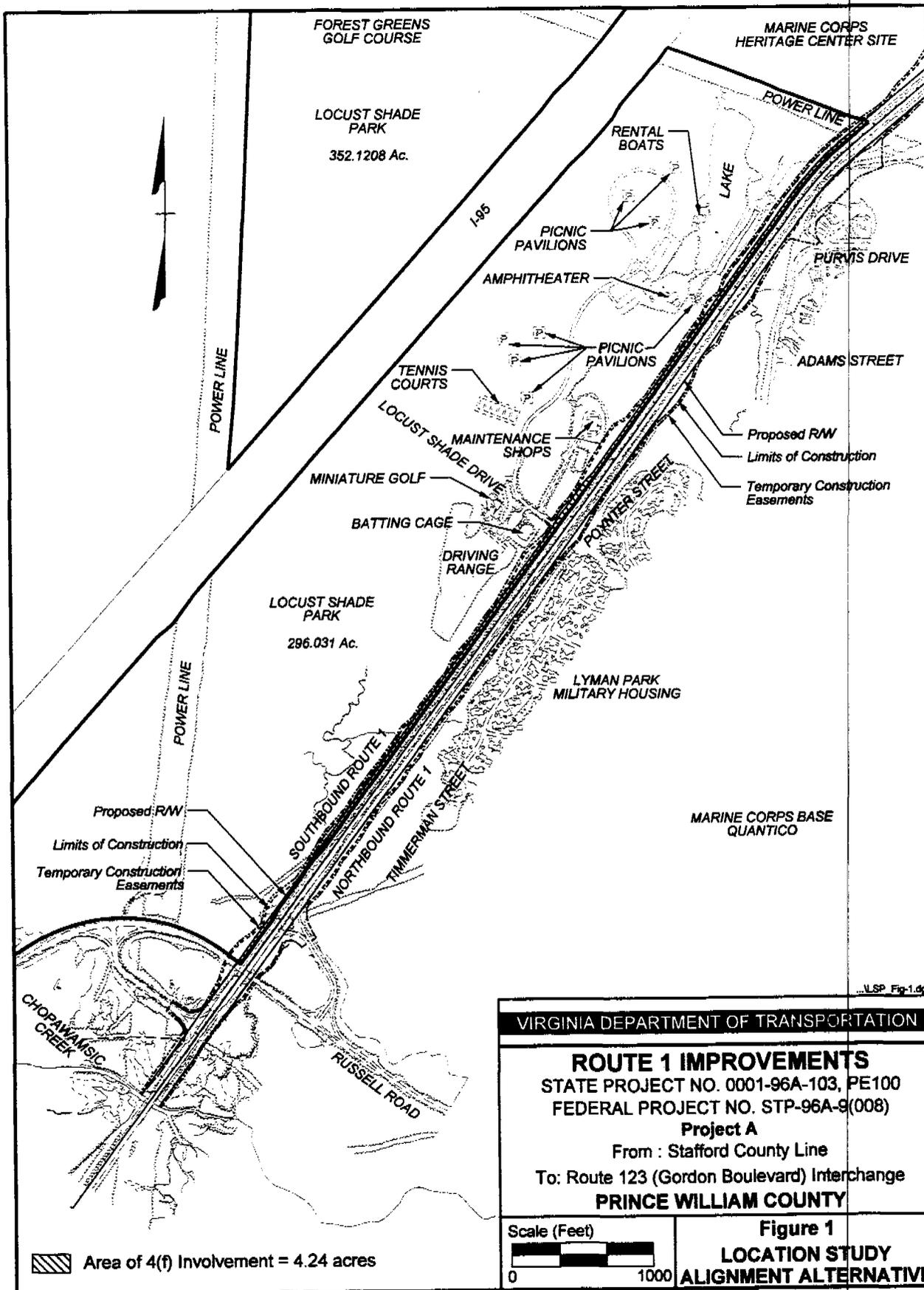
**PROGRAMMATIC SECTION 4(f) EVALUATION  
LOCUST SHADE PARK  
PRINCE WILLIAM COUNTY**

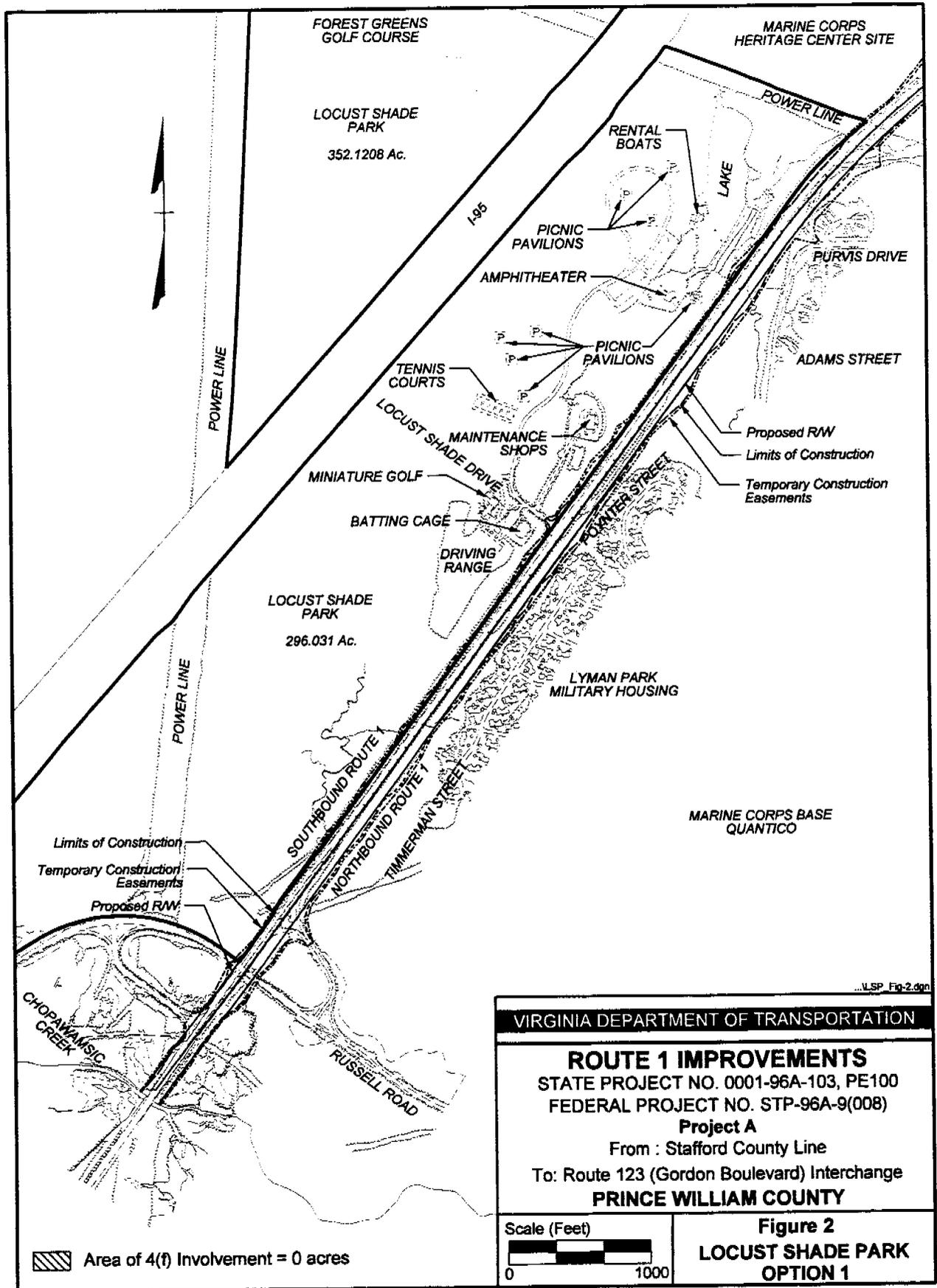
**I. PROPOSED ACTION**

- a. Description of Action:** Widen existing four-lane Route 1 to six lanes. See discussion in Section 1 of the Environmental Assessment (EA).
- b. Purpose and Need:** Add additional highway capacity to accommodate future travel demand. See discussion in Section 1 of the EA.
- c. Applicability of Section 4(f):** Section 4(f) of the U.S. Department of Transportation Act of 1966 (49 USC 303) requires that no publicly owned land from a public park or public recreation area be used for federal-aid highways unless there is no feasible and prudent alternative. Specific alternatives to avoid such lands must be considered, and measures to minimize harm must be included in the project. The Federal Highway Administration (FHWA) has developed a Programmatic Section 4(f) Evaluation for minor involvements with public parks, provided certain criteria are met. The project alternative that would require the use of park land would use only a narrow strip along the existing road amounting to only 0.7% of the total park area, and would not displace any recreational facilities or impair the use of the remaining 4(f) land for recreational purposes. Should all the criteria for the Programmatic Section 4(f) Evaluation be met, and should it be determined that avoidance of the 4(f) property is not feasible and prudent, a formal determination of applicability will be executed by FHWA.

**II. SECTION 4(f) PROPERTY**

- a. Description of Locust Shade Park:** Locust Shade Park is a large publicly owned public park located at 4701 Locust Shade Drive, Triangle, Virginia. It is comprised of two parcels separated by I-95. Its recreational facilities include the 18-hole Forest Greens Golf Course on the west side of I-95, and on the east side of I-95, a batting cage, driving range, miniature golf course, 6 tennis courts, 3 playgrounds, 8 covered picnic pavilions, picnic tables without shelter, sand volleyball court, ball field, fishing lake with paddle boats, an amphitheater used for a variety of music and entertainment programs, an open playing field, and roughly 7 miles of trails.
- b. Features and Functions:**
- 1) **Figures 1 and 2** show the relationship of the project alternatives to Locust Shade Park.
  - 2) Locust Shade Park encompasses approximately 648.1518 acres (352.1208 acres west of I-95, and 296.031 acres east of I-95).
  - 3) Locust Shade Park is owned and managed by the Prince William County Park Authority.
  - 4) The following activities take place on the 4(f) property: golf, miniature golf, batting practice, golf swing practice, tennis, use of playground equipment, outdoor cooking and serving of food, social gathering, sand volleyball, fishing, paddle boating, live entertainment, ball playing, and various trail activities, such as walking and biking.
  - 5) The Forest Greens Golf Course portion of the park west of I-95 is accessed from Joplin Road (Route 619). Locust Shade Drive from Route 1 accesses the portion of the park east of I-95.





6) Several other similarly used large parks are in the vicinity of the project, but would not be affected by the project. Less than a mile west of the project, Prince William Forest Park is a National Park owned and administered by the National Park Service and containing 17,000+ acres. Available activities include hiking, biking, camping, fishing, cross-country skiing, and nature walks on 37 miles of trails. Leesylvania State Park is a 508-acre park, 2 miles east of the project on a peninsula bordered by the Potomac River, Neabsco Creek, and Powells Creek. Owned and administered by the Virginia Department of Conservation and Recreation, the park's available activities include hiking, biking, boating, fishing, camping, picnicking, and nature walks on 6 miles of trails. Less than a mile from the north end of the project, the 654-acre Occoquan Bay National Wildlife Refuge is owned and administered by the U.S. Fish and Wildlife Service. A former military installation and only recently opened to the public, the Refuge's available activities will include trails and environmental education. Several other smaller County-owned parks are within a mile of the project, but do not abut Route 1 and would not be affected by the project.

7) The deeds for the property contain clauses affecting ownership. The land encompassed by the park originally was owned by the United States of America (for the Marine Corps) and was designated as federal surplus land. As such, the park was acquired by Prince William County from the United States of America via the Bureau of Outdoor Recreation through the Federal Land to Parks program. With that land transfer, the United States government reserved the right to reclaim part or all of the land if determined necessary for the national defense. The property was conveyed exclusively for public park and/or public recreation purposes, and, if not used for such purposes, would revert to the United States government at its option.

8) The park has unusual characteristics. The land within Locust Shade Park was acquired by Prince William County under the Federal Land to Parks program by deed from the U.S. Bureau of Outdoor Recreation (DB 820 P 453, December 9, 1975), as authorized under the Federal Property and Administrative Services Act of 1949. The land then was transferred to the Prince William County Park Authority by deed dated February 14, 1979. A portion (134.6282 acres) of that land between the powerline and Joplin Road now has been re-transferred back to the United States government for use as the site of the Marine Corps Heritage Museum (Quitclaim Deed dated September 9, 2001, and recorded January 25, 2002, from Prince William County Park Authority to the United States of America, acting by and through the Department of the Navy, Atlantic Division, Naval Facilities Engineering Command). Originally containing a total of 782.78 acres, the transfer to the Navy reduced the total acreage of Locust Shade Park to 648.1518 acres (352.1208 acres west of I-95, and 296.031 acres east of I-95). The transfer was authorized by Prince William County Park Authority Board resolution on July 22, 2001 for the intent and expressed purpose set forth under authority of special legislation, the Floyd D. Spence National Defense Authorization Act for Fiscal Year 2001, P.L. 106-398, Section 2884 (Oct. 30, 2000). The transfer also was coordinated by the County with the National Park Service, the successor organization to the Bureau of Outdoor Recreation. This transferred portion of the property no longer is part of Locust Shade Park, and thus is no longer subject to Section 4(f).

After receiving the property from the federal government, Prince William County subsequently developed recreational facilities with assistance from the Land and Water Conservation Fund (Project No. 51-00135). Facilities developed with these funds included a boat ramp and boat house, 8 picnic shelters, a playground, restrooms, parking lots, and 6 tennis courts. Under Section 6(f)(3) of the Land and Water Conservation Fund Act, "No property acquired or

developed with assistance under this section shall, without the approval of the Secretary [of Interior], be converted to other than public outdoor recreation uses. The Secretary shall approve such conversion only if he finds it to be in accord with the then existing Statewide Comprehensive Outdoor Recreation Plan and only upon such conditions as he deems necessary to assure the substitution of other recreation properties of at least equal fair market value and of reasonable equivalent usefulness and location.” Thus, for projects that use so-called “Section 6(f)” lands, replacement recreational property must be provided, in addition to meeting the requirements of Section 4(f).

**III. IMPACTS ON SECTION 4(f) PROPERTY**

a. **Use:** Table 1 shows the amount of Locust Shade Park land that would be used for the project.

**TABLE 1  
USE OF SECTION 4(f) LANDS**

Property	Alternatives		
	No-build	Locust Shade Park Option 1 (Avoidance)	Location Study Alignment
Locust Shade Park	0	0	4.24 acres

b. **Other Impacts:** Other adverse effects to Locust Shade Park under either build alternative would be minimal. Noise levels are projected to be 3 to 5 dBA higher for either of the design-year build alternatives compared to existing conditions at park facilities nearest the road (160 to 320 feet from the centerline of Route 1), and 1 to 2 dBA higher for either of the design-year build alternatives compared to the design-year No-build Alternative at park facilities nearest the road. Though portions of the park land are close enough to the road to experience noise levels exceeding FHWA’s Noise Abatement Criterion of 67 dBA, no existing or planned park facilities are close enough to experience a noise impact. The amphitheater, for which the applicable Noise Abatement Criterion is 57 dBA, also would not be impacted. Carbon monoxide concentrations would be essentially identical under any alternative and also would be well below the National Ambient Air Quality Standards. Aesthetically, the proposed improvements should be beneficial due to the addition of landscaping and a more consistent roadway cross section. Access to the park and safety should be improved owing to the addition of a bike trail and sidewalk along Route 1 where currently there is neither, the addition of turn lanes where there currently are none, and improvement of sight distance by raising the grade of Route 1 at the Locust Shade Drive intersection. Temporary construction easements beyond the permanent right of way limits would be necessary under either build alternative. However, these easements would not disturb any existing or planned recreational facilities and would not impair any recreational functions of the property.

**IV. ALTERNATIVES**

a. **Alternatives that use 4(f) property:** The Location Study Alignment establishes the centerline of the proposed widening mostly along the centerline of existing Route 1, essentially widening equally to both sides of the existing road. This alternative would use approximately 4.24 acres of Locust Shade Park as permanent highway right of way. This alternative also would require additional right of way from Marine Corps Base Quantico lands along the east side of Route 1 from the beginning of the project to Fuller Road (Route 619). The strip of land would

range from approximately 25 to 50 feet wide and would amount to approximately 10 acres. No facilities on the base would be displaced. The replica Iwo Jima monument on the corner of Route 1 and Fuller Road would be relocated slightly farther from the intersection. There are no known national defense activities or training functions that occur on the affected lands. Several military housing areas are nearby, but would not be directly affected.

**b. Locust Shade Park Avoidance Alternatives:**

1) The No-build Alternative would avoid any use of park land, but also would not meet the project purpose and need as described in Section 1 of the EA.

2) Locust Shade Park Option 1 entails shifting the centerline of the road to the east for a distance of approximately 10,000 feet (Stations 110+00 to 210+00). Temporary construction easements within the park still would be needed to construct the project. However, no permanent use of park land for project right of way would be needed and no facilities or functions of the park would be affected. This alternative would require acquisition of a strip of federal land from Marine Corps Base Quantico in the form of permanent acquisition or easement ranging from approximately 35 to 95 feet wide and amounting to approximately 16 acres. There currently are no known national defense activities or training functions that occur on the affected lands. The existing forest, however, does provide a buffer between Route 1 and the military housing in Lyman Park and Thomason Park. Carbon monoxide concentrations and noise levels at homes within these housing areas that are closest to the road would be substantially the same under either this alternative or the Location Study Alignment Alternative. A masonry storage building on the Quantico land would be displaced. The replica Iwo Jima monument on the corner of Route 1 and Fuller Road would be relocated slightly farther from the intersection.

Two archaeological sites on Quantico land were identified and recommended as potentially eligible for the National Register of Historic Places (NRHP). VDHR concurred with the recommendation on October 17, 2001. Site 44PW1226 contains prehistoric Middle Archaic/Woodland Period stone artifacts. This site is potentially eligible for the NRHP under Criterion D for its potential ability to yield important information on prehistory. Further testing will be conducted to evaluate whether the site retains those elements that would make it eligible for the NRHP. Both the Location Study Alignment and the Locust Shade Park Option 1 alignment would involve an encroachment on the west side of this site, with the Option 1 alignment displacing nearly half of the site. Site 44PW1227 contains prehistoric stone artifacts of an undetermined period. This site too is potentially eligible for the NRHP under Criterion D for its potential ability to yield important information on prehistory. Further testing will be conducted to evaluate whether the site retains those elements that would make it eligible for the NRHP. Both the Location Study Alignment and the Locust Shade Park Option 1 alignment would involve an encroachment on the west side of this site, with the Option 1 alignment displacing more than  $\frac{3}{4}$  of the site. VDHR concurred on October 24, 2002 that further evaluation of both sites, if needed, could be conducted following identification of a preferred alternative. Because both archaeological sites are important chiefly for the information they may contain, they are not subject to Section 4(f) with respect to its application to archaeological sites.

At this time, there are no apparent unusual factors or extraordinary environmental impacts that would make selection of this avoidance alternative not feasible and prudent. However, a final determination will be made only after additional public input is received through the Location Public Hearing process.

3) Constructing a new roadway on new location could avoid Locust Shade Park, but is not a feasible alternative in this instance. The purpose of the project is to solve existing problems on an existing roadway, and an alternate roadway built somewhere else would not solve those problems. Further, any such alternate roadway would have substantial adverse social, economic, and environmental impacts, such as the severing of Marine Corps Base Quantico land important to military training and the national defense, displacements of more families and businesses, serious disruption of established travel patterns, greater damage to sensitive wetlands and other natural resources, or greater impacts to other Section 4(f) lands. Finally, any such new-location alternative would increase costs and engineering difficulties dramatically. Such problems, impacts, costs, and difficulties would be truly unusual or unique, and of extraordinary magnitude when compared with the use of Section 4(f) lands by the Location Study Alignment Alternative.

## V. MEASURES TO MINIMIZE HARM

Measures to minimize harm include the following:

- a. Minimize encroachment:** The amount of encroachment onto the park would be the minimum necessary to accommodate the proposed road widening, consistent with sound engineering principles and safety. Reducing the encroachment further by reducing the median width is not feasible due to the need to provide turn lanes on Route 1 at the entrance to the park. Similarly, eliminating the proposed trail alongside the road is not feasible because it is an integral element for meeting the project purpose and need (providing for continuous bicycle and pedestrian travel in the corridor) and for accommodating non-motorized access to the recreational opportunities in the park. It may be feasible to reduce the width of the landscaping area by about 5 feet, particularly since nearly all the park land abutting Route 1 already is woodland and may not necessarily need landscaping. Should the Location Study Alignment Alternative be selected, this landscape reduction option will be investigated further.
- b. Maintenance of traffic:** Traffic flow would be maintained during construction so that access to the park and its recreational facilities would not be interrupted.
- c. Turn lanes and park entrance:** The project would provide turn lanes and park entrance features to enhance safety and the ease of park ingress and egress.
- d. Erosion and sediment control:** Temporary and permanent erosion and sediment controls would be installed during construction to minimize any detrimental effects of project-generated sediment on park lands.
- e. Provide replacement lands:** Any park lands permanently used by the project would be replaced in kind with lands having reasonably equivalent usefulness and functions for public recreation, as required for Section 6(f) park land conversions. At this time, such replacement lands have not been identified. Should the Location Study Alignment Alternative be selected, investigations will be undertaken, in cooperation with Prince William County park officials, to identify and evaluate potentially suitable lands.
- f. Additional coordination:** Additional coordination with County and National Park Service representatives would be undertaken to ensure consistency with the requirements of Section 6(f) and with the views of officials with jurisdiction over the park property, and also to develop detailed mitigation measures, particularly with regard to replacement lands.

**VI. COORDINATION**

- DOI: Letter dated September 21, 1999, from National Park Service's Federal Lands to Parks Program Manager, to Prince William County Park Authority, regarding conversion of park land to Marine Corps Heritage Center site.
- Official with jurisdiction: The official with jurisdiction of Locust Shade Park is the Director of the Prince William County Park Authority. The Park Authority was consulted in determining the project's effects on the park. The following is a synopsis of the consultation for the project.
  - 5/9/02 Phone conversation with park planner to obtain information about the park and its facilities.
  - 5/14/02 Phone conversation with park director to obtain information about exact size of park, land transfer of a portion of the park to the Navy, original funding information, reversionary clauses, and potential effects.
  - 5/15/02 Phone conversation with County Attorney's Office to obtain information regarding the acquisition and transfer of park property.
  - 5/15/02 Letter to County Attorney's Office, requesting information about any Land and Water Conservation Act funds spent in the park and mitigation suggestions.
  - 5/24/02 Phone conversation with park director. None of the trails connect to the periphery of Locust Shade Park.
  - 6/18/02 Phone conversation with park director regarding use of Land and Water Conservation Act funds.
  - 6/20/02 Phone conversation and e-mail with park planner regarding information about facilities acquired with Virginia Outdoors Fund money and master plan information.
  - 7/2/02 Letter from Michelle R. Robl, Assistant County Attorney, providing information on the transfer of portion of the park to the Navy for use as Marine Corps Heritage Center site.
- Other affected entities: meeting with Marine Corps Base Quantico representatives on May 21, 2001. Topics of discussion included the proposed typical cross section of the Route 1 improvements, the Marine Corps' proposed Heritage Center, and potential effects on the Lyman Park housing area. Quantico is amenable to the relocation of the Iwo Jima monument, perhaps onto the Heritage Center site. Quantico would be interested in finding ways to minimize the cross section of the roadway by, for example, eliminating sidewalk and landscaping on the east side of the road, which would not be needed for this wooded land with no pedestrian-accessed activities.

# APPENDIX B

## AIR QUALITY ANALYSIS

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### Route 1 Improvements Project A

Prince William County  
State Project: 0001-96A-103, PE100  
Federal Project: STP-96A-9 (008)  
From: Stafford County Line  
To: Route 123 (Gordon Boulevard) Interchange

January 10, 2003

Prepared by:  
Stuart Tyler  
Parsons Transportation Group Inc. of Virginia  
for:  
Virginia Department of Transportation  
Environmental Division

## AIR QUALITY ANALYSIS

The proposed project is located along U.S. Route 1, an urban arterial highway, in Prince William County as shown on **Figure 1**. The project generally would widen the existing four-lane undivided highway to a six-lane divided highway. Opposing lanes would be separated by a raised median approximately 16 feet wide, except at intersections where turn lanes would occupy part of the median area.

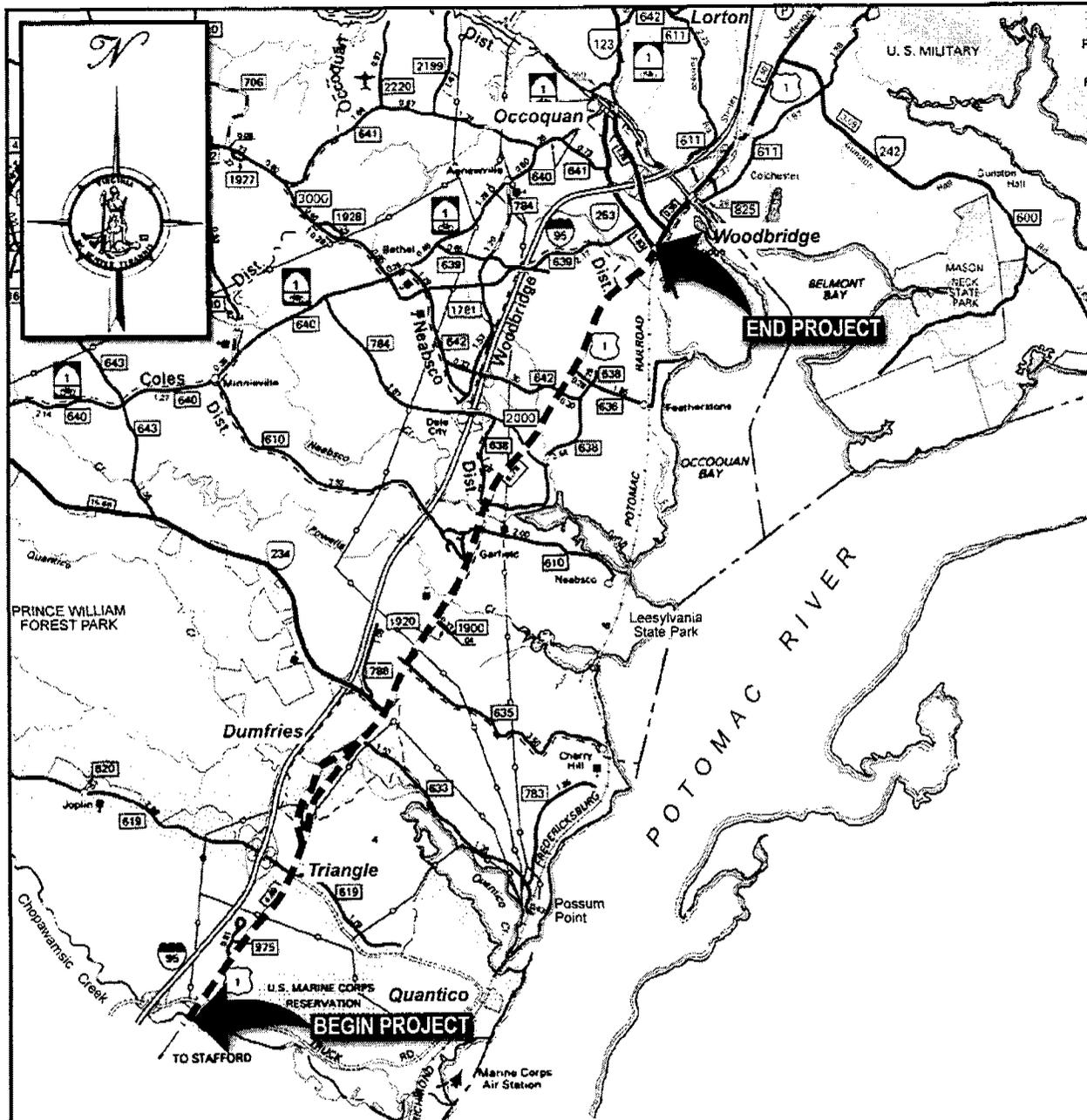
The proposed project is not expected to be a major source of air pollution. Therefore, a detailed technical air quality analysis is not deemed necessary. To illustrate the potential effect of the project on air quality, an analysis of carbon monoxide (CO) concentrations was conducted. CO is the predominant pollutant emitted from gasoline-powered motor vehicles, and its concentrations attributable to highway sources can be accurately estimated with computerized dispersion models. VACALN5A, a simplified microcomputer procedure, was used to estimate CO concentrations at selected sites along the project corridor for existing conditions and for future build and no-build conditions. The following discussion provides details on the analysis and its results. Other air pollutants, such as ozone and nitrogen oxides, are reviewed and evaluated on a regional scale through the State Implementation Plan (SIP) and conformity processes and are not analyzed in this report.

VACALN5A calculates CO concentrations using traffic volumes and speeds and pre-computed emission factors derived from EPA's MOBILE5.0a program. Traffic data for existing conditions (2000), an interim year (2010), and the design year (2025) were developed based on counts of traffic at selected locations and projections for future years. Worst-case assumptions and inputs were used in the analysis, including peak-hour volumes and speeds for one-hour CO concentrations (generally, the highest volume and lowest speed conditions yield the highest CO concentrations), and the average hourly volume and speed for the eight highest-volume hours of the day for eight-hour concentrations. An ambient temperature of 30 degrees Fahrenheit was assumed, along with a wind speed of 1 meter/second, an atmospheric stability rating of "D," and wind directions nearly parallel to the roadway. Background concentrations were assumed to be 6 parts per million (ppm) and 3 ppm for the one-hour and eight-hour concentrations, respectively.

Several sites close to the roadway were selected for the analysis. They are located as shown in **Figure 2** and listed in **Table 1**. Site selection was based on review of the project plans to identify locations along the corridor close to the roadway where the highest CO concentrations might be expected to occur, and where outdoor human activities are likely to occur on a regular basis. Land use along the corridor consists of a mixture of developed and undeveloped lands, with development consisting of a variety of military, commercial, residential, and recreational uses. The selected sites represent a variety of different land uses along the corridor and also represent the worst CO impacts from the proposed project.

The resulting peak one-hour and average eight-hour CO concentrations are shown in **Table 2**. In all cases, the estimated concentrations remain well below the National Ambient Air Quality Standards (NAAQS) of 35 ppm for the one-hour concentrations and 9 ppm for the eight-hour concentrations. Attachment A shows the VACALN5A data inputs and calculated CO outputs.

The project is located in an area that is designated nonattainment for ozone. The project is included in the conformity analysis for The National Capital Region Transportation Planning Board's *2002 Update to the Financially Constrained Long-Range Transportation Plan for the National Capital Region* (CLRP), and the *FY 2003-2008 Transportation Improvement Program* (TIP), which were found to conform with the SIP on October 30, 2002.



RT1A007

**VIRGINIA DEPARTMENT OF TRANSPORTATION**

**ROUTE 1 IMPROVEMENTS**

STATE PROJECT NO. 0001-96A-103, PE100

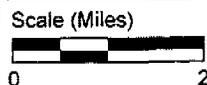
FEDERAL PROJECT NO. STP-96A-9 (008)

Project A

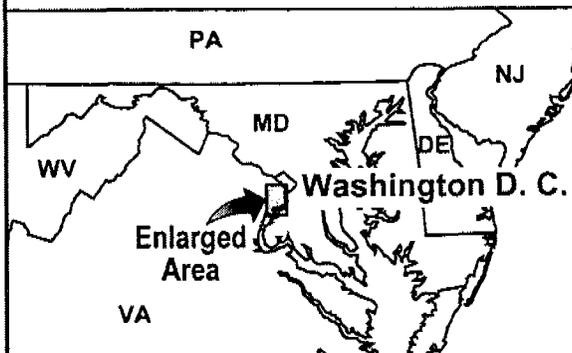
From : Stafford County Line

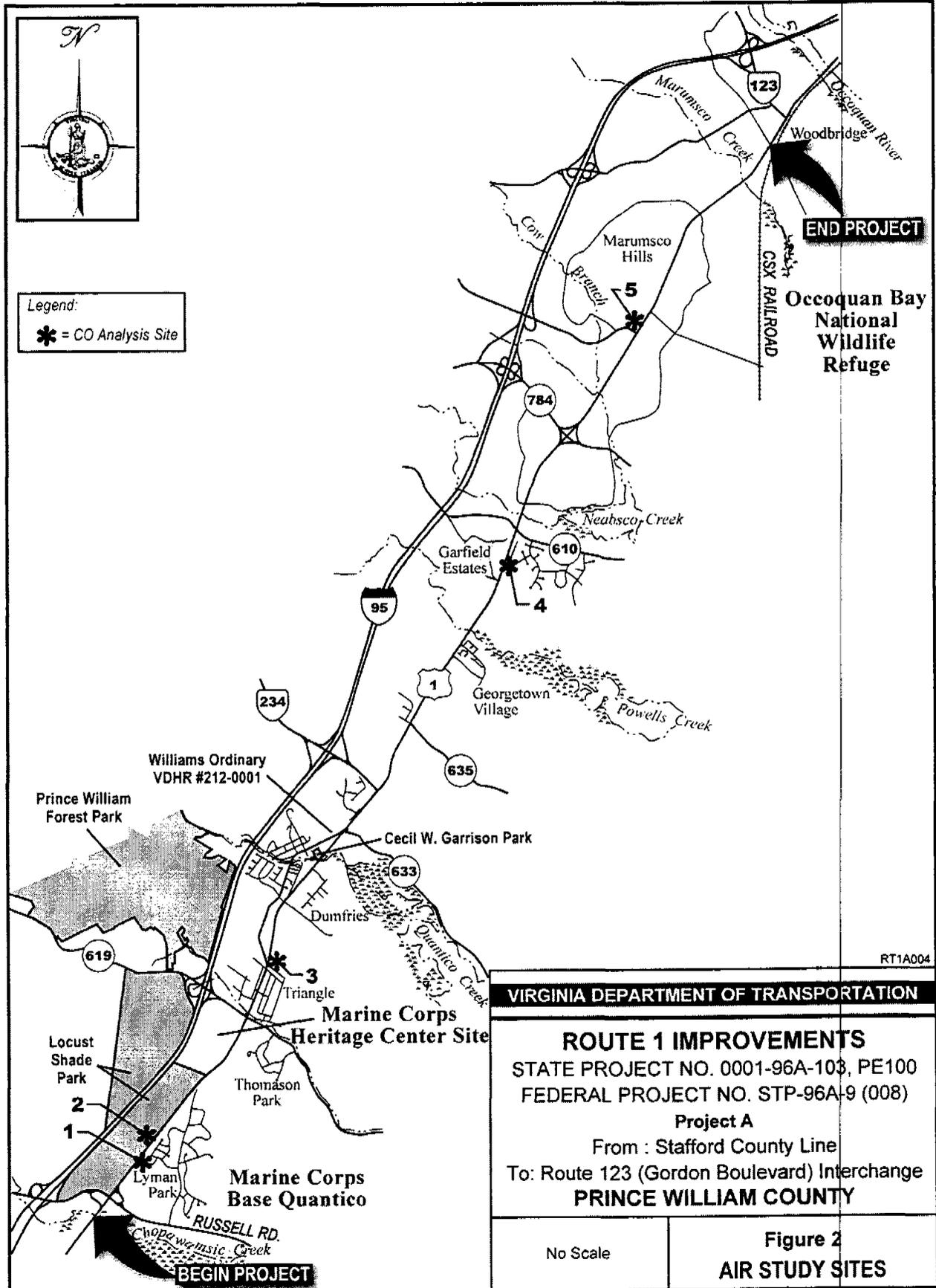
To: Route 123 (Gordon Boulevard) Interchange

**PRINCE WILLIAM COUNTY**



**Figure 1  
PROJECT LOCATION**





**TABLE 1  
CARBON MONOXIDE ANALYSIS SITES**

Site #	Name	Location	Plan Station #	Distance to Centerline (feet)
1	Lyman Park Military Housing, Quantico	East side Route 1 between Russell Road and Joplin/ Fuller Road	150+00	No-build: 150 Build Location Study Alignment: 150 Build Locust Shade Park Option 1: 130
2	Locust Shade Park	West side Route 1 between Russell Road and Joplin/ Fuller Road	157+00	No-build: 160 Build Location Study Alignment: 160 Build Locust Shade Park Option 1: 190
3	Cooper's Corvettes	East side Route 1 at south end of Dumfries	258+50	No-build: 65 Build Location Study Alignment: 75 Build Triangle Option 1: 100 Build Dumfries Option 1: 75 Build Bradys Hill Option 1: 75
4	Chester Circle	East side Route 1 near County Office Complex	477+40	No-build: 110 Build Location Study Alignment: 110 Civil War Option 1: 80
5	Malloy Automall	Northwest quadrant of Route 1/Opitz Blvd. Intersection	605+50	No-build (Route 1): 110 Build Location Study Alignment (Route 1): 110 No-build (Opitz Boulevard): 110 Build Location Study Alignment (Opitz Boulevard): 110

**TABLE 2  
ESTIMATED HIGHEST CARBON MONOXIDE CONCENTRATIONS**

Site	Year	Case	CO Concentration (including background)	
			one-hour (ppm)	eight-hour (ppm)
Lyman Park Military Housing, Quantico	2000	Existing	6.1	3.1
	2010	No-build	6.1	3.1
	2010	Build Location Study Alignment	6.1	3.1
	2010	Build Locust Shade Park Option 1	6.2	3.1
	2025	No-build	6.1	3.1
	2025	Build Location Study Alignment	6.2	3.2
	2025	Build Locust Shade Park Option 1	6.3	3.2
Locust Shade Park	2000	Existing	6.1	3.1
	2010	No-build	6.1	3.1
	2010	Build Location Study Alignment	6.1	3.1
	2010	Build Locust Shade Park Option 1	6.1	3.1
	2025	No-build	6.1	3.1
	2025	Build Location Study Alignment	6.2	3.1
	2025	Build Locust Shade Park Option 1	6.1	3.1

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## SUMMARY

Traffic-related noise levels were estimated to identify noise impacts of the proposed Project A improvements to U.S. Route 1 in Prince William County, beginning at the Stafford County line near the interchange of Route 1 with Russell Road and ending at the intersection of Route 1 with the Route 123 (Gordon Boulevard) interchange proposed under a separate project. The proposed improvements consist of widening the existing four-lane road to six lanes with curbs and gutters, a raised median, a sidewalk, and a bikeway. Noise levels were estimated using the Federal Highway Administration's (FHWA's) Traffic Noise Model (TNM 1.1).

Noise impacts occur when the design-year build noise levels approach or exceed FHWA's Noise Abatement Criteria (NAC), or substantially exceed existing noise levels. The noise analysis indicates that there are no locations where noise levels predicted for the project in the design year would be substantially greater than existing noise levels. Predicted design-year build traffic noise levels would approach or exceed the NAC (i.e., noise levels would be 66 dBA or greater, applicable NAC is 67 dBA) for the following 19 receivers in 10 Noise-Sensitive Areas (NSAs):

- Three receivers (Receivers 17, 22, and 23-1) in NSA D representing **ten single-family** homes in Triangle;
- One receiver (Receiver 38) in NSA I representing **one single-family** home in Dumfries;
- Two receivers (Receivers 39 and 43) in NSA J representing **one apartment building** and **10 single-family** homes in Virginia Commons;
- Three receivers (Receivers 46, 51, and 53) in NSA L representing **two apartment** buildings in Fox Run Apartments, and **one single-family** home;
- Two receivers (Receivers 48 and 52) in NSA M representing **fifteen townhouses** in Village Gate;
- Three receivers (Receivers 61, 63, and 65) in NSA O representing **16 single-family** homes in The Harbors of Newport;
- One receiver (Receiver 73) in NSA R representing **two mobile homes** in the Featherstone area;
- Two receivers (Receivers 79 and 80) in NSA T representing **16 mobile homes** in Belair Mobile Homes;
- One receiver (Receiver 82) in NSA V representing **one apartment building** in Bayvue; and
- One receiver (Receiver 87) in NSA X representing **seven mobile homes** in Holly Acres Mobile Homes.

Abatement measures were considered for all of the impacted NSAs, following VDOT's *State Noise Abatement Policy*. Three noise barriers were evaluated for two of the NSAs (two barriers in NSA J, and one barrier in NSA O). Barriers were not evaluated for the other impacted communities and properties because barriers would block access to the properties from Route 1.

A barrier was determined to be feasible for 5 ground-level apartments in one building in Virginia Commons represented by Receiver 39 in NSA J. This barrier would reduce noise levels by 5 dBA, would be 14 to 16 feet tall, and would extend southward for approximately 318 feet along Route 1

from Allen Dent Road. The total cost of the barrier would be \$104,522, with a cost per protected residence of approximately \$20,904.

A second barrier was determined to be feasible for NSA J at Receiver 43, representing 10 single-family homes in Virginia Commons. This barrier would reduce noise levels by 6 dBA, would be 8 to 16 feet tall, and would extend northward for approximately 922 feet along Route 1 from the intersection of Route 1 and Allen Dent Road. The total cost of the barrier would be \$278,982, with a cost per protected residence of \$27,898.

A third barrier was determined to be feasible for Receivers 61, 63, and 65 in NSA O, representing 16 single-family homes in The Harbors of Newport. This barrier would reduce noise levels by 6 to 7 dBA, would be 10 feet tall, and would extend northward for approximately 1,327 feet between the homes on Uppsala Court and Route 1. The total cost of the barrier would be \$291,918, with a cost per protected residence of approximately \$18,245.

## 1. PROJECT DESCRIPTION

The Virginia Department of Transportation (VDOT) is proposing improvements to approximately 11.4 miles of U.S. Route 1 in Prince William County, from the Stafford County line to the Route 123 (Gordon Boulevard) interchange proposed under a separate project. The proposed improvements would consist of widening the existing four-lane road to six lanes with curb and gutter and a raised median, a bikeway, a sidewalk, and other amenities. **Figure 1** shows the project location. This report describes the analysis of specific noise impacts associated with the proposed improvements. [Note: the sections of Route 1 associated with the separately proposed Route 234 interchange project and the Neabsco Creek bridge replacement project, as well as the Route 123 interchange project noted above, are excluded from this project. The noise impacts of those projects were independently evaluated in previous environmental documents.]

## 2. ALTERNATIVES

### 2.1 No-build Alternative

Under the No-build Alternative, VDOT would continue to maintain and operate Route 1 in its current configuration. The roadway would not be widened and congestion would continue to increase.

### 2.2 Location Study Alignment Alternative

This alternative establishes the centerline of the proposed widening mostly along the centerline of existing Route 1.

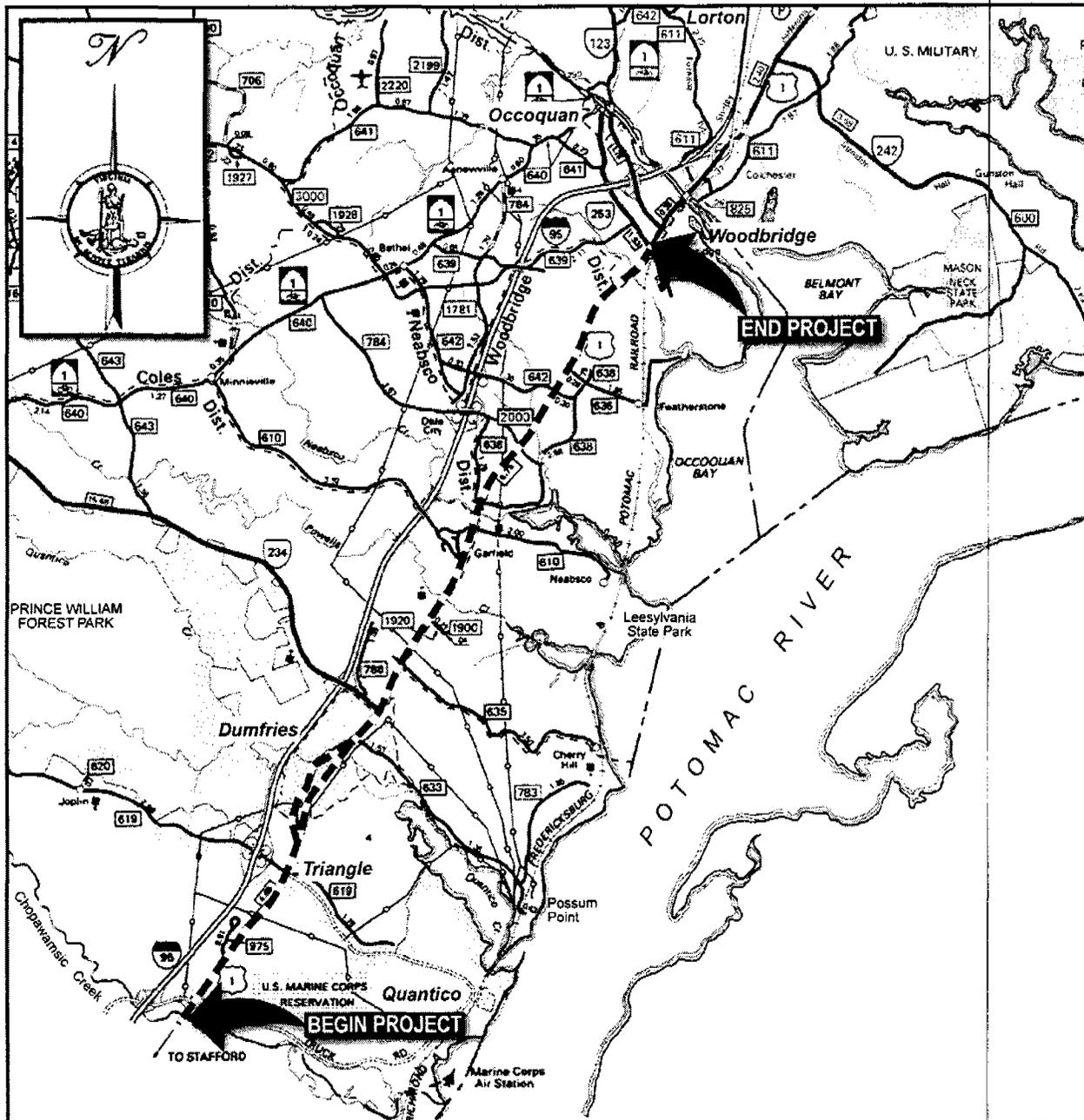
### 2.3 Options at Specific Locations

Several minor variations are being considered at specific locations along the project. They are aimed at reducing encroachments on sensitive properties (e.g., Locust Shade Park), or at considering design variations at intersections. For noise analysis purposes, they were deemed identical to the Location Study Alignment Alternative. The Environmental Assessment discusses these options further.

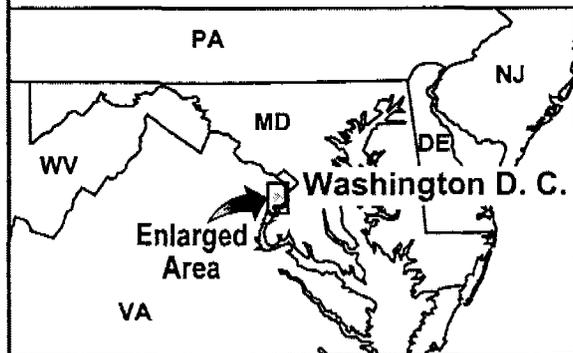
## 3. GUIDELINES AND CRITERIA

### 3.1 Describing Highway Noise

Noise often is described as unwanted sound. It is measured in decibels (dB), with a weighting of sound wave frequencies to which the human ear is particularly sensitive (termed *A weighting*), and usually is denoted as dBA. In addition, traffic noise is evaluated using an "equivalent noise level" ( $L_{eq}$ ), which is a single-number representation of noise that varies over time, such as the noise generated by a stream of motor vehicles of different types and speeds. The equivalent noise level contains the same amount of sound energy as the varying sound level over a specified period, say one hour. It may be thought of as an average noise level. For this analysis, an hourly  $L_{eq}$  was used. The decibel units are logarithmic, not linear. Noise level changes of 2 to 3 dBA are barely perceptible to most people. A change of 5 dBA is readily perceived. Most people perceive a change of 10 dBA as a doubling or halving of the noise level. Noise levels on a quiet suburban night would be approximately 40 dBA. Noise levels on a noisy urban day would be approximately 75 dBA. The noise level of a gasoline-powered lawn mower at a distance of 100 feet would be approximately 70 dBA.



RT1A007



<b>VIRGINIA DEPARTMENT OF TRANSPORTATION</b>	
<b>ROUTE 1 IMPROVEMENTS</b>	
STATE PROJECT NO. 0001-96A-103, PE100	
FEDERAL PROJECT NO. STP-96A-9 (008)	
Project A	
From : Stafford County Line	
To: Route 123 (Gordon Boulevard) Interchange	
<b>PRINCE WILLIAM COUNTY</b>	
Scale (Miles) 	Figure 1 <b>PROJECT LOCATION</b>

### 3.2 Regulations and Policies

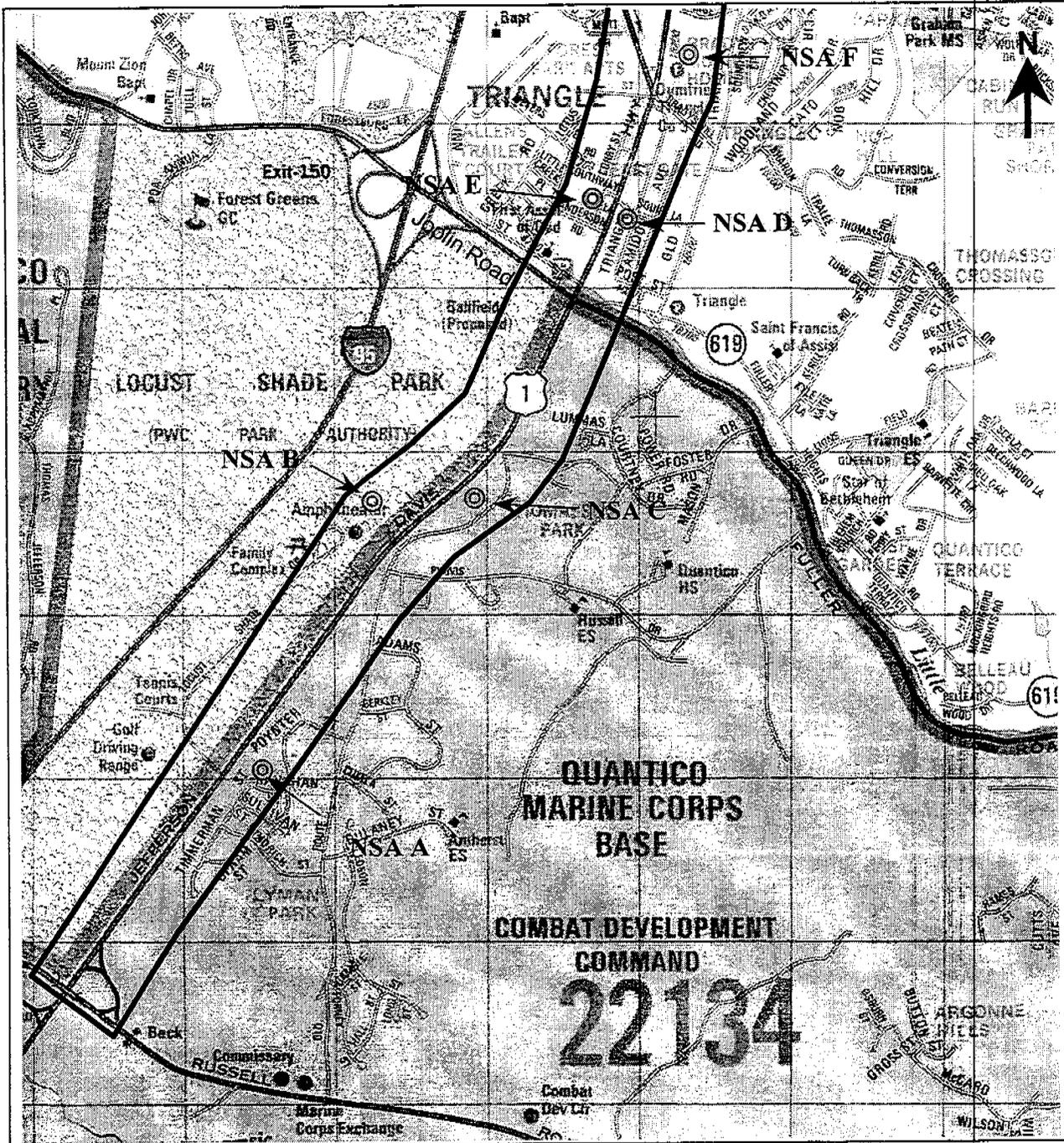
Title 23 of the Code of Federal Regulations, Part 772 (23 CFR 772), *Procedures for Abatement of Highway Traffic Noise and Construction Noise*, specifies the procedures and criteria used by the Federal Highway Administration (FHWA) in evaluating noise impacts for federal-aid highway projects. Within the regulations, FHWA established “noise abatement criteria” (NAC) for several types of land uses or activity categories, as shown in **Table 1**. Noise impacts occur when noise levels projected for traffic on a proposed highway project approach or exceed the NAC, or substantially exceed existing noise levels. Under VDOT’s current FHWA-approved *State Noise Abatement Policy*, “approach” is defined as a noise level that is 1 dBA less than the NAC and “substantial increase” is defined as 10 dBA or more. When noise impacts are identified, noise abatement measures must be considered. Such measures could include traffic management measures (such as truck restrictions), alterations of horizontal and vertical alignments (such as shifting the alignment away from noise-sensitive sites, or depressing the roadway below ground level), or construction of noise barriers. Implementation of such measures is not mandatory. Abatement usually will be warranted only where frequent human use occurs and a lowered noise level would be beneficial. In addition, abatement measures must be determined to be feasible and reasonable, based on engineering, cost, or other considerations. And finally, citizen input must be obtained.

**TABLE 1**  
**FHWA NOISE ABATEMENT CRITERIA**

Activity Category	L <sub>eq</sub> (h) (dBA)	DESCRIPTION OF ACTIVITY CATEGORY
A	57 *	Lands 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*	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72*	Developed lands, properties, or activities not included in Categories A or B above.
D	--	Undeveloped lands.
E	52**	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.
* Exterior ** Interior		

### 4. ANALYSIS METHODS

This study was performed by first identifying Noise Sensitive Areas (NSAs), as defined by FHWA criteria, throughout the study area that would potentially be affected by changes in highway-related noise. **Figures 2, 3, 4, 5, and 6** show the study area and the locations of the NSAs. Next, representative sites among the NSAs were identified for measurement of existing ambient noise levels, which then were used to validate the highway noise prediction model. Highway noise levels then were estimated with a computer model for existing conditions, design-year (2025) no-build conditions, and design-year build conditions. Inputs to the model included traffic volumes by vehicle types, travel speeds, spatial relationships between noise source (the highway) and noise receptors (outdoor activity areas at homes, parks, etc.), and terrain. The period of analysis generally was the peak traffic hour, which normally represents the worst hourly traffic noise impact on a regular basis, because that is when the greatest volume of noise-generating traffic occurs.



**Figure 2: Study Area**  
 U.S. Route 1, from the Stafford  
 County Line to Route 123  
 Noise Sensitive Areas A to F,  
 Prince William County, Virginia

**Legend:**

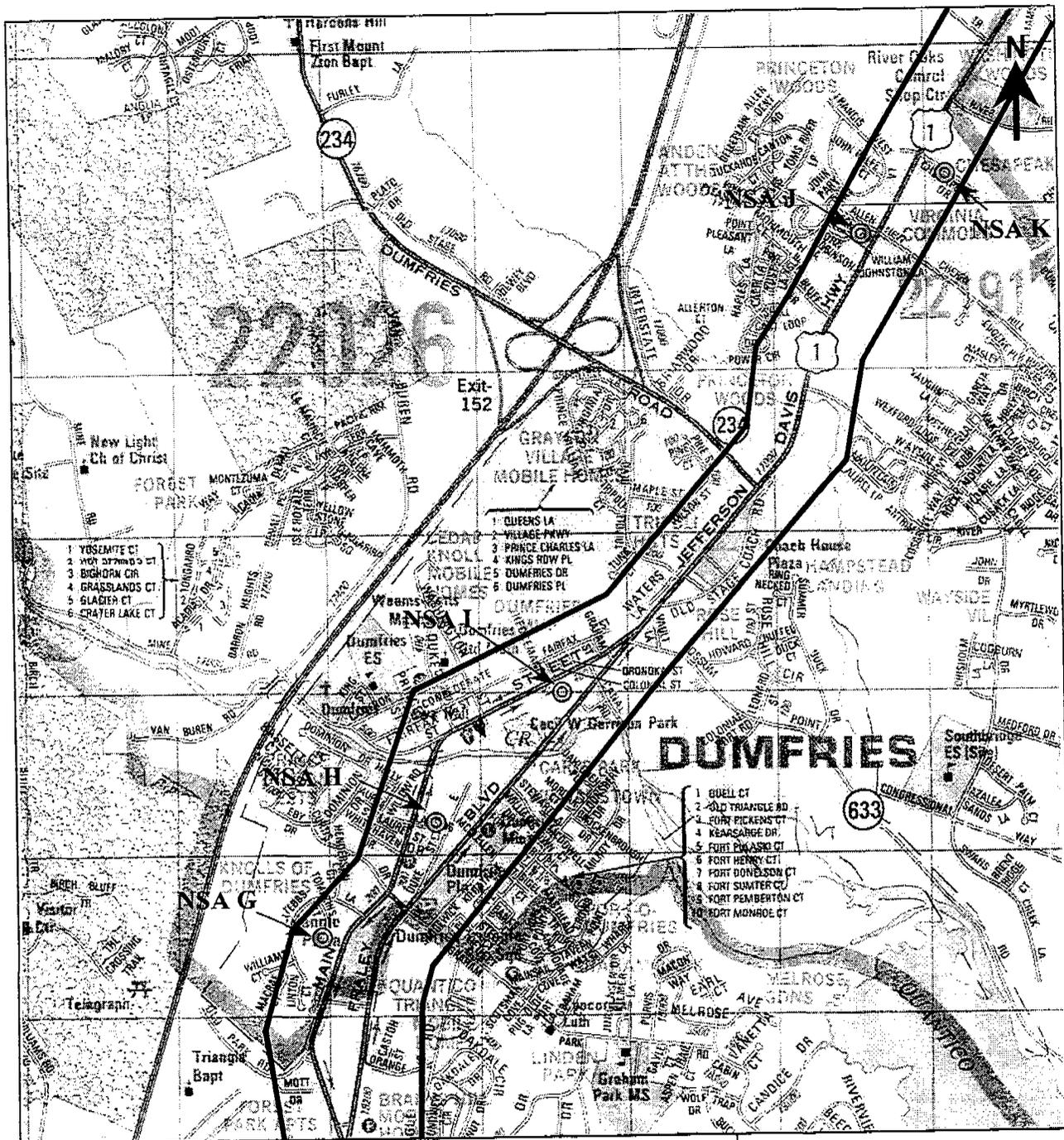
- Study Area Boundary
- ⊙ Measurement and/or Modeling Location

**Scale:**

1 inch = 2,000 feet



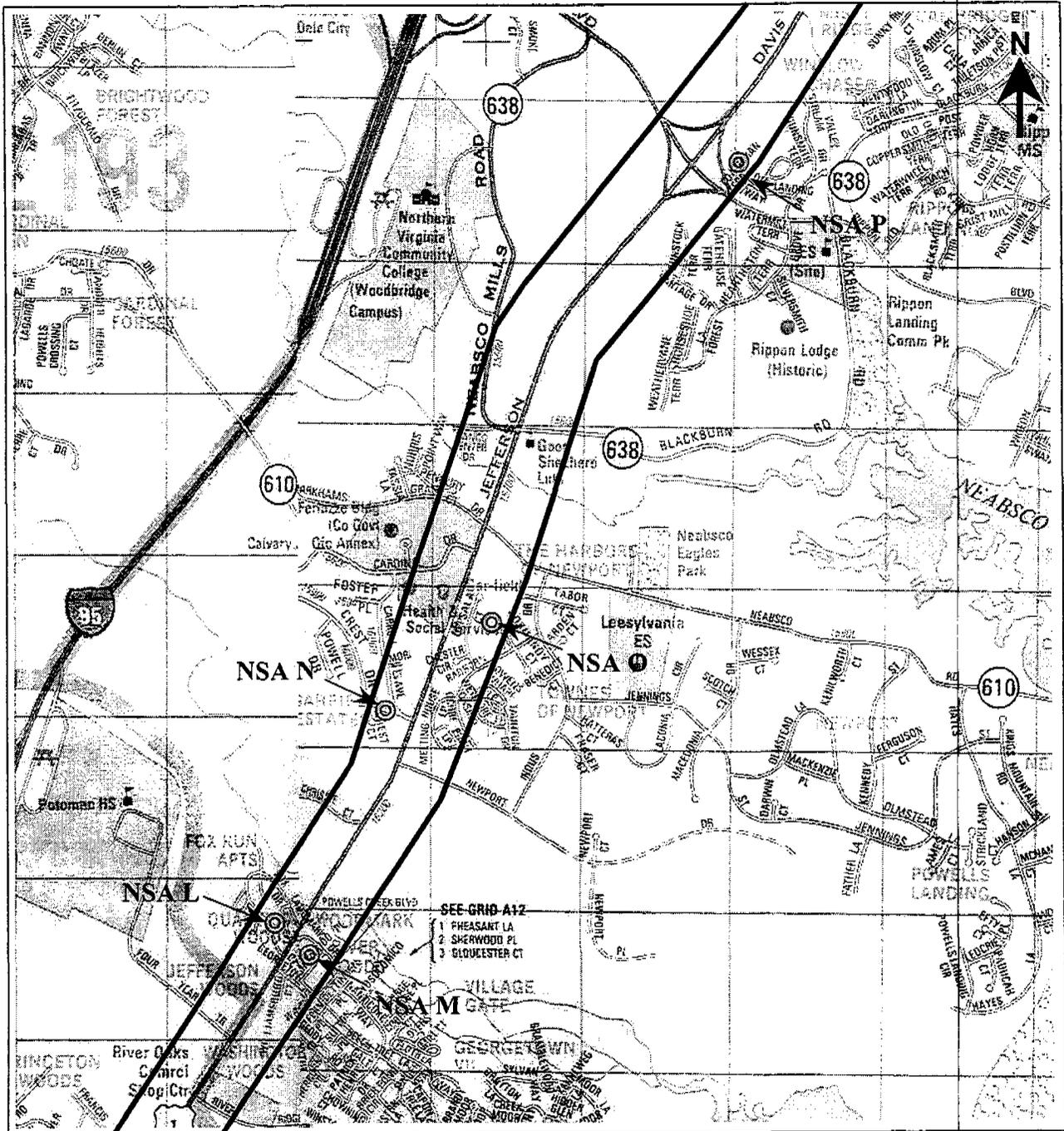
Source: Prince William County, VA. Alexandria Drafting Company, 2000.



**Figure 3: Study Area**  
 U.S. Route 1, from the Stafford  
 County Line to Route 123  
 Noise Sensitive Areas G to K,  
 Prince William County, Virginia

**Legend:**  
 — Study Area Boundary  
 ⊙ Measurement and/or Modeling Location  
**Scale:**  
 1 inch = 2,000 feet

Source: Prince William County, VA. Alexandria Drafting Company, 2000.



**Figure 4: Study Area**  
 U.S. Route 1, from the Stafford  
 County Line to Route 123  
 Noise Sensitive Areas L to P  
 Prince William County, Virginia

**Legend:**

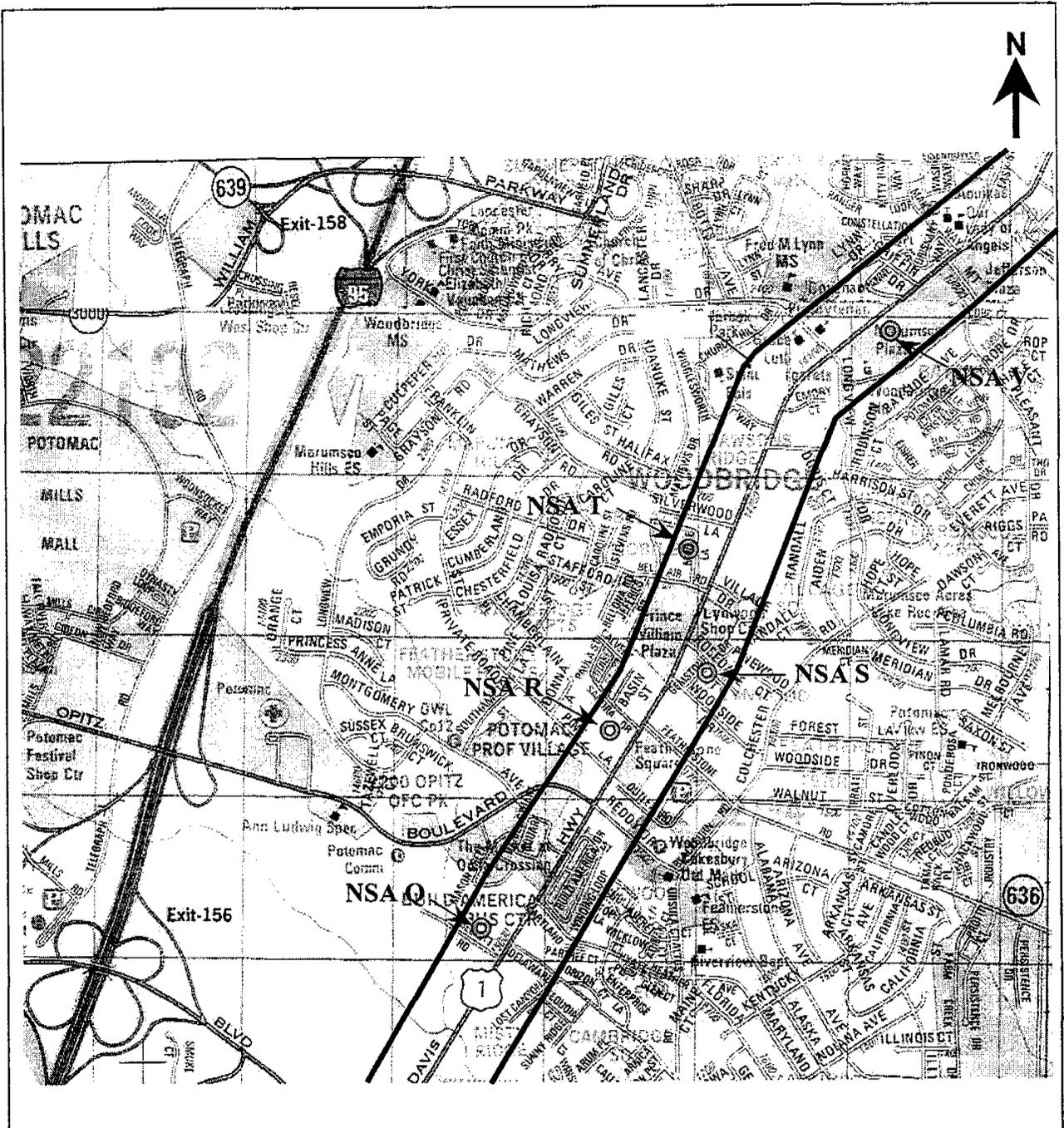
-  Study Area Boundary
-  Measurement and/or Modeling Location

**Scale:**

1 inch = 2,000 feet



Source: Prince William County, VA. Alexandria Drafting Company, 2000.



**Figure 5: Study Area**  
 U.S. Route 1, from the Stafford  
 County Line to Route 123  
 Noise Sensitive Areas Q to V,  
 Prince William County, Virginia

**Legend:**

- Study Area Boundary
- ⊙ Measurement and/or Modeling Location

**Scale:**

1 inch = 2,000 feet



Source: Prince William County, VA. Alexandria Drafting Company, 2000.



#### 4.1 Noise Assessment Locations and Ambient Measurements

A windshield survey was performed to characterize the existing noise environment and verify land uses in the study area. Ambient noise levels then were measured at seven noise assessment sites using a Norsonic Type 116 sound level meter. During the noise data collection, field technicians noted non-traffic-related noise sources that could influence background noise levels, such as aircraft overflight or other community noise sources. Half-hour classified vehicle counts (i.e., automobile, medium-duty truck, heavy-duty truck, bus, etc.) also were obtained during noise measurement activities. These noise level measurements and highway traffic counts were used to establish the current noise environment and to validate the model. **Table 2** describes the locations of the noise measurement sites, the area represented by each noise measurement site, and the measured ambient noise levels. **Table 3** describes the 23 NSAs identified in the study area and the receivers, or noise assessment sites, within each NSA.

#### 4.2 Noise Modeling And Assumptions

Highway traffic noise levels were predicted using the FHWA Traffic Noise Model Version 1.0b (TNM 1.0b) for data input and Version 1.1 (TNM 1.1) for noise level calculations. The FHWA models use traffic volume data, speeds, vehicle type (automobile, medium-duty truck, heavy-duty truck, bus, and motorcycle), roadway geometry, receiver distance from roadway (source), ground absorption, and shielding from local terrain and structures to estimate noise levels in dBA ( $L_{eq}$ ) at a given distance from the centerline of a roadway. TNM is the standard model used in the transportation industry for evaluating noise impacts related to highway traffic.

**TABLE 2**  
**NOISE MEASUREMENT SITES**

Noise Measurement Site	NSA	Receiver #	Location	Area Represented	Ambient Noise Level dBA ( $L_{eq}$ )
1	B	8	Locust Shade Park Picnic Pavilion	Park	62
2	D	22	Triangle/Dumfries	Two First-Row Single-family Homes	68
3	I	31	Dumfries	Three First-Row Single-family Homes	61
4	J	39	Virginia Commons	Two First-Row Apartment Buildings	63
5	M	48	Village Gate	Eight First-Row Townhouses	67
6	V	82	Bayvue	One Second-Row Apartment Building	63
7	W	86	Our Lady of Angels Church & Catholic School	Church	60

TABLE 3  
NOISE ANALYSIS SITES

NSA	Receiver	Description	Location	Nearest Plan Station Number	Type of Receiver
A	1	Seven single-family homes in Lyman Park on Marine Corps Base Quantico	Northbound side of Route 1 along Timmerman Street	142	First-Row Residences
	2	15 single-family homes in Lyman Park on Marine Corps Base Quantico	Northbound side of Route 1 along Timmerman Street	147	Second-Row Residences
	3	Nine single-family homes in Lyman Park on Marine Corps Base Quantico	Northbound side of Route 1 along Timmerman Street	152	First-Row Residences
	4	Four single-family homes in Lyman Park on Marine Corps Base Quantico	Northbound side of Route 1 along Poynter Street	163	First-Row Residences
	5	Five single-family homes in Lyman Park on Marine Corps Base Quantico	Northbound side of Route 1 along Poynter Street	164	Second-Row Residences
B	6	Locust Shade Park Batting Cage	Southbound side of Route 1 south of Locust Shade Drive	157	Park Recreational Facility
	7	Locust Shade Park Amphitheater	Southbound side of Route 1 north of Locust Shade Drive and south of Joplin Road	177	Park Amphitheater
C	8*	Locust Shade Park Picnic Pavilion	Southbound side of Route 1 north of Locust Shade Drive and south of Joplin Road	178	Park Picnic Shelter
	9	Five single-family homes in Thomason Park on Marine Corps Base Quantico	Northbound side of Route 1 along Adams Street	182	Second-Row Residences
	10	Five single-family homes in Thomason Park on Marine Corps Base Quantico	Northbound side of Route 1 along Adams Street	184	First-Row Residences
	11	Four single-family homes in Thomason Park on Marine Corps Base Quantico	Northbound side of Route 1 along Adams Street	188	First-Row Residences
	17	Five single-family homes in Triangle	Northbound side of Route 1 north of Fuller Road and south of Squire Lane	233	First-Row Residences
D	18	Seven single-family homes in Triangle	Northbound side of Route 1 north of Fuller Road and south of Squire Lane	235	Second-Row Residences
	22*	Two single-family homes in Triangle	Northbound side of Route 1 north of Fuller Road and south of Post Street	244	First-Row Residences
	23-1	Three single-family homes in Triangle	Northbound side of Route 1 north of Fuller Road and south of Post Street	251	First-Row Residences
	23-2	Seven single-family homes in Triangle	Northbound side of Route 1 north of Fuller Road and south of Post Street	248	Second-Row Residences
E	19	11 single-family homes in Triangle	Southbound side of Route 1 north of Anderson Road and south of Main Street	237	Second-Row Residences
	24	Two single-family homes in Triangle	Southbound side of Route 1 north of Anderson Road and south of Main Street	255	First-Row Residences
	24-1	Seven single-family homes in Triangle	Southbound side of Route 1 north of Anderson Road and south of Main Street	249	Second-Row Residences

TABLE 3  
NOISE ANALYSIS SITES

NSA	Receiver	Description	Location	Nearest Plan Station Number	Type of Receiver
F	23	Six mobile homes and three single-family homes in Bradys Hill Mobile Homes	Northbound side of Route 1 north of Bradys Hill Road and south of Graham Park Road	255	Second-Row Residences
	25	Two single-family homes in Bradys Hill Mobile Homes	Northbound side of Route 1 north of Bradys Hill Road and south of Graham Park Road	264	First-Row Residences
G	26	Seven single-family homes in the Knolls of Dumfries	Southbound side of Route 1 north of Old Park Road and south of Curtis Drive	281	First-Row Residences
	26-1	Two single-family homes in the Knolls of Dumfries	Between southbound Route 1 and northbound Route 1 north of Curtis Drive and south of Canal Road	270	First-Row Residences
H	27	Two mobile homes and three single-family homes in Dumfries along Duke Street	Between southbound and northbound Route 1 north of Curtis Drive and south of Canal Road	301	Second-Row Residences
	27-1	One apartment building and three single-family homes in Dumfries along Duke Street	Between southbound and northbound Route 1 north of Curtis Drive and south of Canal Road	297	Second-Row Residences
	27-2	Three single-family homes in Dumfries along Duke Street	Between southbound and northbound Route 1 north of Curtis Drive and south of Canal Road	294	Second-Row Residences
	27-3	Two single-family homes in Dumfries along Duke Street	Between southbound and northbound Route 1 north of Curtis Drive and south of Canal Road	293	Second-Row Residences
I	28	One baseball field in Cecil W. Garrison Park	Between southbound and northbound Route 1 north of Curtis Drive and south of Canal Road	310	Baseball Field
	29	Three mobile homes in Dumfries	Between southbound and northbound Route 1 north of Curtis Drive and south of Canal Road	311	First-Row Residences
	30	Three single-family homes in Dumfries	Between southbound and northbound Route 1 north of Curtis Drive and south of Canal Road	310	First-Row Residences
	31*		Between southbound and northbound Route 1 north of Curtis Drive and south of Canal Road	316	First-Row Residences
	32	Four single-family homes in Dumfries	Between southbound and northbound Route 1 north of Curtis Drive and south of Canal Road	319	First-Row Residences
	33	Four single-family homes in Dumfries	Between southbound and northbound Route 1 north of Curtis Drive and south of Canal Road	320	Second-Row Residences
	37	One single-family Home in Dumfries	Between southbound and northbound Route 1 north of Curtis Drive and south of Canal Road	327	First-Row Residence
J	38	One single-family home in Dumfries	Between southbound and northbound Route 1 north of Canal Road and south of Possum Point Road	335	First-Row Residence
	39*	One apartment building in Virginia Commons	Northbound side of Route 1 north of Possum Point Road and south of Old Stage Coach Road	387	First-Row Residences
	40	One apartment building in Virginia Commons	Southbound side of Route 1 north of Pine Bluff Drive and south of Allen Dent Road	388	First-Row Residences
	41	Three single-family homes in Virginia Commons	Southbound side of Route 1 north of Pine Bluff Drive and south of Allen Dent Road	391	First-Row Residences
			Southbound side of Route 1 north of Allen Dent Road along Francis West Lane		

TABLE 3  
NOISE ANALYSIS SITES

NSA	Receiver	Description	Location	Nearest Plan Station Number	Type of Receiver
J	42	Three single-family homes in Virginia Commons	Southbound side of Route 1 north of Allen Dent Road along Francis West Lane	395	Second-Row Residences
	43	Seven single-family homes in Virginia Commons	Southbound side of Route 1 north of Allen Dent Road along Francis West Lane	398	First-Row Residences
	44	One single-family home in Virginia Commons	Southbound side of Route 1 north of Allen Dent Road along Francis West Lane	397	Second-Row Residence
	45	Three apartment buildings	Northbound side of Route 1 along Chesapeake Drive	399	First-Row Residences
	46	One single-family home	Southbound side of Route 1 north of Four Year Trail and south of Fox Lair Drive	420	First-Row Residences
K	50	Two apartment buildings in Fox Run	Southbound side of Route 1 along Fox Lair Drive	431	Second-Row Residences
	51	One apartment building in Fox Run	Southbound side of Route 1 along Fox Lair Drive	432	First-Row Residences
	53	One apartment building in Run	Southbound side of Route 1 along Fox Lair Drive	433	First-Row Residences
	54-1	One apartment building in Fox Run	Southbound side of Route 1 along Fox Lair Drive	437	Second-Row Residences
	47	Eight townhouses in Village Gate	Northbound side of Route 1 along Georgetown Drive	426	First-Row Residences
M	48*	Eight townhouses in Village Gate	Northbound side of Route 1 along Georgetown Drive	428	First-Row Residences
	49	Six townhouses in Village Gate	Northbound side of Route 1 along Georgetown Drive	429	Second-Row Residences
	52	Seven townhouses in Village Gate	Northbound side of Route 1 along Powells Creek Boulevard	433	First-Row Residences
	56	One apartment building in The Woods at Potomac Mills	Northbound side of Route 1 along Powells Creek Boulevard	439	First-Row Residences
	57	Two single-family homes in Garfield Estates	Southbound side of Route 1 along Crest Court	465	First-Row Residences
N	58	One single-family home in Garfield Estates	Southbound side of Route 1 along Crest Drive	466	First-Row Residence
	59	Three single-family homes in Garfield Estates	Southbound side of Route 1 along Carroll Avenue	470	Second-Row Residences
	60	One single-family home in Garfield Estates	Southbound side of Route 1 along Carroll Avenue	472	First-Row Residence
O	61	Three single-family homes in The Harbors of Newport	Northbound side of Route 1 along Chester Circle	478	First-Row Residences
	62	Six single-family homes in The Harbors of Newport	Northbound side of Route 1 along Uppsala Court	481	Second-Row Residences

TABLE 3  
NOISE ANALYSIS SITES

NSA	Receiver	Description	Location	Nearest Plan Station Number	Type of Receiver
P	63	Six single-family homes in The Harbors of Newport	Northbound side of Route 1 along Uppsala Court	483	First-Row Residences
	64	Ten single-family homes in The Harbors of Newport	Northbound side of Route 1 along Uppsala Court	484	Second-Row Residences
	65	Seven single-family homes in The Harbors of Newport	Northbound side of Route 1 along Uppsala Court	489	First-Row Residences
	67	Two townhouses in Rippon Landing	Northbound side of Route 1 along Coachman Terrace	549	First-Row Residences
	68	Two townhouses in Rippon Landing	Northbound side of Route 1 along Coachman Terrace	552	First-Row Residences
	70	One nursing home	Southbound side of Route 1 on Mellott Road	583	Second-Row Residences
	71	One single-family home	Southbound side of Route 1 north of Pine Lane and south of Sandra Drive	610	Second-Row Residences
	73	Two mobile homes	Southbound side of Route 1 on Sandra Drive	615	Second-Row Residences
	74	Four single-family homes and two mobile homes	Southbound side of Route 1 along Basin Street	619	Second-Row Residences
	72	One single-family home in Lynwood	Northbound side of Route 1 north of Featherstone Road and south of Woodside Drive	616	Second-Row Residences
S	75	Two single-family homes in Lynwood	Northbound side of Route 1 north of Featherstone Road and south of Woodside Drive	622	Second-Row Residences
	76	Three apartment buildings in Lynwood	Northbound side of Route 1 north of Woodside Drive and south of Rosedale Court	627	Second-Row Residences
	77	One apartment building in Lynwood	Northbound side of Route 1 north of Rosedale Court and south of Village Drive	634	Second-Row Residences
	78	One apartment building in Lynwood	Northbound side of Route 1 along Village Drive	636	Second-Row Residences
	79	Eight mobile homes in Belair Mobile Homes	Southbound side of Route 1 north of Bel Air Road along Mobile Lane	634	Second-Row Residences
	80	Eight mobile homes in Belair Mobile Homes	Southbound side of Route 1 north of Bel Air Road along Mobile Lane	638	Second-Row Residences
	82*	One apartment building in Bayvue	Northbound side of Route 1 north of Longview Drive and south of Mount Pleasant Drive	665	Second-Row Residences
	83	Eight mobile homes	Southbound side of Route 1 north of Longview Drive and south of Griffin Drive	674	Second-Row Residences
W	84	One single-family home	Southbound side of Route 1 north of Longview Drive and south of Griffin Drive	681	Second-Row Residences

TABLE 3  
NOISE ANALYSIS SITES

NSA	Receiver	Description	Location	Nearest Plan Station Number	Type of Receiver
W	85	Two single-family homes	Southbound side of Route 1 north of Griffin Drive and south of Marys Way	683	Second-Row Residences
	86*	Our Lady of Angels Church & Catholic School	Southbound side of Route 1 on Marys Way	687	First-Row Church
X	87	Seven mobile homes in Holly Acres Mobile Homes	Northbound side of Route 1 north of Mount Pleasant Drive and south of Dawson Beach Road	696	Second-Row Residences
	89	Two mobile homes in Holly Acres Mobile Homes	Northbound side of Route 1 north of Mount Pleasant Drive and south of Dawson Beach Road	701	Second-Row Residences

\* Ambient noise level measurements were conducted at these receivers.

NSA U was eliminated once it was determined that it did not represent a noise sensitive area. Receivers 12, 13, 14, 15, 16, 20, 21, 34, 35, 36, 54, 55, 66, 69, 81, and 88 were eliminated once it was determined that they did not represent noise sensitive sites or that they would be displaced by the project.

## 5. MODELING RESULTS AND IMPACTS ASSESSMENT

### 5.1 Comparison of Existing Conditions, Design-year No-build Conditions, and Location Study Alignment Alternative

**Table 4** lists the model-predicted noise levels for existing (2000) conditions, design-year (2025) No-build conditions, and the design-year Location Study Alignment Alternative. The table also provides the differences in noise levels between the existing conditions and the design-year Location Study Alignment Alternative, and between the design-year No-build conditions and the Location Study Alignment Alternative. Table 4 also includes brief explanations of differences in noise levels at each site. Analysis of the model results indicates that:

- Between the existing conditions (2000) and the No-build Alternative (2025), noise levels would increase by 0 to 3 dBA. The increases would result from the increased traffic volumes projected for future years. These increases would be nearly imperceptible by the human ear.
- Under the Location Study Alignment Alternative, noise levels would increase by 1 to 8 dBA, remain the same, or decrease by up to 8 dBA when compared to existing conditions. These differences would result from the following:
  - Widening the existing roadway would place the roadway noise sources closer to noise assessment sites. Widening the roadway in some places would modify terrain between the roadway and the site that provides shielding and ground sound absorption, thus increasing noise levels.
  - Changes to the grade of the road would change the geometric relationship between the roadway noise source and the receiver.
  - Traffic volumes would grow, thus causing increases in noise levels.
  - In some areas, heavy truck volumes would increase, thus causing increases in noise levels.
  - Removing the split in Route 1 in Dumfries by moving the southbound lanes to the existing alignment of the northbound lanes would place many of the receivers much farther from southbound Route 1 roadway noise, thus decreasing noise levels.
- Under the Location Study Alignment Alternative when compared to the No-build Alternative, noise levels would increase by 1 to 6 dBA, decrease by 1 to 10 dBA, or remain the same. These differences are a result of the following features of the Location Study Alignment Alternative:
  - Widening the existing roadway would place the roadway noise sources closer to noise assessment sites. Widening the roadway in some places would modify terrain between the roadway and the site that provides shielding and ground sound absorption, thus increasing noise levels.
  - Changes to the grade of the road would change the geometric relationship between the roadway noise source and the receiver.
  - Removing the split in Route 1 in Dumfries by moving the southbound lanes to the existing alignment of the northbound lanes would place many of the receivers much farther from Route 1 roadway noise, thus decreasing noise levels.
  - Traffic volumes and speeds would increase over No-build conditions, thus increasing noise levels.
  - In some areas, heavy truck volumes would increase over No-build conditions, thus increasing noise levels.







TABLE 4 EXISTING, NO-BUILD, AND LOCATION STUDY ALIGNMENT BUILD ALTERNATIVE NOISE LEVELS

NSA	Receiver	Distance from Centerline	Distance from Centerline to Site (feet)	Existing Noise Level (2000) (dBA)	No-build Noise Level (2025) (dBA)	Build Noise Level (2025) (dBA)	Impacted Under Design-Year Build (Yes or No)	Existing to Design-year Build Noise Level Increase (dB)	No-build to Design-year Build Noise Level Increase (dB)	Comments on Differences Between Design-year No-build and Build Noise Levels
O	64	270	260	59	61	60	No	1	-1	**
	65	100	80	66	68	66	Yes	0	-2	**
P	67	505	505	51	51	53	No	2	2	**
	68	390	390	59	59	59	No	0	0	**
Q	70	390	370	56	56	57	No	1	1	**
	71	470	480	55	57	63	No	8	6	Noise levels increase due to traffic volume (especially heavy truck volume) increase.
R	73	250	250	60	62	68	Yes	8	6	Noise levels increase due to traffic volume (especially heavy truck volume) increase.
	74	350	350	58	58	64	No	6	6	Noise levels increase due to traffic volume (especially heavy truck volume) increase.
S	72	440	450	51	54	59	No	8	5	Noise levels increase due to traffic volume (especially heavy truck volume) increase.
	75	360	350	53	54	57	No	4	3	Noise levels increase due to traffic volume (especially heavy truck volume) increase.
	76	360	350	56	57	59	No	3	2	**
	77	320	290	59	60	65	No	6	5	Noise levels increase due to traffic volume (especially heavy truck volume) increase.
	78	290	310	59	59	64	No	5	5	Noise levels increase due to traffic volume (especially heavy truck volume) increase.

NSA	Receiver	Distance from Centerline Existing Route 1 to Site (feet)	Distance from Centerline Build Alternative to Site (feet)	Existing Noise Level (2000) (dBA)	No-build (2025) (dBA)	Build Noise Level (2025) (dBA)	Year Build (Yes or No)	Impacted Under Design-Noise Level Increase (dB)	Existing to Design-year Build Noise Level Increase (dB)	Comments on Differences Between Existing and Design-year Build Noise Level Increase (dB)	Noise levels increase due to traffic volume (especially heavy truck volume) increase.	Distance from Centerline Existing Route 1 to Site (feet)	Distance from Centerline Build Alternative to Site (feet)	Existing Noise Level (2000) (dBA)	No-build (2025) (dBA)	Build Noise Level (2025) (dBA)	Year Build (Yes or No)	Impacted Under Design-Noise Level Increase (dB)	Existing to Design-year Build Noise Level Increase (dB)	Comments on Differences Between Existing and Design-year Build Noise Level Increase (dB)	Noise levels increase due to traffic volume (especially heavy truck volume) increase.
T	79 Receiver	280	280	59	60	66	Yes	7	6	Noise levels increase due to traffic volume (especially heavy truck volume) increase.	Noise levels increase due to traffic volume (especially heavy truck volume) increase.	280	275	59	60	66	Yes	7	6	Noise levels increase due to traffic volume (especially heavy truck volume) increase.	Noise levels increase due to traffic volume (especially heavy truck volume) increase.
V	80	280	275	59	60	66	Yes	7	6	Noise levels increase due to traffic volume (especially heavy truck volume) increase.	Noise levels increase due to traffic volume (especially heavy truck volume) increase.	210	225	63	64	69	Yes	6	5	Noise levels increase due to traffic volume (especially heavy truck volume) increase.	Noise levels increase due to traffic volume (especially heavy truck volume) increase.
W	83	480	460	51	52	54	No	3	2			480	460	51	52	54	No	3	2		
	84	240	230	61	61	64	No	3	3			240	230	61	61	64	No	3	3		
	85	325	310	57	58	60	No	3	2			310	310	57	58	60	No	3	2		
	86	230	200	60	61	63	No	3	2			230	200	60	61	63	No	3	2		
	87	200	200	63	63	66	Yes	3	2			200	200	63	64	66	Yes	3	2		
	89	180	210	63	64	65	No	2	1			180	210	63	64	65	No	2	1		

Large bold type indicates noise levels that approach or exceed the NAC.  
 \* The applicable NAC for the Locust Shade Park amphitheater (Receiver 7) is 57 dBA. For all other receivers, the applicable NAC is 67 dBA.  
 \*\* Difference in noise levels would be minor or nonexistent.  
 \*\*\*The two distances to the centerline reflect that existing Route 1 is split in this location, and has separate centerlines for the northbound and southbound lanes.

TABLE 4 EXISTING, NO-BUILD, AND LOCATION STUDY ALIGNMENT BUILD ALTERNATIVE NOISE LEVELS

## 5.2 Noise Impacts Assessment

### NSA A

NSA A consists of 40 single-family homes in Lyman Park, a military housing area on Marine Corps Base Quantico. Receivers 1, 2, 3, 4, and 5 would experience noise levels of 62, 57, 60, 56, and 60 dBA, respectively, under the Location Study Alignment Alternative, and 58, 54, 60, 56, and 60 dBA, respectively, under the No-build Alternative. Existing noise levels are 56, 53, 58, 55, and 59, respectively. These receivers would not be impacted by the project.

### NSA B

NSA B consists of several facilities within Locust Shade Park (batting cage, amphitheater, and picnic pavilion). Receiver 6 representing the batting cage would experience a noise level of 65 dBA under the Location Study Alignment Alternative and 63 dBA under the No-build Alternative. The existing noise level is 61 dBA. Receiver 6 would not be impacted by the project. Receiver 7 representing the amphitheater (NAC for amphitheater is 57 dBA) would experience a noise level of 55 dBA under the Location Study Alignment Alternative and 53 dBA under the No-build Alternative. The existing noise level is 50 dBA. Receiver 7 would not be impacted by the project. Receiver 8, representing a picnic pavilion, would experience a noise level of 65 dBA under the Location Study Alignment Alternative and 64 dBA under the No-build Alternative. The existing noise level is 62 dBA. Receiver 8 would not be impacted by the project.

### NSA C

NSA C consists of 14 single-family homes on the northbound side of Route 1 along Adams Street on Marine Corps Base Quantico. Receivers 9, 10, and 11 would experience noise levels of 59, 60, and 64 dBA, respectively, under the Location Study Alignment Alternative, and 57, 58, and 62 dBA, respectively, under the No-build Alternative. Existing noise levels are 57, 57, and 61 dBA, respectively. These receivers would not be impacted by the project.

### NSA D

NSA D consists of 24 single-family homes on the northbound side of Route 1 in Triangle. Receivers 18 and 23-2 would experience noise levels of 59 and 60 dBA, respectively, under the Location Study Alignment Alternative, and 58 and 63 dBA, respectively, under the No-build Alternative. Existing noise levels at these receivers are 57 and 63 dBA, respectively. These receivers would not be impacted by the project. Receivers 17, 22, and 23-1, representing 10 single-family homes, would experience noise levels of 68, 67, and 68 dBA, respectively, under the Location Study Alignment Alternative, and 70, 68, and 71 dBA, respectively, under the No-build Alternative. Existing noise levels at these receivers are 69, 68, and 70 dBA, respectively. **These receivers would be impacted under the Location Study Alignment Alternative. Under the No-build Alternative, these receivers still would have noise levels exceeding the NAC.**

### NSA E

NSA E consists of 20 single-family homes located on the southbound side of Route 1 in Triangle. Receivers 19, 24, and 24-1 would experience noise levels of 64, 59, and 61 dBA, respectively, under the Location Study Alignment Alternative, and 62, 60, and 60 dBA, respectively, under the No-build Alternative. Existing noise levels at these receivers are 61, 59, and 60 dBA, respectively. These receivers would not be impacted by the project.

**NSA F**

NSA F consists of six mobile homes and two single-family homes in Bradys Hill Mobile Homes located on the northbound side of Route 1. Receivers 23 and 25 would experience noise levels of 58 and 50 dBA, respectively, under the Location Study Alignment Alternative, and noise levels of 59 and 54 dBA, respectively, under the No-build Alternative. Existing noise levels at these receivers are 59 and 54 dBA, respectively. Receivers 23 and 25 would not be impacted by the project.

**NSA G**

NSA G consists of nine single-family homes in the Knolls of Dumfries located on the southbound side of Route 1. Receivers 26 and 26-1 would both experience noise levels of 53 dBA under the Location Study Alignment Alternative, and noise levels of 61 dBA and 55 dBA, respectively, under the No-build Alternative. Existing noise levels at these receivers are 59 and 54 dBA, respectively. These receivers would not be impacted by the project.

**NSA H**

NSA H consists of five single-family homes, two mobile homes, and one apartment building in Dumfries along Duke Street located on the southbound side of Route 1. Receivers 27, 27-1, 27-2, and 27-3 would experience noise levels of 59, 58, 61, and 62 dBA, respectively, under the Location Study Alignment Alternative, and 57, 57, 59, and 60 dBA, respectively, under the No-build Alternative. Existing noise levels at these receivers are 56, 58, 59, and 60 dBA, respectively. These receivers would not be impacted by the project.

**NSA I**

NSA I represents a baseball field, 3 mobile homes, and 13 single-family homes in Dumfries between the existing northbound and southbound lanes of Route 1. Receivers 28, 29, 30, 31, and 32 would experience noise levels of 61, 57, 58, 57, and 60 dBA, respectively, under the Location Study Alignment Alternative, and 58, 57, 59, 63, and 61 dBA, respectively, under the No-build Alternative. Existing noise levels at these receivers are 58, 56, 57, 61, and 60 dBA, respectively. These receivers would not be impacted by the project. Receiver 33, representing four single-family homes, would experience a noise level of 59 dBA under the Location Study Alignment Alternative, and 69 dBA under the No-build Alternative. The existing noise level at this receiver is 67 dBA. Receiver 38 would not be impacted under the Location Study Alignment Alternative. Under the No-build Alternative, this receiver still would have noise levels exceeding the NAC. Receiver 37 would experience a noise level of 65 dBA under the Location Study Alignment Alternative and 65 dBA under the No-build Alternative. The existing noise level at this receiver is 65 dBA. This receiver would not be impacted by the project. Receiver 38, representing one single-family home, would experience a noise level of 71 dBA under the Location Study Alignment Alternative, and 70 dBA under the No-build Alternative. The existing noise level at this receiver is 67 dBA. **Receiver 38 would be impacted under the Location Study Alignment Alternative. Under the No-build Alternative, this receiver still would have noise levels exceeding the NAC.**

**NSA J**

NSA J represents 3 apartment buildings and 14 single-family homes in Virginia Commons located on the southbound side of Route 1 at Allen Dent Road. Receiver 39, representing one apartment building, would experience a noise level of 66 dBA under the Location Study Alignment Alternative, and 65 dBA under the No-build Alternative. The existing noise level at this receiver is 63 dBA.

**Receiver 39 would be impacted under the Location Study Alignment Alternative.** Receivers 40, 41, 42 and 44 would experience noise levels of 62, 63, 60, and 57 dBA, respectively, under the Location Study Alignment Alternative, and 61, 62, 60, and 57 dBA, respectively, under the No-build Alternative. Existing noise levels at these receivers are 59, 60, 58, and 55 dBA, respectively. These receivers would not be impacted by the project. Receiver 43, representing 10 single-family homes, would experience a noise level of 69 dBA under the Location Study Alignment Alternative, and 68 dBA under the No-build Alternative. The existing noise level at this receiver is 67 dBA. **Receiver 43 would be impacted under the Location Study Alignment Alternative. Under the No-build Alternative, this receiver still would have noise levels exceeding the NAC.**

#### NSA K

NSA K consists of three apartment buildings located on the northbound side of Route 1. Receiver 45 would experience a noise level of 55 dBA under the Location Study Alignment Alternative, and 55 dBA under the No-build Alternative. The existing noise level at this receiver is 54 dBA. Receiver 45 would not be impacted by the project.

#### NSA L

NSA L represents five apartment buildings in the Fox Run Apartments and one single-family home located on the southbound side of Route 1. Receivers 50 and 54-1 representing three apartment buildings would experience noise levels of 61 and 64 dBA, respectively, under the Location Study Alignment Alternative, and 60, and 62 dBA, respectively, under the No-build Alternative. Existing noise levels at these receivers are 58 and 60 dBA, respectively. These receivers would not be impacted by the project. Receiver 46 representing one single-family home would experience a noise level of 66 dBA under the Location Study Alignment Alternative and 64 dBA under the No-build Alternative. The existing noise level at this receiver is 63 dBA. **Receiver 46 would be impacted under the Location Study Alignment Alternative.** Receiver 51 representing one apartment building would experience a noise level of 68 dBA under the Location Study Alignment Alternative and 65 dBA under the No-build Alternative. The existing noise level at this receiver is 64 dBA. **Receiver 51 would be impacted under the Location Study Alignment Alternative.** Receiver 53 representing one apartment building would experience a noise level of 70 dBA under the Location Study Alignment Alternative and 67 dBA under the No-build Alternative. The existing noise level at this receiver is 66 dBA. **Receiver 53 would be impacted under the Location Study Alignment Alternative. Under the No-build Alternative, this receiver still would have a noise level equaling the NAC.**

#### NSA M

NSA M represents 29 townhouses in Village Gate and one apartment building in The Woods at Potomac Mills located on the northbound side of Route 1. Receivers 47, 49, and 56 would experience noise levels of 65, 55, and 60 dBA, respectively, under the Location Study Alignment Alternative, and 64, 57, and 59 dBA, respectively, under the No-build Alternative. Existing noise levels at these receivers are 63, 55, and 57 dBA, respectively. These receivers would not be impacted by the project. Receivers 48 and 52, representing 15 townhouses, would experience noise levels of 70 and 73 dBA, respectively, under the Location Study Alignment Alternative, and 69 and 71 dBA, respectively, under the No-build Alternative. Existing noise levels at these receivers are 67 and 69 dBA, respectively. **Receivers 48 and 52 would be impacted under the Location Study**

**Alignment Alternative. Under the No-build Alternative, these receivers still would have noise levels exceeding the NAC.**

#### NSA N

NSA N represents seven single-family homes in Garfield Estates, located on the southbound side of Route 1. Receivers 57, 58, 59, and 60 would experience noise levels of 54, 63, 60, and 56 dBA, respectively, under the Location Study Alignment Alternative, and 53, 63, 57, and 55 dBA, respectively, under the No-build Alternative. Existing noise levels at these receivers are 52, 62, 56, and 54 dBA, respectively. These receivers would not be impacted by the project.

#### NSA O

NSA O represents 32 single-family homes in The Harbors of Newport located on the northbound side of Route 1. Receivers 61, 63, and 65, representing 16 single-family homes, would experience noise levels of 71, 70, and 66 dBA, respectively, under the Location Study Alignment Alternative. Each of these receivers would experience a noise level of 68 dBA under the No-build Alternative and have an existing noise level of 66 dBA. **These receivers would be impacted under the Location Study Alignment Alternative. Under the No-build Alternative, these receivers still would have noise levels exceeding the NAC.** Receivers 62 and 64 would experience noise levels of 59 and 60 dBA, respectively, under the Location Study Alignment Alternative, and 60 and 61 dBA, respectively, under the No-build Alternative. Existing noise levels at both these receivers are 59 dBA. Receivers 62 and 64 would not be impacted by the project.

#### NSA P

NSA P represents four townhouses at Rippon Landing located on the northbound side of Route 1 just north of Dale Boulevard. Receivers 67 and 68 would experience noise levels of 53 and 59 dBA, respectively, under the Location Study Alignment Alternative, and 51 and 59 dBA, respectively, under the No-build Alternative. Existing noise levels at these receivers are 51 and 59 dBA, respectively. These receivers would not be impacted by the project.

#### NSA Q

NSA Q represents a nursing home located on the southbound side of Route 1 at Mellott Road. Receiver 70 would experience a noise level of 57 dBA under the Location Study Alignment Alternative and 56 dBA under the No-build Alternative. The existing noise level at this receiver is 56 dBA. Receiver 70 would not be impacted by the project.

#### NSA R

NSA R represents five single-family homes and four mobile homes, located on the southbound side of Route 1. Receivers 71 and 74 would experience noise levels of 63 and 64 dBA, respectively, under the Location Study Alignment Alternative and 57 and 58 dBA, respectively, under the No-build Alternative. Existing noise levels at these receivers are 55 and 58 dBA, respectively. These receivers would not be impacted by the project. Receiver 73, representing two mobile homes on Sandra Drive, would experience a noise level of 68 dBA under the Location Study Alignment Alternative and 62 dBA under the No-build Alternative. The existing noise level at this receiver is 60 dBA. **Receiver 73 would be impacted under the Location Study Alignment Alternative.**

**NSA S**

NSA S represents three single-family homes and five apartment buildings in Lynwood, located on the northbound side of Route 1. Receivers 72, 75, 76, 77, and 78 would experience noise levels of 59, 57, 59, 65, and 64 dBA, respectively, under the Location Study Alignment Alternative and 54, 54, 57, 60, and 59 dBA, respectively, under the No-build Alternative. Existing noise levels are 51, 53, 56, 59, and 59 dBA, respectively. These receivers would not be impacted by the project.

**NSA T**

NSA T represents 16 mobile homes in Belair Mobile Homes, located on the southbound side of Route 1. Receivers 79 and 80, representing 16 mobile homes, would both experience noise levels of 66 dBA under the Location Study Alignment Alternative and 60 dBA under the No-build Alternative. The existing noise level at both receivers is 59 dBA. **These receivers would be impacted under the Location Study Alignment Alternative.**

**NSA V**

NSA V represents one apartment building in Bayvue, located on the northbound side of Route 1 on Longview Drive. Receiver 82 would experience a noise level of 69 dBA under the Location Study Alignment Alternative and 64 dBA under the No-build Alternative. **Receiver 82 would be impacted under the Location Study Alignment Alternative.**

**NSA W**

NSA W represents eight mobile homes, three single-family homes, and one church located on the southbound side of Route 1. Receivers 83, 84, 85, and 86 would experience noise levels of 54, 64, 60, and 63 dBA, respectively, under the Location Study Alignment Alternative, and 52, 61, 58, and 61 dBA, respectively, under the No-build Alternative. Existing noise levels at these receivers are 51, 61, 57, and 60 dBA, respectively. These receivers would not be impacted by the project.

**NSA X**

NSA X represents nine mobile homes in Holly Acres Mobile Homes, located on the northbound side of Route 1. Receiver 87 representing seven mobile homes would experience a noise level of 66 dBA under the Location Study Alignment Alternative and 64 dBA under the No-build Alternative. The existing noise level at this receiver is 63 dBA. **Receiver 87 would be impacted under the Location Study Alignment Alternative.** Receiver 89 would experience a noise level of 65 dBA under the Location Study Alignment Alternative and 64 dBA under the No-build Alternative. The existing noise level at this receiver is 63 dBA. Receiver 89 would not be impacted by the project.

**Summary of Impacts**

Four apartment buildings, 15 townhouses, 38 single-family homes, and 25 mobile homes would be impacted in the design year under the Location Study Alignment Alternative, as compared to the design-year No-build Alternative, under which 2 apartment buildings, 15 townhouses, 37 single-family homes, and a pool and 2 tennis courts at a community center would have noise levels approaching or exceeding the NAC. Many of the impacted sites are first-row receivers. Many of the sites that are not impacted are farther away from Route 1, are shielded by other structures, and/or are second- or third-row receivers. None of the receivers in the study area would experience a substantial increase in noise levels of 10 dBA or more between existing conditions and the design-year Location Study Alignment Alternative. **Table 5** lists the receivers impacted under the Location Study Alignment Alternative.

**TABLE 5  
SUMMARY OF LOCATION STUDY ALIGNMENT BUILD ALTERNATIVE IMPACTS**

NSA	Receiver	Name & Number of Noise-Sensitive Entities	Nearest Plan Station #	Type of Receiver
D	17	5 single-family homes in Triangle	233	First-Row Residences
	22	2 single-family homes in Triangle	244	First-Row Residences
	23-1	3 single-family homes in Triangle	251	First-Row Residences
I	38	1 single-family home in Dumfries	335	First-Row Residence
J	39	1 apartment buildings in Virginia Commons	387	First-Row Residences
	43	10 single-family homes in Virginia Commons	398	First-Row Residences
L	46	1 single-family home	420	First-Row Residence
	51	1 apartment building in Fox Run	432	First-Row Residences
	53	1 apartment building in Fox Run	433	First-Row Residences
M	48	8 townhouses in Village Gate	428	First-Row Residences
	52	7 townhouses in Village Gate	433	First-Row Residences
O	61	3 single-family homes in The Harbors of Newport	478	First-Row Residences
	63	6 single-family homes in The Harbors of Newport	483	First-Row Residences
	65	7 single-family homes in The Harbors of Newport	489	First-Row Residences
R	73	2 mobile homes	615	Second-Row Residences
T	79	8 mobile homes in Belair Mobile Homes	634	Second-Row Residences
	80	8 mobile homes in Belair Mobile Homes	638	Second-Row Residences
V	82	1 apartment building in Bayvue	665	Second-Row Residences
X	87	7 mobile homes in Holly Acres Mobile Homes	696	Second-Row Residences

**5.3 Noise Contours**

Noise contours are lines of equal noise exposure that parallel the roadway noise source, and diminish in intensity with distance. The location of the 66-dBA noise contour was identified for the Location Study Alignment Alternative to characterize the noise environment in the study area and calculate impacts. **Table 6** shows the approximate distances between the roadway centerline and the 66-dBA noise contours for the Location Study Alignment Alternative at the impacted receivers.

**TABLE 6  
LOCATION STUDY ALIGNMENT BUILD ALTERNATIVE (2025) 66-dBA NOISE CONTOUR DISTANCES**

NSA	Representative Sites	Distance to 66-dBA Noise Contour from Centerline of Roadway (feet)
D	Receiver 17	100
	Receiver 22	60
	Receiver 23-1	60
I	Receiver 38	180
J	Receiver 39	150
	Receiver 43	120
L	Receiver 46	165
	Receiver 51	150
	Receiver 53	85
M	Receiver 48	100
	Receiver 52	80
O	Receiver 61	160
	Receiver 63	150
	Receiver 65	100
R	Receiver 73	350
T	Receiver 79	280
	Receiver 80	275
V	Receiver 82	250
X	Receiver 87	200

Note: Variability in distance to 66-dBA contour is attributable to variations in terrain and shielding provided by other buildings.

## 6. ABATEMENT MEASURES

Four apartment buildings, 15 townhouses, 38 single-family homes, and 25 mobile homes would be impacted in the design year under the Location Study Alignment Alternative. Abatement measures have been considered, including traffic management measures, vertical and horizontal alignment shifts, and noise barriers construction. Traffic management measures, such as restricting or rerouting heavy trucks and modifying speed limits, are not considered feasible as abatement measures for this project because they would compromise traffic operations and the basic transportation functions of Route 1. Horizontal or vertical alignment shifts sufficient to provide meaningful noise abatement are not feasible because of the need to stay generally on the existing alignment of Route 1 and maintain connections to existing intersecting roads and property entrances. Construction of noise barriers has been evaluated as discussed in more detail below. **Table 7** summarizes pertinent features of the feasible noise barriers. **Figure 7** shows the locations of the barriers.

**TABLE 7**  
**SUMMARY OF FEASIBLE NOISE BARRIERS**

Barrier	NSA/ Receiver	Noise Level w/o Barrier (dBA)	Noise Level with Barrier (dBA)	Noise Reduction (dBA)	Height (feet)	Length (feet)	Area (sq ft)	Total Cost*	Cost Per Protected Residence**
J1	J/39	66	61	5	14-16	318	4,751	\$104,522	\$20,904
J2	J/43	69	63	6	8-16	922	12,681	\$278,982	\$27,898
O	O/61	71	64	7	10	1,327	13,269	\$291,918	\$18,245
	O/63	70	64	6					
	O/65	66	59	7					

\* Costs based on planning level cost estimate of \$22/square foot derived from recent VDOT construction bid tabulations.  
 \*\* It is estimated that 5 ground-level apartments within the apartment building would be protected by barrier J1 at Receiver 39. Barrier J2 would protect 10 single-family homes. Barrier O would protect 16 single-family homes.

### NSA A

Receivers 1, 2, 3, 4, and 5 in NSA A would not be impacted under the Location Study Alignment Alternative. Therefore, a noise barrier was not considered for NSA A.

### NSA B

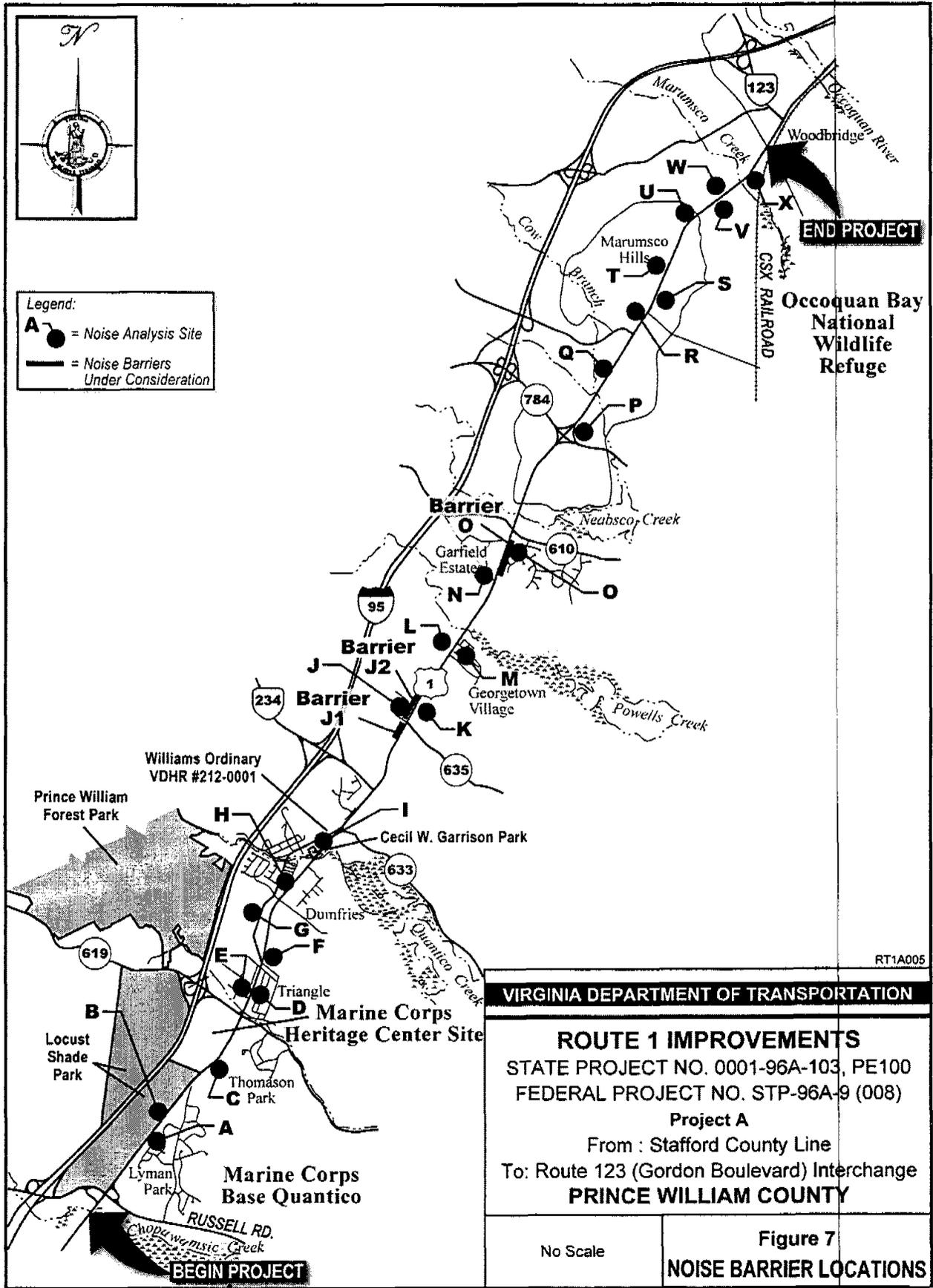
Receivers 6, 7, and 8 in Locust Shade Park would not be impacted under the Location Study Alignment Alternative. Therefore, a noise barrier was not considered for NSA B.

### NSA C

Receivers 9, 10, and 11 in NSA C would not be impacted under the Location Study Alignment Alternative. Therefore, a noise barrier was not considered for NSA C.

### NSA D

Receivers 18 and 23-2 in NSA D would not be impacted under the Location Study Alignment Alternative. Therefore, a noise barrier was not considered for these receivers. Receivers 17, 22, and 23-1, representing 10 single-family homes, would be impacted under the Location Study Alignment Alternative. A noise barrier was considered for NSA D, but was eliminated from detailed evaluation because a barrier would block access to and from Route 1 for these homes.



**NSA E**

Receivers 19, 24, and 24-1 in NSA E would not be impacted under the Location Study Alignment Alternative. Therefore, a noise barrier was not considered for NSA E.

**NSA F**

Receivers 23 and 25 in NSA F would not be impacted under the Location Study Alignment Alternative. Therefore, a noise barrier was not considered for NSA F.

**NSA G**

Receivers 26 and 26-1 in NSA G would not be impacted under the Location Study Alignment Alternative. Therefore, a noise barrier was not considered for NSA G.

**NSA H**

Receivers 27, 27-1, 27-2, and 27-3 in NSA H would not be impacted under the Location Study Alignment Alternative. Therefore, a noise barrier was not considered for NSA H.

**NSA I**

Receivers 28, 29, 30, 31, 32, 33, and 37 would not be impacted under the Location Study Alignment Alternative. Therefore, a noise barrier was not considered for these receivers. Receiver 38, representing one single-family home, would be impacted under the Location Study Alignment Alternative. A noise barrier was considered for this location, but was eliminated from further evaluation because a noise barrier would block access from this single-family home to Route 1.

**NSA J**

Receivers 40, 41, 42, and 44 would not be impacted under the Location Study Alignment Alternative. Therefore, a noise barrier was not considered for these receivers. Receiver 39, representing one apartment building south of Allen Dent Road, would be impacted under the Location Study Alignment Alternative. A noise barrier that would extend 318 feet southward along southbound Route 1 from Allen Dent Road was evaluated. The barrier description is detailed in Table 7 and Figure 7. Receiver 43, representing 10 first-row single-family homes north of Allen Dent Road, would be impacted under the Location Study Alignment Alternative. A noise barrier for these receivers would extend 922 feet northward along southbound Route 1 from Allen Dent Road, was evaluated. The barrier description is detailed in Table 7 and the location is shown in Figure 7. The two barriers analyzed for NSA J appear to be feasible and reasonable according to VDOT noise abatement criteria and policy and will receive further consideration.

**NSA K**

Receiver 45 in NSA K would not be impacted under the Location Study Alignment Alternative. Therefore, a noise barrier was not considered for NSA K.

**NSA L**

Receivers 50 and 54-1 would not be impacted under the Location Study Alignment Alternative. Therefore, a noise barrier was not considered for these receivers. Receiver 46, representing one single-family home, would be impacted under the Location Study Alignment Alternative. A noise barrier was considered for this location, but was eliminated from detailed evaluation because a noise barrier would block access from this single-family home to Route 1. Receivers 51 (representing one

first-row apartment building) and 53 (representing one first-row apartment building) would be impacted under the Location Study Alignment Alternative. A noise barrier was considered for these receivers, but was eliminated from detailed evaluation because a noise barrier would block the entrance road from the apartment community to Route 1.

#### NSA M

Receivers 47, 49, and 56 would not be impacted under the Location Study Alignment Alternative. Therefore, a noise barrier was not considered for these receivers. Receivers 48 (representing eight townhouses) and 52 (representing seven townhouses) would be impacted under the Location Study Alignment Alternative. A noise barrier was considered for this location, but was eliminated from detailed evaluation because a noise barrier would block the entrance roads from the townhouse community to Route 1.

#### NSA N

Receivers 57, 58, 59, and 60 in NSA N would not be impacted under the Location Study Alignment Alternative. Therefore, a noise barrier was not considered for NSA N.

#### NSA O

Receivers 61 (representing three first-row single-family homes), 63 (representing six first-row single-family homes), and 65 (representing seven first-row single-family homes) would be impacted under the Location Study Alignment Alternative. A noise barrier that would extend 1,327 feet along northbound Route 1 south of Neabsco Road was evaluated. The barrier description is detailed in Table 7 and the location is shown in Figure 7. This barrier appears to be feasible and reasonable according to VDOT noise abatement criteria and policy and will receive further consideration. Receivers 62 and 64 would not be impacted under the Location Study Alignment Alternative. Therefore, a noise barrier was not considered for these receivers.

#### NSA P

Receivers 67 and 68 in NSA P would not be impacted under the Location Study Alignment Alternative. Therefore, a noise barrier was not considered for NSA P.

#### NSA Q

Receiver 70 in NSA Q would not be impacted under the Location Study Alignment Alternative. Therefore, a noise barrier was not considered for NSA Q.

#### NSA R

Receivers 71 and 74 would not be impacted under the Location Study Alignment Alternative. Therefore, a noise barrier was not considered for these receivers. Receiver 73 (representing two second-row mobile homes) would be impacted under the Location Study Alignment Alternative. A noise barrier was considered for Receiver 73 in NSA R, but was eliminated from detailed evaluation because a barrier would block access to and from Route 1 for these homes.

#### NSA S

Receivers 72, 75, 76, 77, and 78 in NSA S would not be impacted under the Location Study Alignment Alternative. Therefore, a noise barrier was not considered for NSA S.

**NSA T**

Receivers 79 and 80 in NSA T would be impacted under the Location Study Alignment Alternative. A noise barrier was considered for these receivers, but was eliminated from evaluation because a barrier would block the entrance road to the mobile home community and driveways to businesses along Route 1.

**NSA V**

Receiver 82 would be impacted under the Location Study Alignment Alternative. A noise barrier was considered for this receiver, but was eliminated from evaluation because a barrier would block access to businesses along Route 1.

**NSA W**

Receivers 83, 84, 85, and 86 in NSA W would not be impacted under the Location Study Alignment Alternative. Therefore, a noise barrier was not considered for NSA W.

**NSA X**

Receiver 87 (representing seven mobile homes) would be impacted under the Location Study Alignment Alternative. A noise barrier was considered for these receivers, but was eliminated from detailed evaluation because a barrier would block the entrance road from the mobile home community to Route 1 and driveways to businesses along Route 1. Receiver 89 would not be impacted under the Location Study Alignment Alternative. Therefore, a noise barrier was not considered for this receiver.

**7. CONSTRUCTION NOISE**

Noise-sensitive land uses in the study area that would be affected by traffic noise also would be affected by construction noise. Construction noise can be controlled by establishing a maximum level of noise that construction operations can generate. VDOT has developed, and FHWA has approved, a specification that establishes construction noise limits. This specification can be found in VDOT's *Road and Bridge Specifications*, dated 2002, under "Noise" [Section 107.14 (b) 3.]. The construction contractor will be required to conform to this specification to reduce the impact of construction noise on noise-sensitive sites.

**REFERENCES**

- ADC of Alexandria, Inc., 2000, *Prince William County, Virginia*. Alexandria, VA.
- Code of Federal Regulations (CFR), Part 772, Title 23. *Procedures for Abatement of Highway Traffic Noise and Construction Noise*.
- United States Department of Transportation, Federal Highway Administration. May 1996. *Measurement of Highway-Related Noise*.
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