

DOMINION BOULEVARD / US 17 IMPROVEMENTS PROJECT

City of Chesapeake, Virginia

From: 2.6 Miles South of Cedar Road (Existing Improved US 17)

To: Route 190

State Project: (FO) 0140-131-106, PE101

Federal Project: AC-STP-104-5(001)

ENVIRONMENTAL ASSESSMENT

Prepared Pursuant to 42 U.S.C. 4332 (2)(c) by:



U. S. Department of Transportation
Federal Highway Administration, Virginia Division

and



Virginia Department of Transportation

We concur that this document is acceptable for public availability.

John Dimkins

for: Division Administrator

8/15/08

Date



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1.0 PURPOSE AND NEED

1.1 STUDY AREA

The objective of this study is to evaluate proposed improvements along Dominion Boulevard / US 17 from existing improved US 17 (2.6 miles south of Cedar Road) to the I-64/I-464/Oak Grove Connector Interchange (for a total length of approximately 5.9 miles). The assessment has been conducted in accordance with the National Environmental Policy Act (NEPA), associated NEPA Regulation (40 CFR Part 1500), and U.S. Department of Transportation, Federal Highway Administration Regulation for Implementing NEPA (23 CFR Part 771). The project location within a regional context is shown in Figure 1-1. The project corridor is depicted in Figure 1-2.

1.2 HISTORY

Dominion Boulevard is presently a two-lane highway that was constructed in the 1960's. The existing moveable bridge over the Southern Branch of the Elizabeth River (commonly referred to as "the Steel Bridge") was constructed in 1962 and was re-decked in 1997. The need for replacement of the existing bridge and the construction of a four-lane or six-lane facility between Interstate 464/64 and old U.S. Route 17 in the City of Chesapeake was initially identified in the Hampton Roads 2015 Regional Transportation Plan and the February 1990 City of Chesapeake Master Road Plan.

To further evaluate this need and to identify practicable means for addressing this need, a report titled the "Route 104 Feasibility Study" was initiated by VDOT in the fall of 1997 and was concluded in March of 1999. For comparative purposes, the feasibility study analyzed Dominion Boulevard (formerly "Route 104") as a controlled access facility with at-grade intersections as well as a limited access facility with grade separations at Cedar Road, Bainbridge Boulevard, and Great Bridge Boulevard.

The feasibility study evaluated alternatives for an arterial concept, a freeway concept, and a combination of both. Bridge alternatives initially included a 30-foot vertical clearance moveable bridge, a 65-foot vertical clearance moveable bridge, and a 65-foot vertical clearance fixed bridge. The alternatives were evaluated by a study team task force, which subsequently recommended construction of a four-lane divided arterial roadway within the existing limited access right-of-way at the southern terminus of the corridor (i.e., from US 17 to just south of Cedar Road). From this point north, the roadway was recommended to be a four-lane divided freeway to the northern terminus north of Great Bridge Boulevard. The task force further recommended that grade-separated interchanges be constructed at Cedar Road, Bainbridge Boulevard, and Great Bridge Boulevard.

During the course of the feasibility study, the U.S. Coast Guard (USCG) issued a public notice requesting comment on the proposed bridge. Two maritime industries on the east side of the Steel Bridge (Tidewater Construction, Inc. and Norfolk Dredging) requested greater than the proposed 65 feet of fixed vertical clearance. Pursuant to the Rivers and Harbors Appropriation Act, the USCG investigated these requests and determined that they were both considered to be reasonable needs. The USCG issued a ruling on 10 November 1998 that a moveable-span bridge or a fixed-span bridge with of a minimum of 95 feet vertical clearance would be required for the crossing. In accordance with the USCG ruling, a 95-foot vertical clearance fixed-span bridge at the crossing of the Southern Branch of the Elizabeth River was ultimately recommended in the feasibility study.

Preliminary engineering studies of the replacement bridge and certain roadway improvements commenced in March of 2004. At that time, the project was evaluated as a limited access facility extending from a point just north of Great Bridge Boulevard to Cedar Road. Since 2005, the project has been evaluated as a toll facility due to a lack of transportation funding, and the Hampton Roads 2026 Regional Transportation Plan (RTP) was amended accordingly. The RTP now identifies the current Dominion Boulevard Improvements Project (i.e., that portion between the I-64/I-464/Oak Grove Connector Interchange and existing improved US 17) as a high priority project consisting of a four-lane toll facility with interchanges at Great Bridge Boulevard, Bainbridge Boulevard/Dominion Lakes, and Cedar Road. With the concomitant need to prevent diversions and to collect all appropriate tolls, it became necessary to eliminate all types of potential facilities other than a fully access-controlled facility.

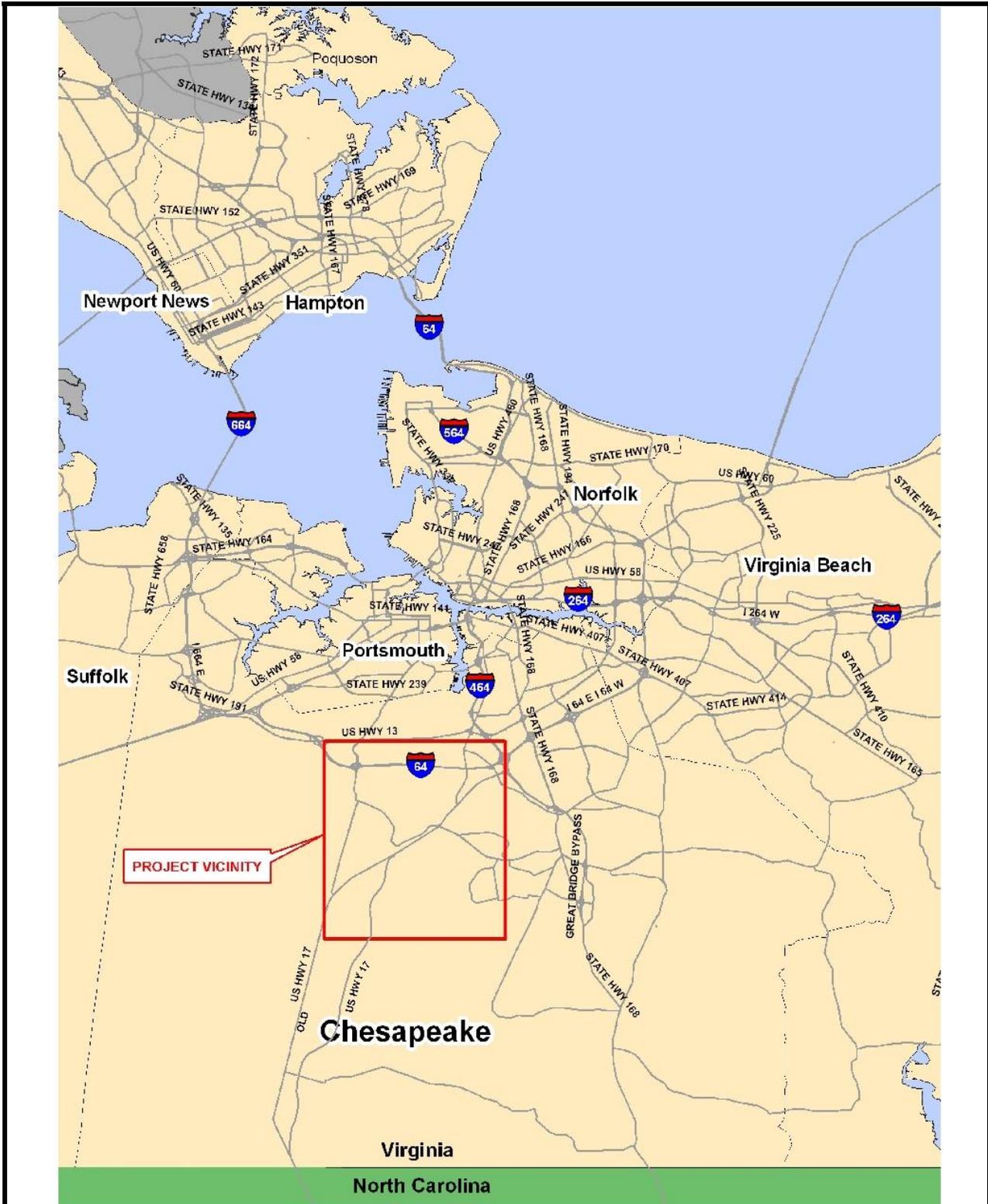


Figure 1-1
Regional Location

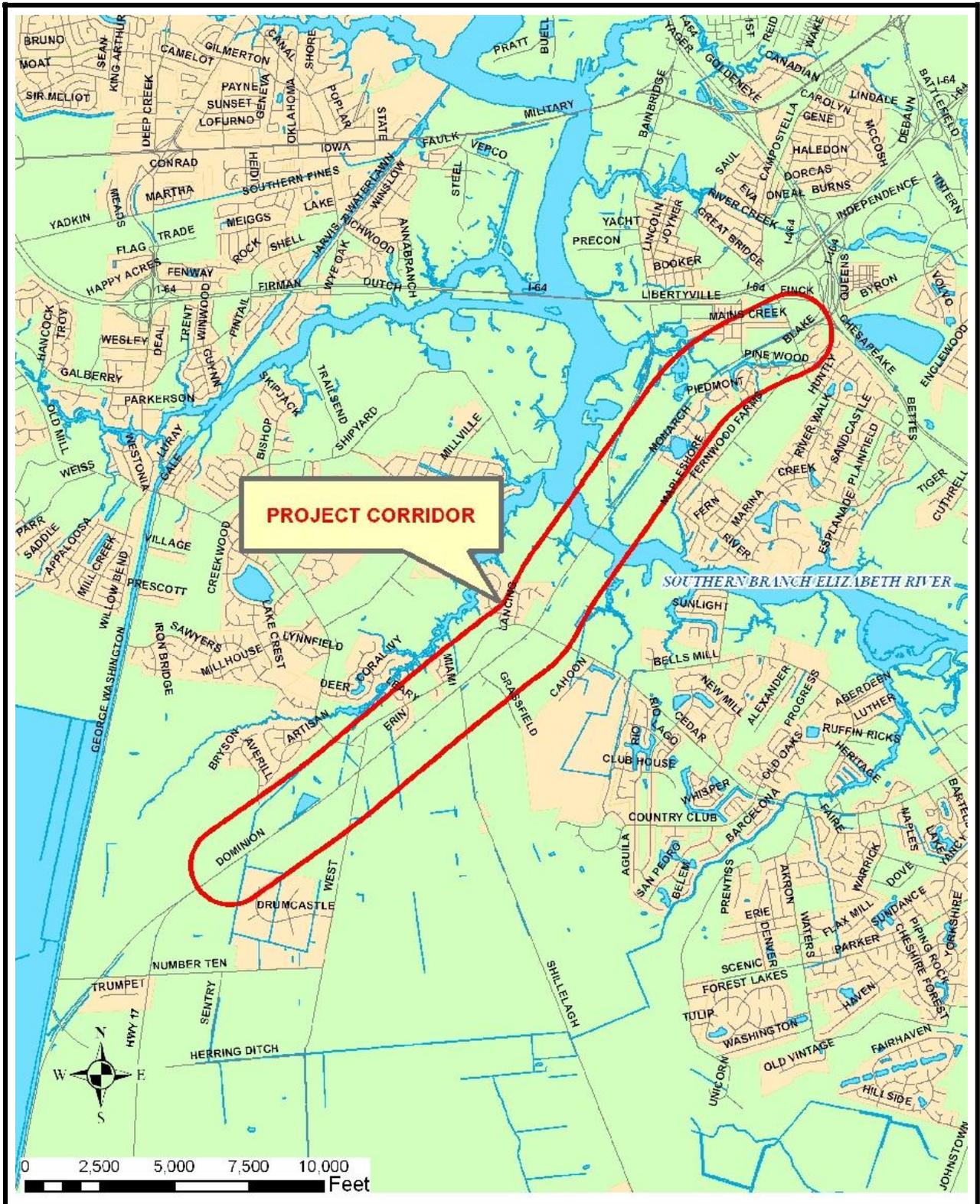


Figure 1-2
Project Corridor



1.3 NEEDS

1.3.1 Existing Conditions

Currently, Dominion Boulevard / US 17 corridor is characterized by (1) a substandard bridge height over the Southern Branch of the Elizabeth River that requires numerous bridge openings for watercraft traffic, (2) ever-increasing traffic volumes, and (3) on-going traffic safety concerns. The existing bridge over the Southern Branch of the Elizabeth River (commonly referred to as “the Steel Bridge”) is a double-leaf bascule bridge that was built in the 1960’s. It carries two lanes of traffic (one in each direction) and, due to its low clearance, currently opens over 6,000 times per year. These bridge openings result in frequent disruptions in traffic flow (for both highway and waterway traffic) and significant backups along Dominion Boulevard on both sides of the river. The efficiency at which a particular road segment normally operates is expressed in terms of “level of service” or LOS. Levels of service range from LOS “A” (representing best operating conditions) to LOS “F” (representing (worst operating conditions). Traffic counts conducted in 2006 confirm that the signalized intersection of Dominion Boulevard and Cedar Road currently operates at borderline unacceptable levels of service. The intersection of Dominion Boulevard and Great Bridge Boulevard performs at LOS D. During the morning peak hour, the operation of the side street of Dominion Lakes is unacceptable with LOS E, while the side street of Bainbridge Boulevard encounters serious delay during the evening peak period. More-detailed discussion of levels of service of study area roads is presented in the Traffic and Transportation Technical Report (City of Chesapeake, 2007). The injury crash rate on Dominion Boulevard (127 per 100 million vehicle miles traveled [MVMT]) is 53 percent greater than the average of two-lane undivided highway statewide (85 per 100 MVMT).

1.3.2 Future Conditions

The Hampton Roads Planning District Commission (HRPDC) 2026 regional demand model was utilized as a basis for projecting future traffic volumes for the corridor. A traffic study conducted in 2006 as part of this Environmental Assessment analyzed the existing and future “No-Build” traffic conditions to establish baseline conditions and determine existing and future deficiencies to study area roadways. The traffic study also included an analysis of future roadway improvement options for (1) widening Dominion Boulevard / US 17 to a four-lane section with improved at-grade intersections, and (2) widening Dominion Boulevard / US 17 to a four-lane section with interchanges at Cedar Road, Bainbridge Boulevard, and Great Bridge Boulevard.

Subsequent to the completion of the 2006 traffic study, the Region adopted a 2030 Long Range Transportation Plan. In order to provide insight into the new 2030 model, a review of the resulting model volumes was conducted. Based on this review, some differences were revealed between comparable roadway segments within the two model sets. However, it is believed that these variations are not enough to substantially change the results of the 2006 traffic analysis. The complete 2006 traffic analysis is presented in the Traffic and Transportation Technical Report.

In summary, the 2006 traffic analyses show that the signalized intersections of Dominion Boulevard at Cedar Road and Great Bridge Boulevard, as well as the unsignalized intersections at Bainbridge Boulevard and Dominion Lakes are expected to operate at unacceptable levels of service by 2029 under no-build conditions. Traffic analyses conducted as part of this Environmental Assessment indicate (1) that traffic volumes for a tolled freeway facility do not necessitate more than four lanes and (2) that six lanes would not be needed prior to 2030. As traffic volumes increase, bridge openings, roadway capacity, and safety concerns will become increasingly more critical under a no-build scenario.

Needs for the Dominion Boulevard / US 17 Improvements Project consist of the following:

- To reduce or eliminate the number of stopped vehicles caused by bridge openings at the present crossing over the Southern Branch of the Elizabeth River, thereby improving traffic flow, emergency response, and hurricane evacuation attributes of the corridor.
- To address present and projected deficiencies in the corridor which contribute to current and future traffic safety concerns.
- To provide facility improvements that will generate acceptable levels of service through year 2030.



1.4 PURPOSE/SUMMARY

The present need for improvements within stated project limits arises from the fact that the existing Dominion Boulevard / US 17 corridor is characterized by (1) a substandard bridge height over the Southern Branch of the Elizabeth River which requires numerous bridge openings, (2) ever-increasing traffic volumes, and (3) on-going traffic safety concerns. Through several phases of design and construction, the proposed Dominion Boulevard / US 17 Improvements Project would ultimately convert existing Dominion Boulevard / US 17 to a limited access four-lane toll facility throughout the proposed project limits. These improvements would reduce or eliminate the number of bridge openings, would provide acceptable levels of service through year 2030, and would address present and future traffic safety concerns.



2.0 ALTERNATIVES

To address the needs identified in Chapter 1 and to promote more-efficient flow of traffic along Dominion Boulevard / US 17, roadway improvements and a new bridge to replace the existing bridge over the Southern Branch of the Elizabeth River are proposed. The no-build scenario and a range of reasonable build alternatives were identified for consideration and development leading up to identification of a Proposed Alternative. A discussion of the initial screening and selection process leading to identification of reasonable alternatives considered is presented in the *Alternatives Development and Screening Technical Report* (City of Chesapeake, 2006). A discussion of the screening and analysis process leading to identification of the Proposed Build Alternative is presented in the *Alternatives Analysis Technical Report* (City of Chesapeake, 2007).

For the purpose of developing alternatives, the Dominion Boulevard / US 17 Improvements Project was divided into five functional components. From south to north, these components are:

- Dominion Boulevard / US 17 widening south of the Cedar Road (Segment S).
- The Cedar Road Interchange (Segment A).
- The new bridge over the Southern Branch of the Elizabeth River (hereinafter referred to as the Elizabeth River Bridge or ERB).
- Dominion Boulevard / US 17 Mainline and the Relocated Bainbridge Boulevard / Diamond Lakes Interchange (Segment B).
- The Great Bridge Boulevard Interchange (Segment C).

As part of this alternatives analysis, transportation and traffic analyses were conducted to support the development of alignment options, location and configuration of interchanges, determination of capacity requirements, assessment of how alternatives would meet the project's purpose and needs, and the screening of environmental impacts. Traffic data and results of analyses are presented in the *Traffic and Transportation Technical Report* (City of Chesapeake, 2008). The transportation and traffic analyses analyzed the existing and future no-build traffic conditions to establish baseline conditions and determine existing and future deficiencies to study area roadways. The transportation and traffic analyses also included an analysis of the following roadway improvement alternatives:

- Widening Dominion Boulevard / US 17 to a four-lane section with improved at-grade intersections.
- Widening Dominion Boulevard / US 17 to a four-lane section with interchanges at three locations - Cedar Road, Bainbridge Boulevard, and Great Bridge Boulevard.

As discussed in greater detail below, a 65-foot fixed bridge over the Southern Branch of the Elizabeth River was eliminated from further consideration during early phases of study because of a ruling by the U.S. Coast Guard (USCG) stating that a minimum fixed vertical clearance of 95 feet or a moveable bridge would be required. The USCG's ruling was based on historically established uses and demonstrated needs of navigable waters for two maritime industries located on the east side (upstream side) of the existing Steel Bridge. Although a 1999 Feasibility Study did not recommend a moveable bridge because of substantially higher construction and operating costs, a 65-foot moveable bridge alternative was included as part of this study to provide additional investigation and substantiation of earlier findings.

Substantive comments received from review agencies and the general public were considered to determine how the various segment alternatives would be combined to form the candidate build alternatives discussed below.

2.1 SEGMENT-SPECIFIC OPTIONS CONSIDERED BUT ELIMINATED FROM FURTHER EVALUATION

A feasibility study for the Dominion Boulevard Improvements Project was conducted by the Virginia Department of Transportation between 1996 and 1999. As part of that study, an evaluation of options for replacing the existing drawbridge over the Southern Branch of the Elizabeth River was conducted. Because the feasibility study ultimately recommended that a moveable bridge not be constructed due to its higher construction and operating costs, a bridge with a fixed vertical clearance of 65 feet was presented for USCG consideration because 65 feet is the standard vertical clearance required by the USCG for the Intracoastal



Waterway system. In response, the USCG issued a public notice requesting comment on the proposed bridge. Two maritime industries located on the east side (upstream side) of the existing Steel Bridge (Tidewater/ Skanska Construction and Norfolk Dredging) responded to the public notice. Based on historically established uses of the waterway, both of these entities requested greater than the proposed 65 feet of fixed vertical clearance. Pursuant to the Rivers and Harbors Act of 1899, the USCG investigated these requests and determined that they were both considered to be reasonable needs. Tidewater/Skanska Construction initially requested a fixed vertical clearance of 110 feet in order to accommodate a barge-mounted crane moored at their yard just upstream of the Steel Bridge. Following their investigation of Tidewater/Skanska Construction's request, the USCG determined that the barge-mounted crane could be accommodated by 95 feet of vertical clearance. Since Norfolk Dredging had only requested 90 feet of clearance, the USCG issued a ruling on November 10, 1998 that a minimum fixed vertical clearance of 95 feet or a moveable bridge would be required for the crossing.

During initial screening, three segment-specific interchange alternatives were eliminated from further evaluation because of design constraints and conflicting land use issues. As discussed in the *Alternatives Development and Screening Technical Report* (City of Chesapeake, 2006), these eliminated alternatives were:

- A partial cloverleaf interchange at Cedar Road (Segment A), which was dropped from further consideration because of large land requirements and associated impacts to existing residential properties.
- A diamond interchange at Bainbridge Boulevard and Dominion Lakes (Segment B), which was dropped from consideration because of greater impacts to the surrounding land compared to other practicable alternatives and because of the additional cost of the ramps that were to be on-structure.
- A single point urban interchange with Great Bridge Boulevard Elevated (Segment C), which was dropped from consideration because impacts to existing businesses would have been substantial.

Several toll-related options were assessed but eliminated from further evaluation as part of the initial screening process. These toll-related options include:

- Construction and operation of the facility as a non-toll facility.
- Construction and operation of the facility as a toll facility using manual tolling only (i.e., a toll plaza).
- Construction and operation of the facility as a toll facility using a combination of manual tolling and open-road tolling.

As discussed in the *Alternatives Development and Screening Technical Report* (City of Chesapeake, 2007), the *Traffic and Transportation Technical Report* (City of Chesapeake, 2007), and as previously discussed in section 1.2 of this report, the non-toll option was eliminated from further consideration due to the lack of transportation funding and a resulting amendment of the Hampton Roads 2026 Regional Transportation Plan (RTP). With the concomitant need to prevent diversions and to collect all appropriate tolls, it became necessary to eliminate all types of potential facilities other than a fully access-controlled facility. In addition, to make the facility functional to as wide a range of potential users as possible, improvements to the section south of Cedar Road were also included as part of the study. Initial evaluation of the facility as a toll facility has been performed using an average toll rate of one dollar per vehicle. Preliminary findings of a financial study conducted by the City of Chesapeake in early 2007 indicate that it is feasible to construct, maintain, and operate the facility as a toll facility.

As discussed in following sections, the project is proposed to be constructed as a toll facility, with means of collecting tolls being located north of the Elizabeth River. Locating a toll collection facility south of the river would not be practicable due to geometric constraints imposed by the proximity of the proposed bridge touch-down point and the proposed Cedar Road Interchange. As discussed in the *Alternatives Development and Screening Technical Report* and the *Alternatives Analysis Technical Report*, the construction and operation of the facility as a toll facility using manual tolling only or a combination of manual tolling and open-road tolling was eliminated from further consideration due to greater encroachment into an existing landfill, the resulting need to dispose of solid and potentially hazardous wastes, and the greater construction costs that would be incurred under each of these alternatives. Assessment of the facility as a toll facility using open-road tolling alone would result in lesser environmental impacts, lower construction and operating costs, and would be



consistent with open-road tolling directives set forth in Virginia’s recently enacted Hampton Roads Transportation Authority Act (Virginia Acts of Assembly; Chapter 10.2, Section 33.1-391.8. Powers of Authority). Specifically, the Act states, “Any tolls imposed by the Authority shall be collected by an electronic toll system that, to the extent possible, shall not impede traffic flow.”

2.2 ALTERNATIVES CARRIED FORWARD

2.2.1 The No-Build Alternative

Consistent with NEPA and FHWA guidelines, full consideration is being given to the socioeconomic and environmental consequences of taking no action (hereinafter referred to as the “No-Build Alternative”). The No-Build Alternative includes routine maintenance improvements that maintain the continuing operation of the existing roadway network in the study area and currently programmed, committed, and funded roadway and transit projects as included in the CLRP and the VDOT Six Year Program. The No-Build Alternative, while having minor direct construction impacts, would result in other economic, environmental, and quality of life impacts that can be expected from the continuation of roadway system deficiencies. While the No-Build Alternative does not meet the project needs for traffic, safety, and roadway infrastructure improvements, it provides a baseline condition with which to compare the improvements and consequences associated with candidate build alternatives. Key differences in the no-build and the build scenarios include those presented below in Table 2-1.

Table 2-1. Comparison of the No-Build and Typical Build Alternatives

Factor or Issue	No-Build Alternative	Typical Build Alternative
Range of LOS at 2030	LOS E to LOS F	LOS B to LOS C
Number of Bridge Openings Per Year	6,000	0 to 25
Annual Bridge Operation & Maintenance Costs	\$260,000	\$20,000 to \$260,000

2.2.2 Segment-Specific Build Alternative Options

For the proposed Elizabeth River Bridge (ERB) and for project segments A, B, and C, several alternative options were developed to the preliminary engineering phase and were further assessed for functionality and environmental effects. Because Segment S south of Cedar Road would entail widening of Dominion Boulevard / US 17 within existing right-of-way with no major interchange modifications, only one build alternative was developed for this segment. Segment alternatives that were developed to the preliminary engineering phase and assessed through preliminary screening are presented in Table 2-2. More-detailed description of these segment alternative options is presented in the *Alternatives Development and Screening Technical Report* (City of Chesapeake, 2006).

Table 2-2. Segment-Specific Build Alternative Options

Functional Component	Alternative Option
Segment S (Dominion Boulevard / US 17 South of Cedar Road)	Alternative S1 (Widening on existing centerline)
Segment A (Cedar Road Interchange) ¹	Alternative A1 (Diamond Interchange)
	Alternative A2 (Single Point Urban Interchange)
	Alternative A3 (Westward-Shifted Single Point Urban Interchange)
ERB (Elizabeth River Bridge)	Alternative ERB65 (65-Foot Moveable Bridge)
	Alternative ERB95 (95-Foot Fixed Bridge)
Segment B (Dominion	



Functional Component	Alternative Option
Boulevard / US 17 along with the Bainbridge Boulevard / Dominion Lakes Interchange)	Alternative B1 (Diamond Interchange at Relocated Bainbridge Boulevard with Unshifted Dominion Boulevard / US 17 and Open-Road Tolling)
	Alternative B2 (Diamond Interchange at Relocated Bainbridge Boulevard with Westward Shifted Dominion Boulevard / US 17 and Open-Road Tolling)
	Alternative B3 (Diamond Interchange at Relocated Bainbridge Boulevard with Westward Shifted Dominion Boulevard / US 17 and Manual Tolling)
Segment C (Great Bridge Boulevard Interchange) ¹	Alternative C1 (Diamond Interchange with Dominion Boulevard / US 17 Elevated)
	Alternative C2 (Single Point Urban Interchange with Dominion Boulevard / US 17 Elevated)

¹ To provide access to adjacent residential communities and commercial properties, several access modifications would be required. Access roads (as shown in Figures 2-1 through 2-5) are required for all interchange alternatives.

2.2.3 Candidate Build Alternatives

2.2.3.1 Screening of Build Alternatives

Based on the number of alternatives considered for each of the project segments (Table 2-2), the various alternatives can be combined in as many as 36 variations to assemble the entire 5.6-mile-long improvements project. To compare the various build alternatives from the perspective of beneficial and adverse effects, an assessment matrix was developed as part of this study (see Appendix A of the *Alternatives Development and Screening Technical Report*). This assessment matrix assessed each build alternative by segment weighing such factors as costs, constructability, ability to satisfy the various elements of the purpose and need, impacts to the built environment, and impacts to the natural environment. Numerical values were assigned under each of the assessment factors based on the relative contribution of a beneficial attribute or the relative severity of an impact.

Using this method, the assessment matrix indicated that there would be insignificant differences (i.e., less than a two percent spread in the total numerical index) between each of the configurations for the Cedar Road interchange (Segment A alternatives), as well as between each of the configurations for the Great Bridge Boulevard interchange (Segment C alternatives). In the case of the Cedar Road interchange options, a westward-shifted single point urban interchange or “SPUI” (option A3) is proposed despite its higher cost based on the fact that a SPUI in general would operate slightly more efficiently than a diamond interchange at this location from the perspective of traffic flow, along with the fact that a shifted version of the SPUI would result in more favorable geometry from the perspective of curvature, would minimize adverse effects to existing businesses, and would be more consistent with the City’s Comprehensive Plan. In the case of the Great Bridge Boulevard interchange options, a diamond interchange (option C1) is proposed based on the fact that a diamond interchange would operate slightly more efficiently at this location from the perspective of traffic flow, would have relatively fewer constructability issues, and would cost less than a SPUI.

Based on these findings, a determination was made to assess the various combinations of segments emphasizing those segments which exhibited a greater spread in the total numerical index (i.e., the ERB alternatives which exhibited a 33 percent spread in values and the Segment B alternatives which exhibited a 10 percent spread in values) along with proposed options A3 and C1. This approach allowed for an effective comparative assessment of six segment combinations or “candidate build alternatives” (CBAs) rather than the 36 that would have otherwise been included.

2.2.3.2 Identification of Candidate Build Alternatives

Of the six CBAs assessed through the aforementioned means, the *Alternatives Development and Screening Technical Report* and the *Alternatives Analysis Technical Report* indicate that the three which would provide



the greatest benefits with the least adverse effects are described below in Table 2-3. Individual segments comprising each of the CBAs are shown in Figure 2-1 through 2-4.

Table 2-3. Candidate Build Alternatives

Candidate Build Alternative	Segment Options	Description
CBA 95B1	S1/A3/ERB95/B1/C1	Widening on existing centerline south of Cedar Road with a westward-shifted SPUI at Cedar Road with a 95-foot fixed bridge with open road tolling on an unshifted Dominion Boulevard / US 17 with a diamond interchange at Great Bridge Boulevard.
CBA 95B2	S1/A3/ERB95/B2/C1	Widening on existing centerline south of Cedar Road with a westward-shifted SPUI at Cedar Road with a 95-foot fixed bridge with open road tolling on a shifted Dominion Boulevard / US 17 with a diamond interchange at Great Bridge Boulevard.
CBA 65B2	S1/A3/ERB65/B2/C1	Widening on existing centerline south of Cedar Road with a westward-shifted SPUI at Cedar Road with a 65-foot moveable bridge with open road tolling on a shifted Dominion Boulevard / US 17 with a diamond interchange at Great Bridge Boulevard.

2.2.4 Proposed Build Alternative

To determine which of the three aforementioned CBAs would be the Proposed Build Alternative to be assessed in detail in this Environmental Assessment, a comparative assessment of the built environment and the natural environment was conducted. As a result of this assessment (presented in the *Alternatives Analysis Technical Report*), CBA ERB95B2 was identified to be part of the Proposed Build Alternative to be assessed in greater detail as part of this EA. In brief, CBA ERB95B2 was identified to be part of the Proposed Build Alternative for the following reasons:

- It would require eight fewer residential relocations compared to CBA ERB95B1 and the same number of residential relocations as CBA ERB65B2.
- It would affect the fewest linear feet of ditches subject to regulation under Section 404 of the Clean Water Act.
- It would affect one acre fewer wetlands than CBA ERB65B2 and only 0.1 acre more wetlands than CBA ERB95B1.
- It would affect the fewest acres of 100-year floodplain.
- It would be more consistent with the City’s Comprehensive Land Use Plan by better accommodating planned commercial growth around the proposed Cedar Road interchange.
- It would cost approximately \$22,500,000 less to construct than CBA ERB65B2 and would not require long-term operational costs associated with the 65-foot moveable bridge option.

The Proposed Build Alternative, therefore, is comprised of build segment options S1/A3/ERB95/B2/C1. Construction activities that would occur as part of the Proposed Build Alternative consist of:

- Widening of Dominion Boulevard / US 17 on existing centerline south of Cedar Road.
- A westward-shifted SPUI at Cedar Road.
- A 95-foot fixed bridge over the Southern Branch of the Elizabeth River.
- Open road tolling on a shifted Dominion Boulevard / US 17.
- A diamond interchange at Great Bridge Boulevard.



2.2.4.1 Proposed Project Phasing

As previously stated, the project is proposed to be constructed as a toll facility with means for collecting tolls being located north of the Elizabeth River. The proposed approach to project development is phased to permit the earliest-as-feasible construction of the critical elements of the project.

The initial phase is anticipated to include construction of the Elizabeth River bridge and its approaches; widening Dominion Boulevard / US 17 from the northern bridge approach to the Oak Grove Connector interchange; the Bainbridge Boulevard/Dominion Lakes interchange; and minor intersection improvements at Cedar Road and Great Bridge Boulevard. Later phases would include construction of the Cedar Road interchange, construction of the Great Bridge Boulevard interchange, and widening of Dominion Boulevard / US 17 south of Cedar Road.

To protect the corridor and reduce future costs, right-of-way to accommodate the ultimate facility would be acquired. The planned sequence and planned timing of the interchange phases would be refined over time as determined by the projected traffic volumes and resulting levels of service, and funding available at the time of need. Prior to ultimate build-out of the project, interim improvements are anticipated to be required at the onset to increase capacity of the at-grade intersections in the initial phase. Layouts have been developed for these interim intersection improvements; however, because they would be located within the footprint of the ultimate construction limits, the proposed interim intersections themselves have not been independently assessed in detail. The environmental analysis in Chapter 3 is based on the long-term scenario (*i.e.*, ultimate project build-out with interchanges rather than interim intersections).

2.2.4.2 Bicycle and Pedestrian Accommodations

Should a build alternative be selected, it would include a multi-use trail (*i.e.*, pedestrian and bicycle) extending from the southern terminus of the project (existing US 17 Improved) to the Bainbridge Boulevard (relocated) / Dominion Lakes interchange. Considering the availability of other practical routes for pedestrian and bicycle traffic (side streets such as Fernwood Farms Road and the city-maintained facility beneath the Chesapeake Expressway connecting the Wickford and Battlefield Commons neighborhoods) and to help reduce overall project costs, the proposed multi-use trail (as a defined component of the Dominion Boulevard Improvements Project) would transition to these other routes north of the proposed Bainbridge Boulevard (relocated) / Dominion Lakes interchange.

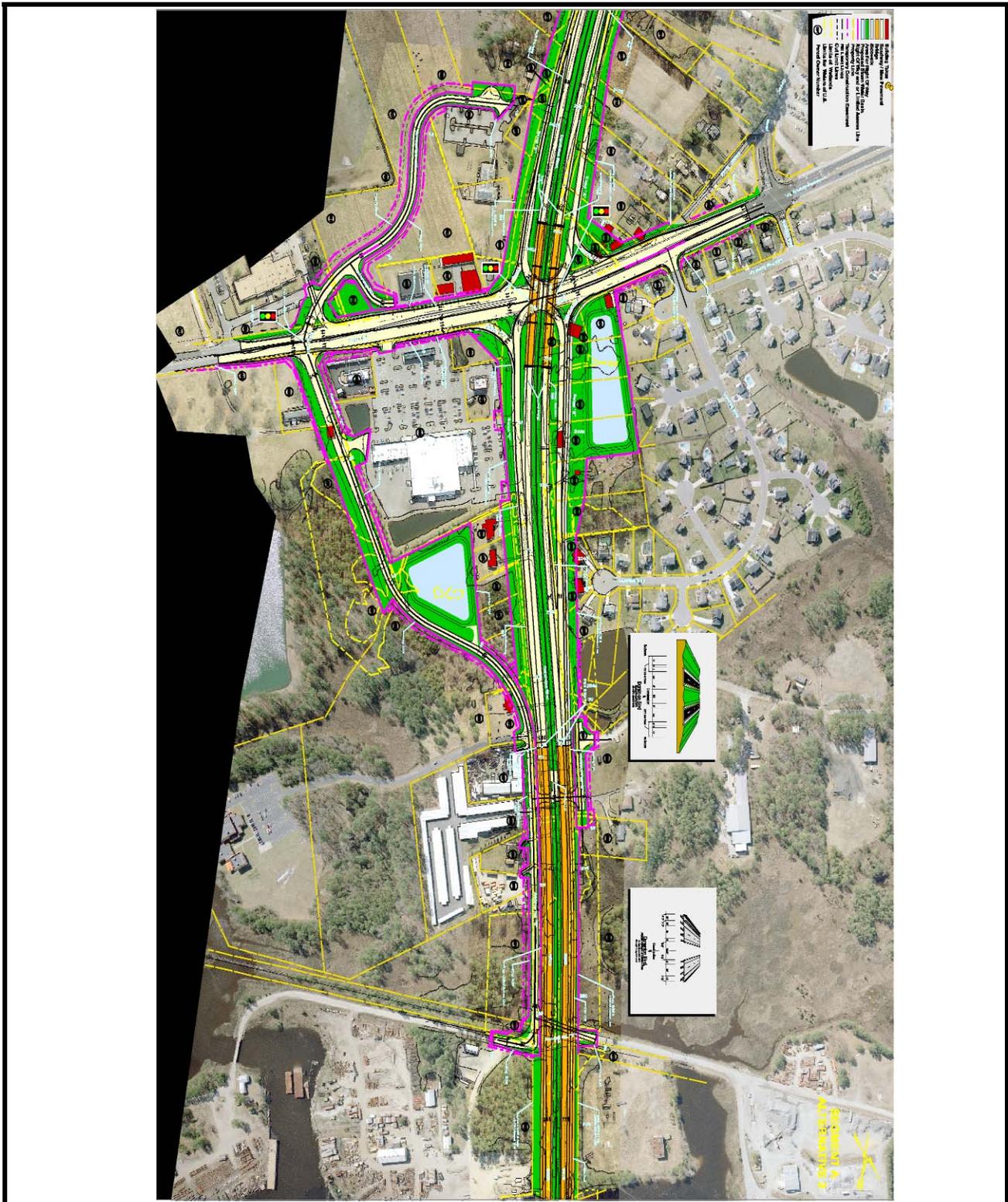


Figure 2-2.
Proposed Build Alternative: Segment A - Alternative 3

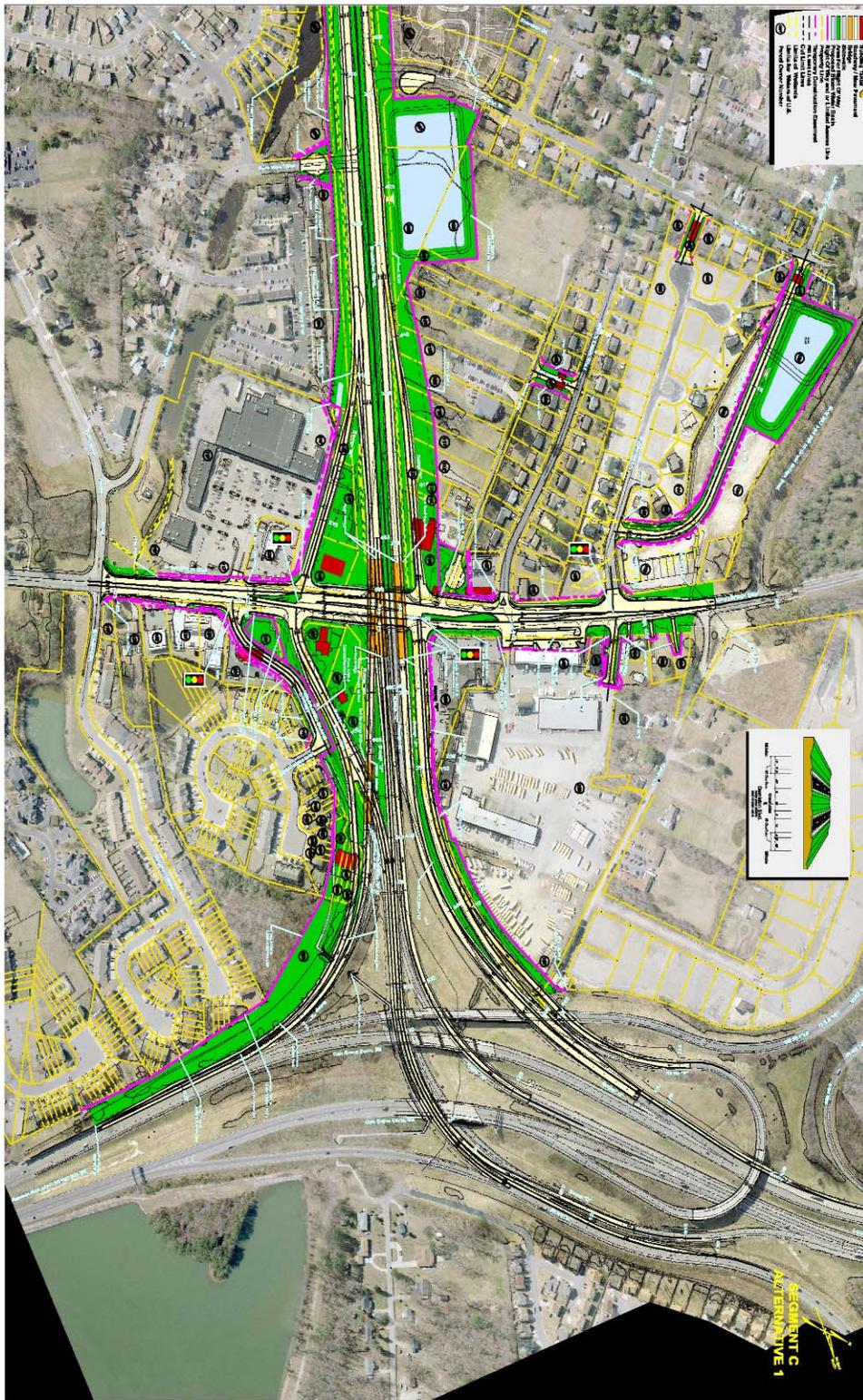


Figure 2-4.
Proposed Build Alternative: Segment C - Alternative 1



3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Results of an alternatives analysis (presented in the *Alternatives Analysis Technical Report* and summarized in Chapter 2 of this EA) indicate that CBA 95B2 is the Proposed Build Alternative to be assessed in greater detail as part of this EA. The Proposed Build Alternative is comprised of build segment options S1/A3/ERB95/B2/C1 (see Chapter 2). Construction activities that would occur as part of the Proposed Build Alternative consist of:

- Widening of Dominion Boulevard / US 17 within existing right-of-way south of Cedar Road.
- A westward-shifted single-point urban interchange (SPUI) at Cedar Road.
- A 95-foot fixed-span bridge over the Southern Branch of the Elizabeth River.
- Open-road toll collection on a shifted Dominion Boulevard / US 17 north of the Southern Branch of the Elizabeth River.
- A diamond interchange at Great Bridge Boulevard.

Due to project-related impacts to wetlands, jurisdictional ditches, and navigable waters, the proposed road and bridge improvements would require several permits, including:

- a Clean Water Act Section 404 permit for the placement of fill in wetlands and other waters of the U.S.;
- a Virginia Water Protection Permit (Clean Water Act Section 401 water quality certification);
- a Section 9 and Section 10 permit for the bridge over the Southern Branch of the Elizabeth River (as per the Rivers and Harbors Act of 1899);
- a Virginia Marine Resources Commission sub-aqueous lands permit; and
- a City of Chesapeake Wetlands Board permit or approval.

For the Proposed Build Alternative, a Joint Permit Application would be prepared and distributed to the U.S. Army Corps of Engineers, Virginia Department of Environmental Quality, Virginia Marine Resources Commission, and the City of Chesapeake Wetlands Board prior to construction. In addition, a Section 9 permit application for the new bridge would be submitted to the U.S. Coast Guard.

3.1 DEVELOPED PROPERTIES AND COHESIVE COMMUNITIES

The City of Chesapeake’s 2050 Master Transportation Plan (as well as the Hampton Roads Metropolitan Planning Organization’s Constrained Long Range Plan) designates the Dominion Boulevard / US 17 corridor as an upgraded facility. In addition, the city has included the Dominion Boulevard / US 17 corridor in its Transportation Corridor Overlay District. The overlay districts addressed in the plan were established under the following principles: 1) that transportation improvements will create a catalyst for development, 2) that the city should preserve future opportunities for economic development, and 3) that these corridors are highly visible and any proposal contained therein should reflect good building and site design practices. The Master Transportation Plan and the Transportation Corridor Overlay District specifically identify the Dominion Boulevard / US 17 improvements project as a high priority project within the city. As such, the Proposed Build Alternative would be in full conformance with local land use plans and policies.

3.1.1 Developed Properties

3.1.1.1 Affected Environment

Existing developed land uses within 0.25 mile of the Proposed Build Alternative centerline are presented in Table 3-1.

Table 3-1. Existing Developed Land Uses

Land Use Category	Specific Land Use	Acres
Residential	Countryside / Large Lot Residential	78.17
	High Density Multi-Family	55.02
	Suburban Single Family	1,123.97
	Urban Single Family	6.37



Land Use Category	Specific Land Use	Acres
	Total	1,263.53
Industrial	Office, Research, and Light Industry	8.23
	Water Related Industry	206.23
	Total	214.46
Mixed Use (includes Marina)	Marina	17.40
	Predominantly Office/Mixed Use	10.40
	Total	27.8
General Business/Commercial	Not applicable	64.66
Government, Institutional, Education, Parks	Not applicable	23.87
Other	Not applicable	27.48

3.1.1.2 Environmental Consequences

Acres of developed land affected and the number of properties requiring relocation under the Proposed Build Alternative are presented in Table 3-2 and Table 3-3, respectively.

Table 3-2. Affected Developed Land Use (in acres)

Land Use Category	Land Use	Acres Affected
Residential	Countryside/Large Lot Residential	4.89
	High Density Multi-Family	3.94
	Suburban Single Family	112.49
	Urban Single Family	0.05
	Subtotal	120.10
Industrial	Office, Research, & Light Industry	1.16
	Water Related Industry	36.22
	Subtotal	37.38
Mixed Use (includes Marina)	Marina	1.92
	Predominantly Office/Mixed Use	0
	Subtotal	1.92
General Business/Commercial	General Business/Commercial	18.28
Government, Institutional, Education, Parks	Government, Institutional, Education, Parks	1.03
Other	Other	27.48
TOTAL		206.19

Table 3-3. Properties Requiring Relocation

Type of Property	Number of Properties Requiring Relocation
Residential	18
Commercial / Industrial	7
TOTAL	25



3.1.1.3 Mitigation

The Virginia Department of Transportation's right-of-way acquisition and relocation program will be conducted in accordance with the Federal Uniform Relocation Assistance and Real Property Acquisition Act of 1970, as amended and with the Surface Transportation and Uniform Relocation and Assistance Act of 1987 (STURRA). A relocation assistance and payment program is available through VDOT to aid displaced residents. Relocation payments and advisory assistance are offered in addition to the state's payment for real property. Construction authorization for the Proposed Build Alternative will not be granted until VDOT is satisfied that there is sufficient decent, safe, and sanitary housing in the area available to the families and that they have been informed of its availability. Also, VDOT must be satisfied that supplemental payments, if any, have been made available, that the affected occupants have received sufficient time to obtain possession of housing which is within their financial means, and that replacement housing is open and fair to all persons regardless of race, color, religion, sex or national origin. Specific relocation impacts will be dependent upon final design.

The acquisition and relocation program will be conducted in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended by the Uniform Relocation Act Amendments of 1987. All property owners of real property displaced by this project will be treated fairly, consistently, and equitably; and in a manner so that they will not suffer disproportionate injuries. Relocation resources will be available to all residential, farms, non-profit organizations, and businesses that will be relocated, without discrimination.

3.1.2 Cohesive Communities

3.1.2.1 Affected Environment

Modern subdivisions (as compared to traditional neighborhoods) characterize the study area. From these subdivisions, communities are, nonetheless, created and community cohesion is established. North of the Southern Branch of the Elizabeth River are five such subdivisions: Crest Harbor and Main's Creek Park (located west of Dominion Boulevard) along with Dominion Pines, Dominion Lakes, and Fernwood Shores (located east of Dominion Boulevard). South of the Southern Branch are New Mill Landing and Herberts Corner. Both subdivisions are located near the intersection of Dominion Boulevard and Cedar Road. South of the Cedar Road intersection are homes that are not necessarily part of subdivisions, such as the homes along West Road and off Cedar Road (which is now west of Dominion Boulevard).

3.1.2.2 Environmental Consequences

Neighborhood identity and cohesiveness has evolved in response to the presence of Dominion Boulevard corridor, which has been in place since the early 1960s. All improvements are proposed with the existing corridor, thus, no neighborhoods will be further bisected by the project.

3.1.2.3 Mitigation

Shifting the proposed centerline of Dominion Boulevard approximately 200 feet to the west (away from the Dominion Lakes Subdivision) as proposed under the Proposed Build Alternative would serve to avoid effects to the neighborhood.

3.2 ENVIRONMENTAL JUSTICE

3.2.1 Affected Environment

3.2.1.1.1 Minority Populations

According to EPA's Environmental Justice Enviro-mapper data, corridor-wide data shows the study area having a total population of about 3100 individuals, roughly 53.9% are white, 41.3% are African-American, and less than 5% of that population consists of other minority groups. These minority percentages are higher than the statewide minority population of 30 percent and the city-wide population of 34 percent. Block group and study corridor data from the EPA were used in this EA to reflect the population that surrounds the Dominion Boulevard study area; therefore, the percentages of the racial and ethnic composition should be used as a guide as opposed to the exact numbers.



The affected census blocks with the highest numbers of Minorities are in the northeast and northwest section of the study area – specifically, around the Dominion Boulevard/Great Bridge Road intersection area. The three areas with the highest minority populations include:

- Crest Harbor south of Mains Creek Rd. (over 90% minority)
- Crestwood neighborhood areas located north of Dominion Boulevard and south of I-64 (over 80% minority)
- Dominion Lakes and Dominion Pines neighborhoods (50% minority)

Although the Hispanic population is small (2.5) compared to the White and Black (not of Hispanic origin) populations, the census block with the highest number of Hispanics is located in the northern section of the study area to the south of Great Bridge Road and west of Dominion Boulevard near the I-64/464/Route 168 interchange.

3.2.1.1.2 Low-Income Populations

The study area contains a number of people at or below the poverty level as defined by the U.S. Department of Health and Human Services. Of the roughly 3100 people in the study area, about 8.7% are persons of low-income. This percentage is comparable to the statewide percentage of 9.3% and the city-wide percentage of 7.2%.

The area that has the highest number of those persons at or below the poverty line is located north of Dominion Boulevard in the Crest Harbor and Crestwood neighborhoods. This area includes Mullenville, Mains Creek, Harbour North apartment complex, as well as a large industrial area along the Elizabeth River. There are roughly 300 people in this area, 40 percent of which are at or below the poverty line. Within this area, the medium-density neighborhood off of Mains Creek Road is an intact neighborhood with single-family homes. The neighborhood north of the Mains Creek area (off Libertyville, Channel, and Harbour North) contains more high-density housing. The Harbour North Apartments is a multi-unit complex, and the secluded neighborhood to the east is full of two-story town homes. While the apartment complex is in satisfactory condition, a windshield survey of the town home complex shows that the area is densely populated and the maintenance of the structures are not in the same condition as in the surrounding neighborhoods.

3.2.2 Environmental Consequences

The Dominion Boulevard facility would not be constructed to serve strictly as a local transportation corridor. Instead, the facility would serve as a key component of the regional (Hampton Roads) transportation network and would also be used by interstate traffic traveling to and from the Outer Banks and other portions of eastern North Carolina. Construction of the Proposed Build Alternative would not disproportionately affect minority or low-income populations within the study area as described below.

3.2.2.1.1 Noise Impacts

Based on the noise analysis completed for this study, traffic related noise impacts are expected to occur at:

- The Dominion Pines apartment complex
- The area of Wickford Drive and Blake Street
- The Rose Garden Estates off of Mullen Drive

The majority of the noise impacts occur in areas that have a minority population that is comparable to the average for the City of Chesapeake. The Dominion Pines apartment complex and the Blake Street area both have minority and low-income populations that are at normal levels when compared to the City of Chesapeake's average. The new residential development of Rose Garden Estates off of Mullen Drive is currently under construction - the noise analysis completed for this study found that two residences within this area would have noise impacts. The population data for this area is not currently available but will be included in the final design analysis after CTB approval. These are the areas that would be affected under the Proposed Build Alternative and would qualify for noise abatement considerations but they do not contain a



disproportionate number of minorities or low-income populations. There would be an increase in project area noise levels during construction of the Proposed Build Alternative.

3.2.2.1.2 Displacements

The Proposed Build Alternative would result in approximately 18 residential displacements, 10 of which are potentially minority and/or low-income residences. These include:

- 4 houses along Moses Grandy Trail
- 2 houses along Lansing Way
- 2 houses east of Dominion Boulevard and North of Cedar Road
- 2 houses along Mullen Drive South of Mains Creek Road

Of these, the two homes along Mullen Drive are the only displacements that are in a neighborhood with a high percentage (over 90 percent) of minority and/or low-income residents. The other areas noted above have much lower percentages of minority and/or low-income residents (less than 50 percent) and homes displaced in these areas are just as likely to be occupied by non-minorities or families above the poverty level. Overall, displaced residents include a mix of minority, non-minority, low-income and families above the poverty level. Therefore, in terms of displacement impacts, the Proposed Build Alternative is not expected to disproportionately affect minority or low-income residents. Any property owner of real property displaced by this project would be treated fairly, consistently, and equitably in order to ensure that no persons suffer disproportionate injuries. All relocation payments and advisory assistance are offered in addition to the state's payment for real property. VDOT will not authorize construction on the Proposed Build Alternative until there is sufficient, safe, and sanitary housing in the area available to all families displaced. VDOT must also be satisfied that all persons affected by displacements from this project would obtain housing within their financial means regardless of race, color, religion, sex or national origin. The acquisition and relocation program will be conducted in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended by the Uniform Relocation Act Amendments of 1987.

3.2.2.1.3 Road Access and Mobility

Change in access is an issue for minority and low-income residents located in the Crest Harbor neighborhood. This area can currently access Dominion Boulevard via Mullen Drive, Bainbridge Boulevard (via Libertyville), and Great Bridge Road (via Mains Creek Road). In the Proposed Build Alternative, Mullen Drive would end in a cul-de-sac and there would no longer be direct access from Mullen Drive to Dominion Boulevard. However, with the Proposed Build Alternative, the extension of Libertyville Road or the extension of the new road through the industrial complex would allow improved access to Great Bridge Road; and the new Bainbridge Road intersection at Dominion Boulevard is closer to this area than the current intersection near the drawbridge. The time involved to access Dominion Boulevard may increase due to the lack of direct access; however, the improvements of the new intersections would allow better and safer access (via signals and limited access once on Dominion Boulevard / US17).

No diversion of traffic through neighborhoods having minority or low-income populations would occur as a result of the Proposed Build Alternative. Elimination of traffic back-ups (a result of bridge openings) and the use of open-road tolling will serve to improve traffic flow and, hence, improve air quality compared to those conditions presently experienced within minority or low-income population concentrations along the corridor. All users of the Proposed Build Alternative, including low-income populations, would benefit from the improved mobility and reduced congestion. Existing public transit services would not be adversely affected by construction of the Proposed Build Alternative. Also, low-income populations would have the opportunity to participate in the decision-making process via public hearings.

3.2.2.1.4 Tolling

All users of the new facility would be subject to tolls. Therefore, tolling is not expected to disproportionately affect low-income populations. Although a modest increase in travel time and distance would be incurred, alternate north-south routes are available (via George Washington Highway and Great Bridge Boulevard) to local low-income residents who may wish to avoid paying tolls on Dominion Boulevard.



3.2.3 Mitigation

Although the time involved to access Dominion Boulevard may increase due to the lack of direct access from Mullen Drive, traffic flow improvements resulting from new intersections along with better access (via signals and limited access once on Dominion Boulevard / US17) would serve to offset delays resulting from removal of certain access points. As previously mentioned the elimination of traffic back-ups and the use of open-road tolling would serve to improve traffic flow and, hence, improve air quality compared to those conditions presently experienced along the corridor. Toll “no-pay” or discount options may be considered for low-income persons as part of the final facility operational plan.

3.3 AESTHETICS AND VISUAL QUALITY

3.3.1 Affected Environment

The Dominion Boulevard / US17 corridor is located within a suburban overlay which was intended to create “a transition area between the urban areas of the City and the outer lying rural areas” which in turn would allow “diversity for persons not desiring either an urban or rural lifestyle” (City of Chesapeake, 1972). The city has included the Dominion Boulevard / US17 corridor in its Transportation Corridor Overlay District which includes the policy that “These corridors are highly visible and any proposal contained therein should reflect good building and site design practices”. Viewsheds to and from the corridor reflect a mix of suburban residential, commercial, and industrial development. Currently, viewsheds of particular note are dominated by construction crane towers along the banks of the Elizabeth River just upstream of the Steel Bridge, the debris landfill near the intersection of Bainbridge Boulevard and Dominion Boulevard, and the interchange complex at the northern terminus of the project. Viewsheds of the Elizabeth River from the existing Steel Bridge are reflective of the largely industrial nature of the waterfront.

Virginia has a program that recognizes road corridors containing aesthetic or cultural value near areas of historical, natural, or recreational significance known as Virginia Byways; however, no Virginia Byways are located within the study area.

3.3.2 Environmental Consequences

Interchanges and the new bridge would be visible from certain residential areas. Land uses along the Southern Branch of the Elizabeth River are largely industrial in nature and, given the fact that views are presently influenced by the existing Steel Bridge, views from the waterway would not be substantially affected.

3.3.3 Mitigation

During design of the Proposed Build Alternative, efforts will be made to avoid visual effects or, if this cannot be done, to minimize impacts to the fullest degree practicable. Mitigation measures may include landscaping (i.e. plantings and/or berms) to screen selected areas from the proposed roadway and surface treatments designed to minimize visual effects of noise walls, interchanges, and the bridge.

3.4 PARKS AND RECREATION AREAS

3.4.1 Affected Environment

Based on data available from the City, the Virginia Outdoor Plan, and other mapping, there are no existing private or publicly-owned parks or recreation facilities in the project study area. The nearest recreational facility is Cahoon Plantation Golf Club, a privately owned golf course approximately 0.25 mile from Dominion Boulevard off of Cedar Road. In its 2026 Comprehensive Plan (adopted March 9, 2005), the City of Chesapeake has identified a proposed bicycle facility along the Dominion Boulevard corridor. Section 6(f) of the Land and Water Conservation Fund Act of 1965 prohibits the conversion of any property acquired or developed with the assistance of the fund to anything other than public outdoor recreation use without the approval of the Secretary of the Department of the Interior. No Section 6(f) properties are located within the study corridor.



3.4.2 Environmental Consequences

No private or publicly-owned parks or recreation facilities would be affected by the Proposed Build Alternative. The Proposed Build Alternative would be consistent with the planned multi-use trail (bicycle facility). No Section 6(f) properties would be affected by the Proposed Build Alternative.

3.4.3 Mitigation

Not applicable.

3.5 CULTURAL RESOURCES

3.5.1 Architectural Resources

3.5.1.1 Affected Environment

During an initial survey of the proposed improvements to Dominion Boulevard sponsored by VDOT in 1998, 26 architectural resources were recorded or revisited, nine of which have since been demolished. Twenty-four architectural resources were recorded during the 2006 survey conducted as part of this study. The previous resources were revisited and the information was updated.

3.5.1.2 Environmental Consequences

Two of the architectural resources within the project area (Figure 3-1) have been determined to be eligible for the National Register of Historic Places (NRHP). The Lindsay House (VDHR # 131-0253) has been determined eligible under Criterion B for its association with Ambrose Lindsay, a prominent dairy farmer and, under Criterion C, as a good example of a dairy farming operation. Dominion Boulevard is out-of-view with respect to the Lindsay House, and the resource will not be affected by the Proposed Build Alternative. The Lindsay Canal (VDHR # 131-5076) is also eligible for the NRHP but only in those areas where the canal retains its integrity. Where it crosses Dominion Boulevard (Figure 3-1), the canal does not retain its integrity and is not able to function as a canal proper. Per their memorandum dated February 20, 2008, the Virginia Department of Historic Resources has determined that no historic properties would be affected by the Proposed Build Alternative.

3.5.1.3 Mitigation

Not applicable.

3.5.2 Archaeological Resources

3.5.2.1 Affected Environment

The Great Neck Site (44VB007), located north of the study area, is actually a complex of sites dating from Paleo-Indian to historic times. This site has provided information on the Native American settlement of Virginia's southern coastal region. Three previously recorded sites (44CS58, 44CS59, and 44CS60) are located just north of the project area along Mill Creek. The locations of these sites were mapped by a collector in 1986, but the locations have not been verified. There is little information available about these sites. Two archaeological surveys conducted in association with the relocation of US 17 from the North Carolina line to former Route 104 (Dominion Boulevard) recorded a total of 19 sites; however, most were not eligible for the NRHP. No previously recorded sites are located within the area of potential effects (APE) for the current project.

3.5.2.2 Environmental Consequences

Archaeological surveys for the Dominion Boulevard improvements project were completed in 1998 and 2006. No archaeological sites were recorded during either survey. The Proposed Build Alternative will have no effect on archaeological sites or resources.

3.5.2.3 Mitigation

Not applicable.

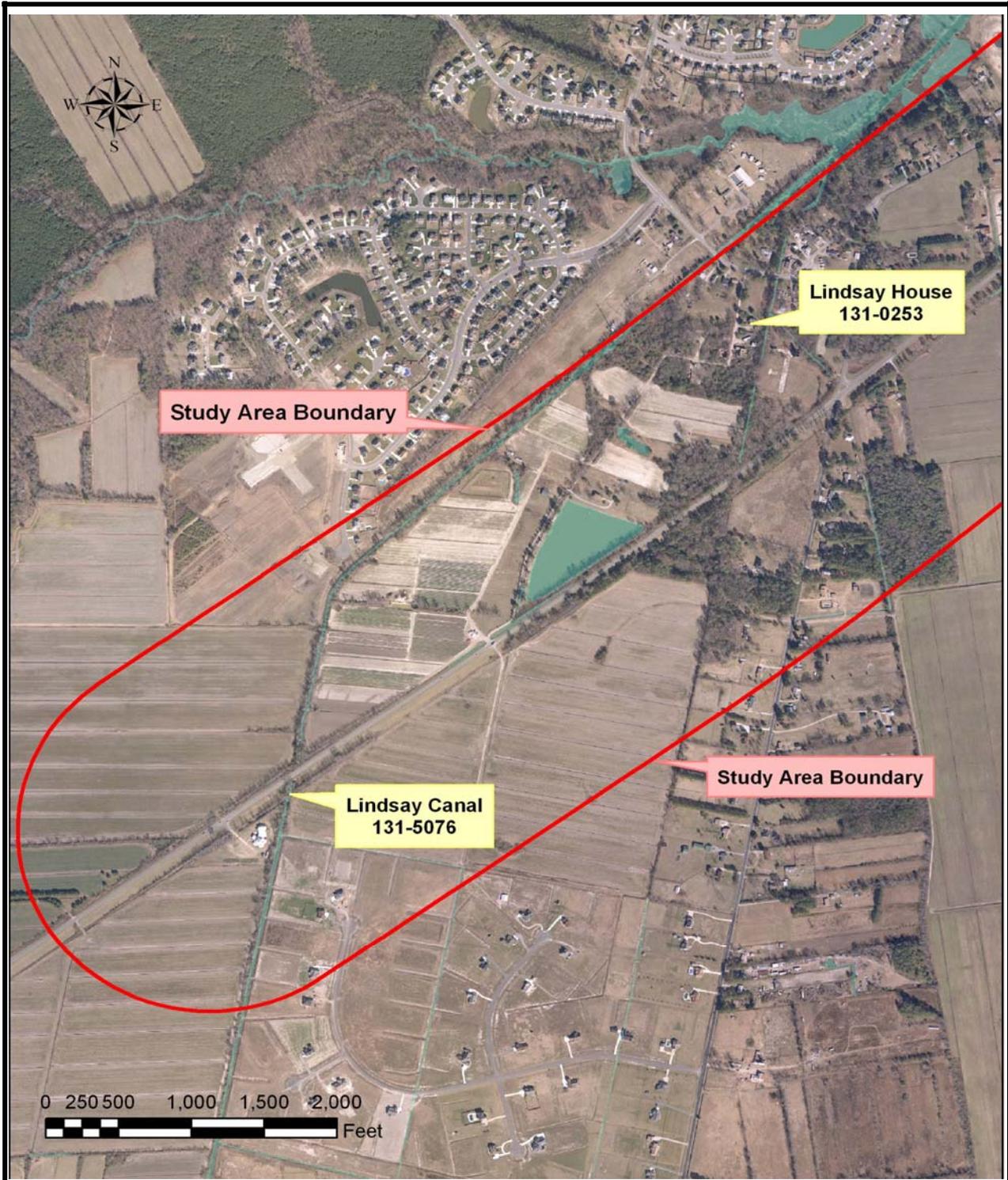


Figure 3-1.
Cultural Resources Eligible for NRHP Listing



3.6 SECTION 4(F) PROPERTIES

3.6.1 Affected Environment

Section 4(f) of the 1966 U.S. Department of Transportation Act is applicable only to agencies within the U.S. Department of Transportation and applies to publicly owned parks, recreation areas, and wildlife and waterfowl refuge areas, as well as historic sites (i.e. cultural resources listed or eligible for listing on the NRHP, 23 CFR 771.135(e)). Use of a 4(f) property could include a fee simple acquisition, a temporary or permanent easement, or a constructive use as defined in 23 CFR 771.135(p)(2).

No 4(f) properties are within the study area. Although portions of the Lindsay Canal (VDHR # 131-5076), located near the southern terminus of the project, have been determined to be eligible for the National Register of Historic Places (NRHP), the canal was found not eligible where it crosses Dominion Boulevard.

3.6.2 Environmental Consequences

The Proposed Build Alternative would not result in the use of any 4(f) properties.

3.6.3 Mitigation

Not applicable.

3.7 AIR QUALITY

3.7.1 Affected Environment

The Virginia Department of Environmental Quality (DEQ) is required to conduct air quality monitoring by both federal and state regulations. Monitored ambient air quality monitor data for CO, O₃, PM₁₀, and PM_{2.5}, for 2003 to 2005 within or near the study area, is presented in Table 3-4.

Table 3-4. Ambient Air Quality Monitor Data 2003-2005

Air Pollutant	Standards and Exceedances	City of Hampton 700 Shell Road			City of Norfolk 600 Church Street			City of Norfolk 181-A1 2 nd Street & Woods Avenue		
		2004	2005	2006	2004	2005	2006	2004	2005	2006
Carbon Monoxide (CO)	Max. 1-hr Concentration (ppm)	3.1	4.8	4.0	3.9	NA	NA	NM	NM	NM
	Max. 8-hr Concentration (ppm)	1.8	1.8	3.1	3.2	NA	NA	NM	NM	NM
	# Days > Federal 1-hr Std. of >35 ppm	0	0	0	0	-	-	-	-	-
	# Days > Federal 8-hr Std. of >9 ppm	0	0	0	0	-	-	-	-	-
Ozone (O ₃)	Max. 8-hr Concentration (ppm)	.085	.081	.092	NM	NM	NM	NM	NM	NM
	# Days > Fed & State 8-hr Std. >0.08 ppm	1	0	0	-	-	-	-	-	-
Suspended Particulates (PM ₁₀)	Max. 24-hr Concentration (µg/m ³)	NM	NM	NM	NM	NM	NM	34	47	48
	Annual Mean (µg/m ³)	NM	NM	NM	NM	NM	NM	18	20	NM
	# Days > Fed. 24-hr Std. of >150 µg/m ³	0	0	0	0	0	0	0	0	0



	# > Federal Annual Mean Std of 50µg/m ³	0	0	0		0	0	0		0	0	
Suspended Particulates (PM _{2.5})	Max. 24-hr Concentration (µg/m ³)	27.9	26.9	32		NM	NM	NM		28.2	29.6	31.3
	Annual Mean Concentration (µg/m ³)	12.2	12.5	12.2		NM	NM	NM		12.7	13.5	12.3
	# Days > Fed. 24-hr Std. of >65 µg/m ³	0	0	0	-	-	-	-		0	0	0
	# > Federal Annual Mean Std. of 15 µg/m ³	0	0	0	-	-	-	-		0	0	0

Source: USEPA Airsdata, <http://www.epa.gov/air/data/>

Note: NM = Not Measured

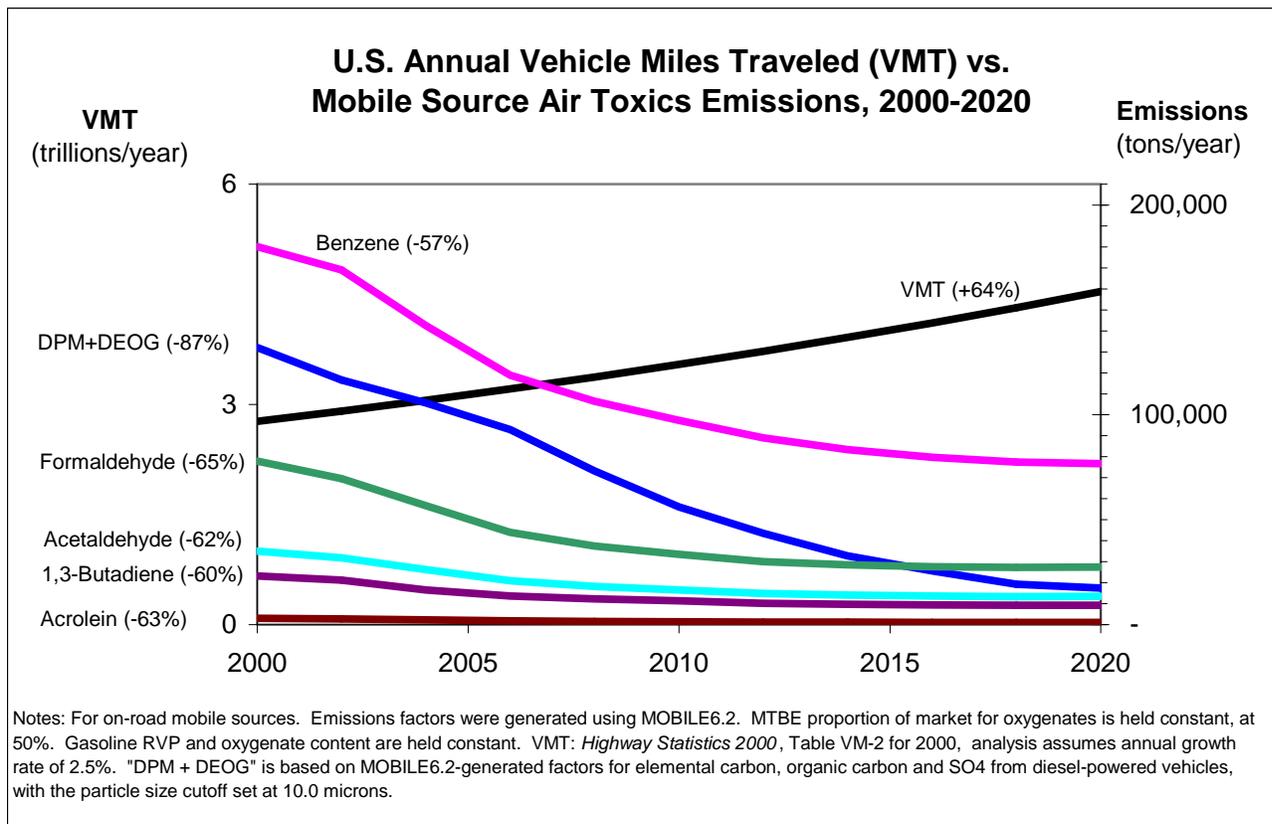
3.7.2 Environmental Consequences

3.7.2.1 Mobile Source Air Toxics (MSAT)

In addition to the criteria air pollutants for which there are National Ambient Air Quality Standards (NAAQS), EPA also regulates air toxics. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners) and stationary sources (e.g., factories or refineries).

Mobile Source Air Toxics (MSATs) are a subset of the 188 air toxics defined by the Clean Air Act. The MSATs are compounds emitted from highway vehicles and non-road equipment. Some toxic compounds are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. Metal air toxics also result from engine wear or from impurities in oil or gasoline.

EPA is the lead Federal Agency for administering the Clean Air Act and has certain responsibilities regarding the health effects of MSATs. EPA issued a Final Rule on Controlling Emissions of Hazardous Air Pollutants from Mobile Sources. 66 FR 17229 (March 29, 2001). This rule was issued under the authority in Section 202 of the Clean Air Act. In its rule, EPA examined the impacts of existing and newly promulgated mobile source control programs, including its reformulated gasoline (RFG) program, its national low emission vehicle (NLEV) standards, its Tier 2 motor vehicle emissions standards and gasoline sulfur control requirements, and its proposed heavy duty engine and vehicle standards and on-highway diesel fuel sulfur control requirements. Between 2000 and 2020, FHWA projects that even with a 64 percent increase in VMT, these programs will reduce on-highway emissions of benzene, formaldehyde, 1,3-butadiene, and acetaldehyde by 57 percent to 65 percent, and will reduce on-highway diesel PM emissions by 87 percent, as shown in the following graph:



As a result, EPA concluded that no further motor vehicle emissions standards or fuel standards were necessary to further control MSATs. The agency is preparing another rule under authority of CAA Section 202(l) that will address these issues and could make adjustments to the full 21 and the primary six MSATs.

This EA includes a basic analysis of the likely MSAT emission impacts of this project; however, available technical tools do not enable the prediction of project-specific health impacts of the emission changes associated with the alternatives in this EA. Due to these limitations, the following discussion is included in accordance with CEQ regulations (40 CFR 1502.22(b)) regarding incomplete or unavailable information.

3.7.2.2 Information that is Unavailable or Incomplete

Evaluating the environmental and health impacts from MSATs on a proposed highway project would involve several key elements, including emissions modeling, dispersion modeling in order to estimate ambient concentrations resulting from the estimated emissions, exposure modeling in order to estimate human exposure to the estimated concentrations, and then final determination of health impacts based on the estimated exposure. Each of these steps is encumbered by technical shortcomings or uncertain science that prevents a more complete determination of the MSAT health impacts of this project.

1. **Emissions:** EPA tools to estimate MSAT emissions from motor vehicles are not sensitive to key variables determining emissions of MSATs in the context of highway projects. While MOBILE 6.2 is used to predict emissions at a regional level, it has limited applicability at the project level. MOBILE 6.2 is a trip-based model--emission factors are projected based on a typical trip of 7.5 miles, and on average speeds for this typical trip. This means that MOBILE 6.2 does not have the ability to predict emission factors for a specific vehicle operating condition at a specific location at a specific time. Because of this limitation, MOBILE 6.2 can only approximate the operating speeds and levels of congestion likely to be present on the largest-scale projects, and cannot adequately capture emissions effects of smaller projects. For particulate matter, the model results are not sensitive to average trip speed, although the other MSAT emission rates do change with changes in trip speed. Also, the emissions rates used in MOBILE 6.2 for



both particulate matter and MSATs are based on a limited number of tests of mostly older-technology vehicles. Lastly, in its discussions of PM under the conformity rule, EPA has identified problems with MOBILE6.2 as an obstacle to quantitative analysis.

These deficiencies compromise the capability of MOBILE 6.2 to estimate MSAT emissions. MOBILE 6.2 is an adequate tool for projecting emissions trends, and performing relative analyses between alternatives for very large projects, but it is not sensitive enough to capture the effects of travel changes tied to smaller projects or to predict emissions near specific roadside locations.

2. Dispersion. The tools to predict how MSATs disperse are also limited. EPA's current regulatory models, CALINE3 and CAL3QHC, were developed and validated more than a decade ago for the purpose of predicting episodic concentrations of carbon monoxide to determine compliance with the NAAQS. The performance of dispersion models is more accurate for predicting maximum concentrations that can occur at some time at some location within a geographic area. This limitation makes it difficult to predict accurate exposure patterns at specific times at specific highway project locations across an urban area to assess potential health risk. The NCHRP is conducting research on best practices in applying models and other technical methods in the analysis of MSATs. This work also will focus on identifying appropriate methods of documenting and communicating MSAT impacts in the NEPA process and to the general public. Along with these general limitations of dispersion models, FHWA is also faced with a lack of monitoring data in most areas for use in establishing project-specific MSAT background concentrations.
3. Exposure Levels and Health Effects. Finally, even if emission levels and concentrations of MSATs could be accurately predicted, shortcomings in current techniques for exposure assessment and risk analysis preclude reaching meaningful conclusions about project-specific health impacts. Exposure assessments are difficult because it is difficult to accurately calculate annual concentrations of MSATs near roadways, and to determine the portion of a year that people are actually exposed to those concentrations at a specific location. These difficulties are magnified for 70-year cancer assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over a 70-year period. There are also considerable uncertainties associated with the existing estimates of toxicity of the various MSATs, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population. Because of these shortcomings, any calculated difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with calculating the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against other project impacts that are better suited for quantitative analysis.

3.7.2.3 Summary of Existing Credible Scientific Evidence Relevant to Evaluating the Impacts of MSATs

Research into the health impacts of MSATs is ongoing. For different emission types, there are a variety of studies that show that some either are statistically associated with adverse health outcomes through epidemiological studies (frequently based on emissions levels found in occupational settings) or that animals demonstrate adverse health outcomes when exposed to large doses.

Exposure to toxics has been a focus of a number of EPA efforts. Most notably, the agency conducted the National Air Toxics Assessment (NATA) in 1996 to evaluate modeled estimates of human exposure applicable to the county level. While not intended for use as a measure of or benchmark for local exposure, the modeled estimates in the NATA database best illustrate the levels of various toxics when aggregated to a national or State level.

The EPA is in the process of assessing the risks of various kinds of exposures to these pollutants. The EPA Integrated Risk Information System (IRIS) is a database of human health effects that may result from exposure to various substances found in the environment. The IRIS database is located at <http://www.epa.gov/iris>. The following toxicity information for the six prioritized MSATs was taken from the IRIS database *Weight of Evidence Characterization* summaries. This information is taken verbatim from EPA's IRIS database and represents the Agency's most current evaluations of the potential hazards and toxicology of these chemicals or mixtures.



- **Benzene** is characterized as a known human carcinogen.
- The potential carcinogenicity of **acrolein** cannot be determined because the existing data are inadequate for an assessment of human carcinogenic potential for either the oral or inhalation route of exposure.
- **Formaldehyde** is a probable human carcinogen, based on limited evidence in humans, and sufficient evidence in animals.
- **1,3-butadiene** is characterized as carcinogenic to humans by inhalation.
- **Acetaldehyde** is a probable human carcinogen based on increased incidence of nasal tumors in male and female rats and laryngeal tumors in male and female hamsters after inhalation exposure.
- **Diesel exhaust (DE)** is likely to be carcinogenic to humans by inhalation from environmental exposures. Diesel exhaust as reviewed in this document is the combination of diesel particulate matter and diesel exhaust organic gases.
- **Diesel exhaust** also represents chronic respiratory effects, possibly the primary noncancer hazard from MSATs. Prolonged exposures may impair pulmonary function and could produce symptoms, such as cough, phlegm, and chronic bronchitis. Exposure relationships have not been developed from these studies.

There have been other studies that address MSAT health impacts in proximity to roadways. The Health Effects Institute, a non-profit organization funded by EPA, FHWA, and industry, has undertaken a major series of studies to research near-roadway MSAT hot spots, the health implications of the entire mix of mobile source pollutants, and other topics. The final summary of the series is not expected for several years.

Some recent studies have reported that proximity to roadways is related to adverse health outcomes - particularly respiratory problems¹. Much of this research is not specific to MSATs, instead surveying the full spectrum of both criteria and other pollutants. The FHWA cannot evaluate the validity of these studies, but more importantly, they do not provide information that would be useful to alleviate the uncertainties listed above and enable FHWA to perform a more comprehensive evaluation of the health impacts specific to this project.

3.7.2.4 Relevance of Unavailable or Incomplete Information to Evaluating Reasonably Foreseeable Significant Adverse Impacts on the Environment and Evaluation of Impacts Based Upon Theoretical Approaches or Research Methods Generally Accepted in the Scientific Community

Because of the uncertainties outlined above, a quantitative assessment of the effects of air toxic emissions impacts on human health cannot be made at the project level. While available tools do allow us to reasonably predict relative emissions changes between alternatives for larger projects, the amount of MSAT emissions from each of the project alternatives and MSAT concentrations or exposures created by each of the project alternatives cannot be predicted with enough accuracy to be useful in estimating health impacts. (As noted above, the current emissions model is not capable of serving as a meaningful emissions analysis tool for smaller projects.) Therefore, the relevance of the unavailable or incomplete information is that it is not possible to make a determination of whether any of the alternatives would have "significant adverse impacts on the human environment."

In this document, FHWA has provided a qualitative analysis of MSAT emissions relative to the Proposed Build Alternative and has acknowledged that the Proposed Build Alternative may result in increased exposure to MSAT emissions in certain locations.

¹ South Coast Air Quality Management District, Multiple Air Toxic Exposure Study-II (2000); Highway Health Hazards, The Sierra Club (2004) summarizing 24 Studies on the relationship between health and air quality; NEPA's Uncertainty in the Federal Legal Scheme Controlling Air Pollution from Motor Vehicles, Environmental Law Institute, 35 ELR 10273 (2005) with health studies cited therein.



3.7.2.5 Results of Qualitative Analysis

As discussed above, technical shortcomings of emissions and dispersion models and uncertain science with respect to health effects prevent meaningful or reliable estimates of MSAT emissions and effects of this project. However, even though reliable methods do not exist to accurately estimate the health impacts of MSATs at the project level, it is possible to qualitatively assess the levels of future MSAT emissions under the project. Although a qualitative analysis cannot identify and measure health impacts from MSATs, it can give a basis for identifying and comparing the potential differences among MSAT emissions, if any, from the various alternatives. The qualitative assessment presented below is derived in part from a study conducted by the FHWA entitled *A Methodology for Evaluating Mobile Source Air Toxic Emissions Among Transportation Project Alternatives*.

For the Proposed Build Alternative, the amount of MSATs emitted would be proportional to the vehicle miles traveled, or VMT. Because the VMT estimated for the No-Build Alternative is only one percent less than for the Proposed Build Alternative, higher levels of regional MSATs are not expected from the Proposed Build Alternative compared to the No-Build. Also, emissions will likely be lower than present levels in the design year as a result of EPA's national control programs that are projected to reduce MSAT emissions by 57 to 87 percent from 2000 to 2020. Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures; however, the magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future in virtually all locations.

Because of the specific characteristics of the Proposed Build Alternative (i.e. new connector roadways), there may be localized areas where VMT would increase and other areas where VMT would decrease; therefore it is possible that localized increases and decreases in MSAT emissions may occur. However, even if increases do occur, they too will be substantially reduced in the future due to implementation of EPA's vehicle and fuel regulations. In addition, localized emissions increases are offset somewhat by lower MSAT emission rates due to increased speeds; according to EPA's MOBILE6 emissions model, emissions of all of the priority MSATs except for diesel particulate matter decrease as speed increases. The extent to which these speed-related emissions decreases will offset VMT-related emissions increases cannot be reliably projected due to the inherent deficiencies of technical models. Moreover, MSAT emissions will likely be lower than present levels in the design year as a result of EPA's national control programs that are projected to reduce MSAT emissions by 57 to 87 percent between 2000 and 2020, even with a 64 percent increase in VMT. This will both reduce the background level of MSATs as well as the possibility of even minor MSAT emissions from the Proposed Build Alternative. Additional discussion of MSAT from the perspective of current FHWA interim guidance is provided in the *Air Quality Technical Report (City of Chesapeake, 2006)*.

In summary, it is expected there would be minimally increased MSAT emissions in the immediate area of the project under the Proposed Build Alternative in the design year relative to the No-Build Alternative. This would primarily be due to the slightly higher VMT associated with more direct routing and would also be due to EPA's MSAT reduction programs. MSAT levels could be higher in some locations than others, but current tools and science are not adequate to quantify them. However, on a regional basis, EPA's vehicle and fuel regulations, coupled with fleet turnover, would over time cause substantial reductions that, in almost all cases, would cause region-wide MSAT levels to be significantly lower than today.

3.7.2.6 Carbon Monoxide

Maximum one-hour and eight-hour CO levels were predicted at receptor sites at the intersection of Scenic Parkway and Dominion Boulevard. Opening year (2011) one-hour CO concentrations and eight-hour CO concentrations are shown in Tables 3.5 and 3.6, respectively. Design year (2030) one-hour CO concentrations and eight-hour CO concentrations are shown in Tables 3.7 and 3.8, respectively. As demonstrated in these tables, no violations of the NAAQS are predicted under the Proposed Build Alternative.



Table 3-5. Predicted 2011 Maximum One-Hour CO Concentrations (ppm)

Site	Receptor	No Build		Build (with \$1.00 toll)	
		a.m.	p.m.	a.m.	p.m.
Scenic Parkway @ Dominion Boulevard	1	6.8	7.0	6.8	7.3
	2	7.4	7.7	7.4	7.7
	3	7.0	7.0	7.1	7.2
	4	7.2	6.8	7.6	6.8
	5	6.9	7.7	7.1	8.2
	6	6.7	7.1	7.1	7.4
	7	6.4	6.8	6.7	7.2
	8	6.7	6.9	6.9	7.2
	9	6.9	6.8	6.8	6.9
	10	6.8	6.9	6.8	6.8
	11	6.7	6.6	6.7	6.8
	12	7.1	7.4	7.5	7.6
	13	7.1	7.3	7.6	7.3
	14	6.9	7.2	7.4	7.3
	15	6.8	7.2	7.3	7.3
	16	7.7	8.1	7.6	8.1
	17	7.0	7.6	7.0	7.5
	18	6.9	7.2	6.9	7.2
	19	7.1	7.4	7.2	7.6
	20	6.8	7.4	6.9	7.5
	21	6.6	7.4	6.8	7.4
	22	6.4	7.3	6.6	7.4
	23	7.8	7.5	7.8	6.9
	24	8.1	7.0	7.8	6.8
	25	7.3	6.4	7.1	6.8
	26	7.2	6.6	7.6	6.6
	27	6.8	6.6	7.4	6.5
	28	6.8	6.5	7.1	6.6
	29	6.6	6.5	7.2	6.6
	30	7.4	7.9	7.5	7.8
	31	7.2	7.4	7.3	7.3
	32	7.0	7.1	7.3	7.0
Maximum Concentration		8.1	8.1	7.8	8.2

Note: Concentrations include one-hour CO background= 6.0 ppm

One-hour CO Standard = 35 ppm



Table 3-6. Predicted 2011 Maximum Eight-Hour CO Concentrations (ppm)

Site	Receptor	No Build	Build (with \$1.00 toll)
Scenic Parkway @ Dominion Boulevard	1	3.6	3.8
	2	4.0	4.0
	3	3.6	3.7
	4	3.7	4.0
	5	4.0	4.3
	6	3.7	3.8
	7	3.5	3.7
	8	3.5	3.7
	9	3.5	3.5
	10	3.5	3.5
	11	3.4	3.5
	12	3.8	4.0
	13	3.8	4.0
	14	3.7	3.8
	15	3.7	3.8
	16	4.3	4.3
	17	4.0	3.9
	18	3.7	3.7
	19	3.8	4.0
	20	3.8	3.9
	21	3.8	3.8
	22	3.8	3.8
	23	4.1	4.1
	24	4.3	4.1
	25	3.8	3.7
	26	3.7	4.0
	27	3.5	3.8
	28	3.5	3.7
	29	3.4	3.7
	30	4.1	4.1
	31	3.8	3.8
	32	3.7	3.8
Maximum Concentration		4.3	4.3

Notes: Concentrations include one-hour CO background= 3.0 ppm

Eight-hour CO Standard = 9 ppm



Table 3-7. Predicted 2030 Maximum One-Hour CO Concentrations (ppm)

Site	Receptor	No Build		Build (with \$1.00 toll)	
		a.m.	p.m.	a.m.	p.m.
Scenic Parkway @ Dominion Boulevard	1	6.6	6.8	6.7	7.1
	2	7.0	7.3	7.1	7.4
	3	6.8	6.8	6.7	6.9
	4	7.1	6.5	7.1	6.5
	5	6.6	7.2	6.9	7.6
	6	6.5	6.6	6.8	7.0
	7	6.4	6.6	6.7	6.8
	8	6.4	6.8	6.7	6.9
	9	6.8	6.8	6.7	6.7
	10	6.6	6.7	6.6	6.7
	11	6.5	6.5	6.4	6.6
	12	6.9	7.0	7.2	7.2
	13	6.8	7.0	7.2	7.1
	14	6.7	7.0	7.1	7.0
	15	6.6	6.9	7.0	7.1
	16	7.1	7.5	7.2	7.4
	17	6.7	7.2	6.7	7.1
	18	6.7	7.0	6.7	6.9
	19	6.8	7.1	6.8	7.2
	20	6.7	7.0	6.6	7.0
	21	6.4	7.0	6.6	7.1
	22	6.4	7.0	6.5	7.0
	23	7.3	7.1	7.3	6.7
	24	7.6	6.7	7.5	6.7
	25	7.0	6.4	6.7	6.7
	26	6.8	6.4	7.3	6.4
	27	6.7	6.4	6.9	6.4
	28	6.7	6.4	6.8	6.5
	29	6.4	6.5	6.9	6.4
	30	7.0	7.3	7.2	7.3
	31	6.8	7.1	7.0	7.1
	32	6.8	6.7	6.9	6.8
Maximum Concentration		7.6	7.5	7.5	7.6

Notes: Concentrations include one-hour CO background= 6.0 ppm

One-hour CO Standard = 35 ppm



Table 3-8. Predicted 2030 Maximum Eight-Hour CO Concentrations (ppm)

Site	Receptor	No Build	Build (with \$1.00 toll)
Scenic Parkway @ Dominion Boulevard	1	3.5	3.7
	2	3.8	3.8
	3	3.5	3.5
	4	3.7	3.7
	5	3.7	4.0
	6	3.4	3.6
	7	3.4	3.5
	8	3.5	3.5
	9	3.5	3.4
	10	3.4	3.4
	11	3.3	3.4
	12	3.6	3.7
	13	3.6	3.7
	14	3.6	3.7
	15	3.5	3.7
	16	3.9	3.8
	17	3.7	3.7
	18	3.6	3.5
	19	3.7	3.7
	20	3.6	3.6
	21	3.6	3.7
	22	3.6	3.6
	23	3.8	3.8
	24	4.0	3.9
	25	3.6	3.4
	26	3.5	3.8
	27	3.4	3.5
	28	3.4	3.5
	29	3.3	3.5
	30	3.8	3.8
	31	3.7	3.7
	32	3.5	3.5
Maximum Concentration		4.0	4.0

Notes: Concentrations include one-hour CO background= 3.0 ppm

Eight-hour CO Standard = 9 ppm



3.7.2.7 Construction-Related Effects

Fugitive dust is airborne particulate matter, generally of a relatively large particulate size. Haul trucks, concrete trucks, delivery trucks, and earth-moving vehicles operating around the construction sites would generate fugitive dust during construction. This fugitive dust would primarily result from particulate matter re-suspended by vehicle movement over paved and unpaved roads, dirt tracked onto paved surfaces from unpaved areas at access points, and material blown from uncovered haul trucks. The distance that particles drift from their source generally depends on their size, the emission height, and the wind speed. Small particles (30 to 100 micron range) can travel several hundred feet before settling to the ground, but most fugitive dust is comprised of relatively large particles (greater than 100 microns in diameter). These particles are responsible for the reduced visibility often associated with this type of construction. Given their relatively large size, these particles tend to settle within 20 to 30 feet of their source. Construction-related effects of the Proposed Build Alternative would be limited to short-term increased fugitive dust and mobile-source emissions during construction. Performance standards of state and local regulations regarding dust control and other air quality emission reduction controls would be implemented and monitored.

3.7.3 Mitigation

Because no substantial air quality impacts are expected to result from the Proposed Build Alternative, mitigation associated with long-term operation of the facility would not be required. Any measures to reduce automobile travel would reduce air pollutant emissions. In order to minimize the amount of construction dust generated, the following guidelines would be followed.

Site Preparation:

- Minimize land disturbance.
- Use watering trucks to minimize dust.
- Cover trucks when hauling dirt.
- Stabilize the surface of dirt piles if they are not removed immediately.
- Use windbreaks to prevent accidental dust pollution.
- Limit vehicular paths and stabilize these temporary roads.
- Pave all unpaved construction roads and parking areas to road grade for a length of no less than 50 feet from points where these roads and parking areas exit the construction site to help prevent dirt from washing onto paved roadways.

Construction:

- Cover trucks when transferring materials.
- Use dust suppressants on unpaved traveled paths.
- Minimize unnecessary vehicular and machinery activities.
- Minimize dirt track-out by washing or cleaning trucks before leaving the construction site. An alternative would be to pave or gravel no less than 50 feet of the exit road just before entering the public road.

Post-Construction:

- Re-vegetate any disturbed land not slated for ongoing use.
- Remove unused material and dirt piles.
- Re-vegetate vehicular paths created during construction to avoid future off-road vehicular activities.

Mobile Source Emissions

Because CO emissions from motor vehicles generally increase with decreasing vehicle speed, traffic disruption during construction (e.g., temporary reduction of roadway capacity and increased queue lengths) could result in short-term, elevated concentrations of CO. In order to minimize the amount of emissions generated, every effort would be made during the construction phase to limit disruption to traffic, especially during peak travel hours.

Construction activity may generate a temporary increase in MSAT emissions. Construction mitigation will include strategies that reduce engine activity or reduce emissions per unit of operating time. Operational agreements that reduce or redirect work or shift times will be considered as a means to avoid community



exposures near vulnerable populations (such as, agreements that stress work activity outside normal hours of an adjacent school campus). With respect to construction emissions, technological adjustments to equipment (such as off-road dump trucks and bulldozers) will be considered during preparation of construction documents. These technological measures could include particulate matter traps, oxidation catalysts, and other devices that provide after-treatment of exhaust emissions. The use of clean fuels, such as ultra-low sulfur diesel, will also be considered.

Longer-term MSAT emissions will be more difficult to control, as variables such as daily traffic and vehicle mix are elusive. Operational strategies targeted at reducing MSAT emissions (such as speed limit enforcement or traffic management policies) will be the responsibility of local jurisdictions. Local planners could also consider the benefits of establishing buffer zones between new or expanded highway alignments and areas of vulnerable populations. Modifications of local zoning or the development of guidelines that separate emissions and receptors would also be the responsibility of local jurisdictions. Final mitigation measures related to MSAT emissions will be developed through interagency consultation during the design and permitting phases of the Proposed Build Alternative.

3.7.3.1 Summary of Air Quality Effects

In summary, the purpose and need of the project focuses on meeting the current and future regional transportation needs of the area. The project is listed on the TIP. The Proposed Build Alternative is not predicted to cause or exacerbate a localized violation of the NAAQS or measurably increase regional pollutant emission burdens or MSAT levels. Construction-related effects of the project would be limited to short-term increased fugitive dust and mobile-source emissions during construction. State and local regulations regarding dust control and other air quality emission reduction controls would be followed.

3.8 NOISE

To evaluate traffic noise, FHWA has established Noise Abatement Criteria (NAC). As presented in Table 3-9, the NAC vary according to land use activity. When predicted traffic noise levels “approach” or exceed the NAC, or when predicted traffic noise levels increase substantially from existing levels, FHWA requires that noise abatement measures be considered. VDOT defines “approach” as reaching one decibel less than the NAC, and a substantial increase occurs if noise levels are predicted to increase 10 dBA or more as a direct result of the transportation improvement project.

Table 3-9. Noise Abatement Criteria

Activity Category	LAeq1h (dBA)	Description of Activity
A	57 Exterior	Lands on which serenity & quietness of extraordinary significance serve an important public purpose & where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 Exterior	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, & hospitals.
C	72 Exterior	Developed lands, properties, or activities not included in Categories A or B.
D	--	Undeveloped lands.
E	52 Interior	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, & auditoriums.

Source: Title 23 Code of Federal Regulations, Part 772, *Procedures for Abatement of Highway Traffic Noise and Construction Noise*, Federal Highway Administration, April 2001.

Predicted noise levels were simulated using FHWA's computer prediction model for highway traffic noise – Traffic Noise Model (TNM) Version 2.5, February 2004. Noise level predictions were made for the traffic characteristics that yield the worst-hourly traffic noise on a regular basis. Noise level contours of equal levels were estimated to identify the noise sensitive sites that may approach or exceed the NAC as a result of the 2030 design year for the Proposed Build Alternative. Since the noise sensitive sites within the project limits consist of the exterior areas of low density and medium density residential (NAC Activity Category B), the



contours were estimated for the 66 dBA noise level. To validate the computer noise model, field measurements were taken at six locations which are representative of the noise sensitive sites within the study limits. Traffic volumes by vehicle classification and vehicle speeds were recorded during each fifteen-minute measuring period. Additional discussion of methods used to derive findings set forth in following sections is provided in the Noise Technical Report (July, 2008).

3.8.1 Affected Environment

A total of 149 noise sensitive sites (dwellings) distributed among nine noise sensitive areas (NSA) were evaluated as part of this noise study. These noise sensitive sites include single-family residences, apartment buildings, and condominium buildings within the project limits along Dominion Boulevard, as well as in the vicinity of cross streets and adjacent cul-de-sacs. For the purpose of the noise study, the sites were grouped into nine NSA based on proximity and geographic relationship to one another. Table 3-10 presents the location and description of each NSA. Boundaries of the NSA are presented graphically in the Noise Technical Report.

Table 3-10. Noise Sensitive Areas

Noise Sensitive Area	Location	Dwelling Type	Number of Dwellings	Exstg. Noise Levels (dBA)
NSA 1	Cul-de-sac on Erin Lane west of Dominion Blvd terminating just south of the intersection of Dominion Blvd and Cedar Rd	Single-family residence	25	51 - 64
NSA 2	Intersection of Dominion Blvd and Cedar Rd, cul-de-sacs off Lancing Way and residences at cul-de-sac on Lancing Way	Single-family residence	13	56 - 69
NSA 3	Dominion Lakes Subdivision south of Dominion Lakes Blvd. Also includes the homes within the new housing development of Dominion Forest, south of Dominion Lakes. Homes run parallel to Dominion Blvd	Single-family residence	32	47 - 65
NSA 4	Dominion Lakes Subdivision north of Dominion Lakes Blvd. Homes run parallel to Dominion Blvd	Single-family residence	21	53 - 64
NSA 5	Located on Cobblewood Arch	Single-family residence and condominiums	3	56 - 60
NSA 6	Dominion Pines Apartment Complex	Apartment buildings	30	63
NSA 7	Located off of Main's Creek Rd south of Great Bridge Blvd intersection with Dominion Blvd	Single-family residence	8	47 - 63
NSA 8	Located on Wickford Dr and Blake St	Single-family residence and condominiums	10	48 - 68
NSA 9	Includes the new residential development off of Mullen Rd. Most homes run parallel to Dominion Blvd	Single-family residence	7	61 - 65

3.8.2 Environmental Consequences

Predicted noise levels for the Proposed Build Alternative were calculated and compared to the No-Build Alternative and to the Existing Condition noise level at 149 noise sensitive sites adjacent to Dominion Boulevard. Locations of predicted noise level sites are shown in Figures 5 through 8 of the Noise Technical Report. Table 6 of the Noise Technical Report summarizes predicted noise levels for the existing condition, the No-Build, and the Proposed Build Alternative. In summary, the No-Build Alternative results in noise impacts to 64 residences and the Proposed Build Alternative results in noise impacts to 44 residences. No sites are expected to experience a substantial increase (i.e., an increase of 10 dBA Leq or more above existing noise levels) as a result of the Proposed Build Alternative. Narrative summaries of noise impacts associated with each of the nine NSA are provided in the following paragraphs.



NSA 1 represents 25 single-family residences in the southern portion of the project area adjacent to the roadway and terminating just south of the Cedar Road intersection. Existing noise levels at these residences range from 51 to 64 dBA. Future design year (no-build) noise levels range from 54 to 65 dBA and future design year (build) noise levels range from 54 to 65 dBA. Based on VDOT's NAC, no noise impacts are anticipated.

NSA 2 is located at the intersection of Dominion Boulevard and Cedar Road. NSA 2 includes 13 single-family residences on cul-de-sacs and off Lancing Way. Existing noise levels range from 56 to 69 dBA. Future design year (no-build) noise levels range from 59 to 72 dBA, while future design year (build) noise levels range from 58 to 67 dBA. Two residences within NSA 2 are anticipated to exceed VDOT's NAC. Noise abatement considerations are warranted for NSA 2.

NSA 3 encompasses a portion of the Dominion Lakes subdivision south of Dominion Lakes Boulevard. It also includes the planned Dominion Forest subdivision. Dominion Forest was not under construction nor had its completion date been specified at the time this report was prepared. NSA 3 includes 32 single-family residences that run parallel to Dominion Boulevard. Existing noise levels range from 47 to 65 dBA. Future design year (no-build) noise levels range from 50 to 67 dBA. Future design year (build) noise levels range from 58 dBA to 66 dBA. Four residences within NSA 3 are anticipated to exceed VDOT's NAC. Noise abatement considerations are warranted for NSA 3.

NSA 4 covers an additional portion of the Dominion Lakes subdivision. It includes 21 single-family residences oriented roughly parallel to Dominion Boulevard north of Dominion Lakes Boulevard. Noise levels in NSA 4 for existing conditions range from 53 to 64 dBA. Future design year (no-build) noise levels range from 56 to 67 dBA and future design year (build) noise levels range from 59 to 67 dBA. Five residences within NSA 4 are anticipated to exceed VDOT's NAC. Noise abatement considerations are warranted for NSA 4.

NSA 5 includes the Cobblewood Arch area. It includes three single-family residences. Existing noise levels for NSA 5 range from 56 to 60 dBA. Future design year (no-build) noise levels range from 58 to 63 dBA and future design year (build) noise levels range from 59 to 63 dBA. Based on VDOT's NAC, no noise impacts are anticipated.

NSA 6 includes the Dominion Pines Apartment complex. It includes 30 residences. Existing noise levels for NSA 6 are 63 dBA. Future design year (no-build) noise levels are 66 dBA and future design year (build) noise levels range from 66 to 68 dBA. Thirty residences within NSA 6 are anticipated to exceed VDOT's NAC. Noise abatement considerations are warranted for NSA 6.

NSA 7 includes the area off Mains Creek Road. This NSA includes eight single-family residences. Existing noise levels range from 47 to 63 dBA. Future design year (no-build) noise levels range from 50 to 65 dBA. Future design year (build) noise levels range from 50 to 63 dBA. Based on VDOT's NAC, no noise impacts are anticipated.

NSA 8 is located in the area of Wickford Drive and Blake Street. This NSA includes ten single-family residences. Existing noise levels range from 48 to 68 dBA. Future design year (no-build) noise levels range from 50 to 69 dBA and future design year (build) noise levels range from 55 to 67 dBA. One residence within NSA 8 is expected to exceed VDOT's NAC. Noise abatement considerations are warranted for NSA 8.

NSA 9 encompasses Rose Gardens Estates off Mullen Road which, at the time of this report, was under construction and includes seven single-family residences. Existing noise levels range from 61 to 65 dBA. Future design year (no-build) noise levels range from 63 to 68 dBA and future design year (build) noise levels range from 61 to 67 dBA. Two residences within NSA 9 are expected to exceed VDOT's NAC. Noise abatement considerations are warranted for NSA 9.

3.8.3 Mitigation

FHWA guidelines set forth in 23 CFR Part 772 require that, when the noise levels attributed to a proposed roadway project approach or exceed the NAC, noise abatement measures must be evaluated. Since noise levels along the study corridor were determined to exceed NAC for Activity Category B, noise abatement measures were evaluated. Evaluated measures include traffic system management, alignment modifications, and noise barriers.



3.8.3.1 Traffic Management Measures

Traffic management measures considered for noise abatement include reduced speeds and truck restrictions. Reduced speeds would not be an effective noise mitigation measure since a substantial decrease in speed would be necessary to provide a significant noise reduction. A 10-mph reduction in speed typically results in only a two dB decrease in noise level. Truck restrictions may reduce noise levels; however, such traffic management measures would be in conflict with the intended use of the project.

3.8.3.2 Alignment Modifications

A westward shift in the alignment of Dominion Boulevard was incorporated into the Proposed Build Alternative to reduce future noise levels at several residential dwellings in the existing Dominion Lakes subdivision and the proposed Dominion Forest subdivision. Any further alteration of horizontal alignment along the corridor is limited by the available right-of-way along the project corridors. Significant noise reduction at noise sensitive locations would require large alignment shifts which would necessitate additional property acquisition and could expose additional sites to project noise. In the vicinity of Dominion Lakes subdivision, the corridor is also constrained by the proximity of the Higginson-Buchanan landfill. The City initially considered a westward shift away from Dominion Lakes; however, this resulted in a substantial acquisition of the permitted solid waste landfill, an action that would be costly in terms of time and money for landfill permitting and clean-up and long-term monitoring. The City would also take on the risk of liability if the landfill was found to be contaminated. The alteration of vertical alignment of the proposed roadway is not considered to be a feasible noise abatement measure. Depressing the roadway would require taking of additional property for the sloped embankments, or excessive costs for the construction of sound-absorptive retaining walls; elevating the roadway would allow noise to propagate farther into the community at higher levels.

3.8.3.3 Noise Barriers

Noise barriers were evaluated at locations where noise impact is expected to approach or exceed VDOT's NAC for the Proposed Build Alternative. With respect to individual dwelling units, FHWA and VDOT policies require that noise barriers found to be both "feasible" and "reasonable" be recommended for construction. To be feasible, a barrier must be effective, that is it must reduce noise levels at noise sensitive locations by at least five decibels, thereby "protecting" or "benefiting" the property. To be "reasonable", a barrier cannot cost more than \$30,000 per protected or benefited residential property.

Where the construction of noise barriers was found to be feasible, barrier noise reduction was estimated based on roadway, barrier, and receiver geometry. All noise barrier analyses were performed using TNM 2.5 using the alignment and typical sections of the project roadways. Barrier heights and lengths were adjusted within TNM model runs to provide the minimum noise reduction of five dB at all noise sensitive locations where noise impact is expected to occur. The resulting barrier heights would be between eight and sixteen feet. Details of each evaluated barrier are presented in Table 3-11. Figures 3-2 and 3-3 provide a graphical depiction of each evaluated barrier.

Table 3-11. Details of Evaluated Noise Barriers

Barrier Description		Site No.	Barrier Length (ft)	Range Barrier Height (ft)	Range Noise Reduction (dB)	Surface Area (sq. ft.)	Protected Residences	Cost Per Residence
No.	Segment							
1	A3	R123	500	16	1	8,000	1	n/a
2	C1	R23	716	10	5	7,160	2	\$125,317
3	C1	R36	784	12	5-7	9,408	5	\$65,856
4	C1	R40	742	14	5-8	10,388	30	\$12,119
5	C1	R76	482	12	6	5,785	2	\$101,237
Total			3,224	n/a	n/a	40,741	39	



Noise Barrier 1 at Lancing Way was found not feasible. Barrier 2 (at Dominion Lakes/Dominion Forest), Barrier 3 (at Dominion Lakes), and Barrier 5 (at Rose Garden Estates off Mullen Road) all exceed the State Noise Abatement Policy's cost-effectiveness criteria. Third-party funding is required for these barriers to continue towards construction. FHWA and VDOT contribute the first \$30,000 for each protected or benefited property. The remainder must come from a source other than FHWA or VDOT. Barrier 4, at the Dominion Pines Apartment complex was found to be both feasible and reasonable in terms of cost. Based on preliminary road design plans, the cost of sound wall materials (using year 2007 dollars), and the installation costs (using year 2007 labor dollars), the estimated total cost for Barrier 4 is \$363,580 or \$12,119 per protected property.

VDOT's cost to construct noise barriers in the Hampton Roads region is currently \$35 per square foot. Although cost-effectiveness with respect to individual dwelling units cannot be determined at this point of the study, preliminary costs for the total project would total \$1,145,935 assuming cost effectiveness of all barriers presented above in Table 3-11 with the exception of Barrier 1, which is not feasible. Final approval of any barriers will take into account the views of the affected property owners.

3.8.4 Construction Noise

An increase in project area noise levels would occur during construction of the Proposed Build Alternative. General mitigation measures concerning construction noise would include:

- Equipping any internal combustion engine used for any purpose on or related to the job with a properly operating muffler;
- Conducting truck loading, unloading, and hauling so that noise is kept to a minimum;
- Routing construction equipment and vehicles in areas that will cause the least disturbance to nearby receptors where possible; and
- Placing continuously operated diesel powered equipment, such as compressors and generators, in areas as far as possible from or shielded from noise sensitive locations.

Noise barriers to be constructed as part of the Proposed Build Alternative would be constructed as soon as practicable to allow the barriers to protect noise-sensitive areas from construction noise. In addition, VDOT has developed a specification concerning construction noise that is applicable to this project (VDOT Specification, Section 107.14(b) 3 Noise). The specification requires construction noise levels be limited to 80 decibels in noise sensitive areas adjacent to the project area between 10 p.m. and 6 a.m. Construction noise may be monitored and noise abatement may be required where exterior noise levels from construction operations exceed 80 decibels. Under its noise ordinance (Code of Ordinances, Ch. 26: Environment, Article V: Noise, Section 26-123(6) and (8)), the City of Chesapeake may prohibit or restrict work that produces objectionable noise between 9 p.m. and 7 a.m.

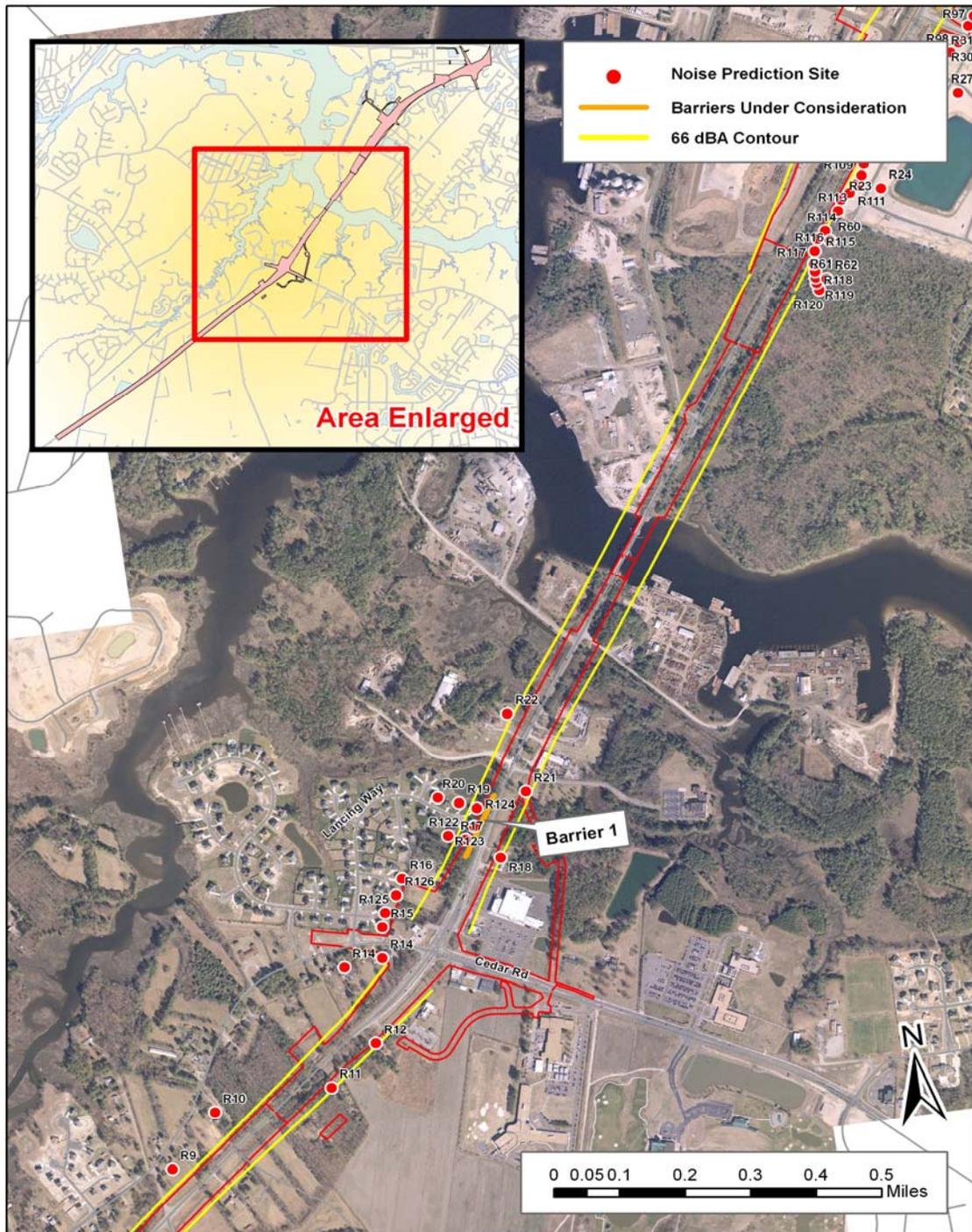
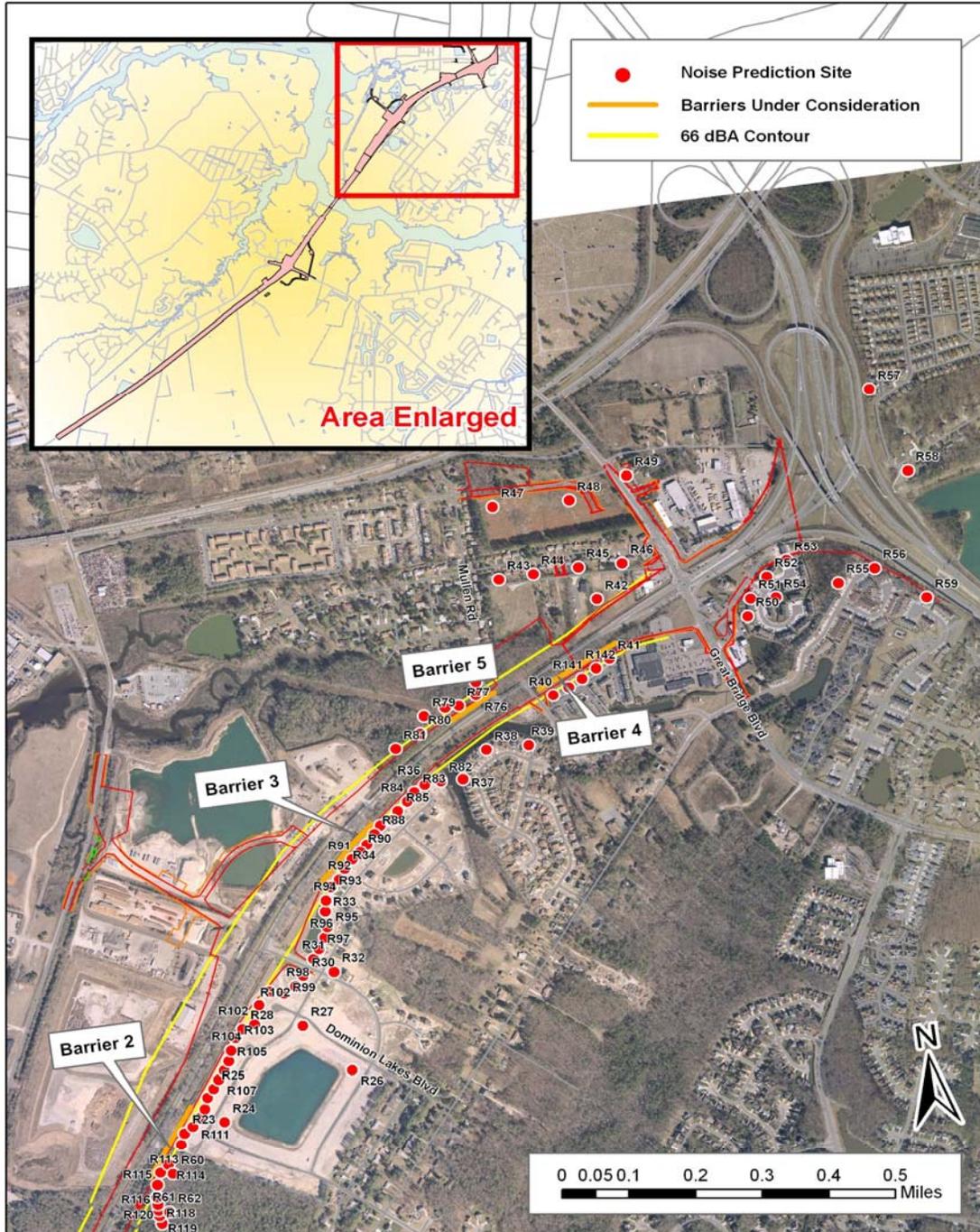


Figure 3-2
Barriers Under Consideration – Panel 1



**Figure 3-3
Barriers Under Consideration – Panel 2**



3.9 HAZARDOUS MATERIALS

3.9.1 Affected Environment

Available federal and state environmental databases were searched to identify properties within one mile of either side of Dominion Boulevard that have a documented release or pose a threat of a release of oil and/or hazardous materials. Within this two-mile buffer, 37 hazardous materials sites were identified through the database search. Detailed information for these sites along with a figure showing their locations is provided in the report titled *EDR Data Map™ Corridor Study, Dominion Blvd.* (Environmental Data Resources, Inc. 2004).

In summary:

- None of the six Resource Conservation and Recovery Act (RCRA) generators located within the search area have had previous reports of violations.
- All three sites on the DEQ Pollution Complaint database (SPILLS) have closed cases.
- Seventeen underground storage tanks currently in use and six above ground storage tanks in use are located within the search area.
- Only one of the 17 sites with leaking underground storage tanks has an open file.
- One Formerly Used Defense or FUD site (a former Nike missile battery) is located within the search area at the southern end of the corridor.
- One active solid waste (debris) landfill (owned by Higgerson Buchanan, Inc.) is located within the study area.

The Higgerson Buchanan, Inc. landfill (originally permitted in December 1985) is situated on the west side of Dominion Boulevard, between Bainbridge Boulevard and Dominion Boulevard. The Virginia Solid Waste Management Permit allows the landfill to accept construction waste, demolition waste, brush, tree trimmings, stumps, and inert waste materials. The landfill does not have a liner. Groundwater monitoring is performed on a regular basis from six wells located on-site. In addition, as part of this study, soil and groundwater samples were taken on 3 January 2005 along the southbound shoulder of Dominion Boulevard, immediately adjacent to the landfill. The sample analysis results indicate that the study area is void of residual contamination from the landfill (Schnabel, 2005). According to DEQ, no closure plan for the landfill has been developed to date.

3.9.2 Environmental Consequences

Existing underground storage tanks (USTs) and above-ground storage tanks (ASTs) along the corridor could potentially pose a health risk or environmental concern during construction if the tanks are leaking. At the Great Bridge Boulevard interchange, five facilities currently have USTs in operation, three of which have experienced leaks in the past. Also, two sites in the vicinity are listed as a facility that generates, transports, stores, treats, or disposes hazardous waste (RCRA). Phase I Environmental Site Assessments would be required from the landowners prior to acquisition and construction in order to characterize potential environmental threats from hazardous materials.

The Proposed Build Alternative would affect approximately seven acres of the Higgerson Buchanan property at the northern edge of the property, outside of the permitted solid waste landfill boundary. All buildings on the property will remain intact. The proposed design reflects the City's decision to avoid taking property within the permitted landfill limits and taking on the associated liability and regulatory responsibilities of a landfill owner. In their effort to avoid the landfill proper, the City has taken all reasonable design measures to minimize impacts to the Dominion Lakes subdivision including the use of retaining walls. Prior to acquisition and construction of the Proposed Build Alternative, additional soil and groundwater testing would be performed in the area to be acquired to determine the presence or absence of contamination that may have migrated from the landfill. If found, hazardous materials would be disposed of in an appropriate facility in accordance with state and federal regulations prior to VDOT's acquisition of real property or an easement.

3.9.3 Mitigation

VDOT will require that a Phase I Environmental Site Assessment be completed by the landowner or another responsible party prior to construction in order to characterize potential environmental threats from hazardous



materials. VDOT would not acquire properties or easements, nor would it begin construction in areas containing potential contamination sources until such time that a responsible party has cleaned-up the areas or has taken measures to prevent the off-site migration of contaminants.

3.10 TERRESTRIAL ECOLOGY

3.10.1 Affected Environment

The study area has experienced significant alterations since the early 1960s due almost exclusively to human activity. Land use throughout the study area consists of agriculture, landfilling, sand burrowing, and residential and commercial development. Urbanization of the study area has encroached on the various natural terrestrial communities and associated wildlife habitats once found in the study area. Natural or managed terrestrial communities identified within the study area include mixed hardwood-pine forests, agricultural lands (primarily cropland and some pasture), and transitional lands (primarily brush and old field communities). According to the database of rare terrestrial communities that occur throughout Virginia (maintained by the DCR-DNH), no rare terrestrial communities are reported to occur within the study area.

3.10.2 Environmental Consequences

Natural terrestrial communities and associated wildlife habitats affected by the Proposed Build Alternative are presented in Table 3-12.

Table 3-12. Terrestrial Land Cover Affected

Type of Land Cover	Number of Acres Affected
Agricultural	29.71
Mixed Forest	66.39
Disturbed (land fill, recently graded, etc.)	10.66
Other (unclassified)	2.00

Total forest resources in the Hampton Roads / Elizabeth River hydrologic sub-basin (DEQ designation “G15”) are estimated at 16,359 acres (U.S. Geological Survey, EROS database, accessed 2006). Forest communities lost through conversion to highway right-of-way would represent 0.41 percent of the regional total under the Proposed Build Alternative. The conversion of forest due to construction would represent a relatively small percentage of the forest lands within the sub-basin. Forest stands that would be affected are already fragmented and none would be further bisected. Forest communities that would not be affected by the construction of the roadway are widespread throughout the region; thus mobile wildlife species inhabiting affected areas could be absorbed into adjoining forest communities with no long-term adverse effects. No forest communities large enough to contain interior forest habitat exist within affected areas, thus, construction of the Proposed Build Alternative would not have substantial direct or indirect effects to migratory birds.

Wildlife habitat associated with agricultural lands is generally limited in value and function due to the lack of plant diversity and the relatively high frequency of disturbance; however, agricultural lands are utilized by wildlife - with the species composition often depending on the type of crop being cultivated, the time of year, and methods of harvesting. Croplands offer refuge and foraging areas for a variety of small mammals, birds, and reptiles and, following harvesting, offer foraging for white-tailed deer and migrating waterfowl. Total agricultural land within the Hampton Roads / Elizabeth River hydrologic sub-basin (G15) is estimated at 19,141 (U.S. Geological Survey, EROS database, accessed 2006). Terrestrial habitat associated with agricultural lands lost through conversion to highway right-of-way would represent 0.16 percent of the regional total under the Proposed Build Alternative. The conversion of habitat associated with agricultural lands due to construction would represent a comparatively small percentage of the agricultural lands within the sub-basin.

Due to the developed nature of the corridor, no significantly adverse effects associated with habitat fragmentation from the construction of a roadway, vehicle collisions with birds and wildlife, or noise impacts would occur.



3.10.3 Mitigation

Construction of the Proposed Build Alternative would convert forest lands and agricultural lands to maintained vegetation communities and pavement. Vegetated communities remaining within the right-of-way would provide limited and undesirable wildlife habitat, particularly for bird and insect species. Use of plantings that would not attract wildlife to rights-of-way, construction of wildlife fences, and maintenance of existing wildlife crossings would serve to minimize vehicle-wildlife collisions. The implementation of BMPs along with erosion and sediment control would minimize the impacts to adjoining communities and habitat.

3.11 FARMLANDS

3.11.1 Affected Environment

Approximately 3,940 acres of soils classified by the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) as “prime farmland soils” occur within the Hampton Roads / Elizabeth River hydrologic sub-basin within which the project is located (DEQ Sub-Basin G15). Soil units underlying areas potentially considered as prime farmland within the City of Chesapeake consist of the following:

- Acredale silt loam, 0 to 1 percent slopes;
- Bojac loamy fine sand, 0 to 2 percent slopes;
- Deloss-Tomotley-Nimmo complex, 0 to 1 percent slopes;
- Dragston fine loamy sand, 0 to 2 percent slopes;
- Dragston-Tomotley complex, 0 to 2 percent slopes Tomotley-Bertie complex, 0 to 2 percent slopes;
- Tomotley-Deloss complex, 0 to 1 percent slopes;
- Tomotley-Nimmo complex, 0 to 1 percent slopes.

3.11.2 Environmental Consequences

Acres of NRCS-mapped prime farmland soil units affected by the Proposed Build Alternative are presented in Table 3-13. The Proposed Build Alternative would affect only 0.19 percent of the total prime farmland soils occurring within Hampton Roads / Elizabeth River sub-basin and, as such, effects, would be not be significant. All mapped prime farmland soil units that would be affected by project construction are located within existing City of Chesapeake right-of-way and, accordingly, are not considered to be prime farmlands from an existing or potential land use perspective. NRCS Farmland Conversion Impact Rating is, therefore, not necessary.

Table 3-13. Prime Farmlands Affected

Acres of Mapped Prime Farmland Soil Units Affected	Percent of Total Within Sub-Basin
7.533	0.19

3.11.3 Mitigation

Not applicable.

3.12 WATER QUALITY AND WATER RESOURCES

3.12.1 Surface Water Resources

3.12.1.1 Affected Environment

The Virginia Department of Environmental Quality (DEQ) released a report in 2003 titled “State of the River 2003” for the Elizabeth River Project (DEQ, 2003). Six criteria were evaluated to ascertain the health of the aquatic environment, specifically (1) sediment contamination, (2) bottom community health, (3) cancer in mummichog fish, (4) dissolved oxygen, (5) dissolved metals, and (6) tributyltin. All criteria, with the exception of dissolved metals, were ranked as being a “severe problem” in the South Branch of the Elizabeth River. Dissolved metals were considered “not a problem”. While this study did note that water quality generally improved over the period between 1989 and 2000, “the status of most parameters [was] poor.” Levels of bottom dissolved oxygen were “classified as good in all segments of the Hampton Roads / Elizabeth River sub-basin except for the Southern Branch for which the status was fair.” The degraded condition of the South



Branch of the Elizabeth River (and the lower Elizabeth River in general) is reflected in the fact that these waters have been condemned for market oyster production for many years (VIMS, 2002). In DEQ's Final 2006 305(b)/303(d) Water Quality Assessment Integrated Report, the South Branch of the Elizabeth River is classified as a Category 5 Impaired Water and a priority for Total Maximum Daily Load (TMDL) development (DEQ 2006). Listed impairments include the presence of the microbe, *Enterococcus* spp., and low concentrations of dissolved oxygen (DEQ, 2006).

3.12.1.2 Environmental Consequences

In the absence of appropriate mitigation measures, highway and bridge improvements could potentially result in further degradation of poor water quality conditions in the Southern Branch of the Elizabeth River as a result of construction, land disturbance, and land use changes. Potential contaminants from road surfaces include heavy metals, liquid calcium chloride, organic pollutants, suspended solids from tire wear, and salt and sand applied to combat poor road conditions.

3.12.1.3 Mitigation

During construction and operation of the Proposed Build Alternative, water quality impacts would be managed by adherence to federal, state, and local standards for water quality protection. In addition, impacts would be minimized by implementation of erosion and sedimentation control practices in accordance with the *VDOT Erosion and Sediment Control (E&SC) and Stormwater Management (SWM) Program Manual* (March 2004), and the Virginia Stormwater Management Program. Best management practices (BMPs) would be implemented to treat waters before their release into roadside ditches that drain into the Elizabeth River. With the implementation of appropriate erosion and sediment control, and stormwater management controls, impacts to water quality in the South Branch of the Elizabeth River are anticipated to be relatively minor and are not expected to contribute to violations of state water quality standards.

3.12.2 Groundwater Resources

3.12.2.1 Affected Environment

The Dominion Boulevard study area is underlain by sands, silts, and clays – materials deposited in response to fluctuations in sea level during the upper Pleistocene. Peaty deposits formed in poorly drained depressions in the coastal plain setting are also common. These sediments represent the Tabb Formation which are, in turn, underlain by the older, Pliocene, Yorktown Formation. The uppermost, unconfined groundwater aquifer in the study area is the Columbia Aquifer. It is underlain by six confined aquifers. According to the City of Chesapeake's 2026 Comprehensive Plan:

"The quality of water obtained from the water table aquifer, or Columbia Aquifer, is generally suited for small-scale irrigation, such as lawn irrigation, but requires treatment for potable use. Associated water quality problems include high acidity, high iron content, and hardness. In addition, the pollution potential for the water table aquifer is high, considering its close proximity to the ground surface and the lack of a low permeable barrier."

3.12.2.2 Environmental Consequences

Without implementation of appropriate mitigation measures, runoff from road and bridge surfaces associated with the Proposed Build Alternative could contain potential groundwater contaminants (particularly organic compounds and heavy metals). Since the groundwater table is relatively close to the surface, contaminants released to the surrounding ground surface would experience very little infiltration and a low potential for soil capture before entering the groundwater.

3.12.2.3 Mitigation

The Proposed Build Alternative would employ appropriate erosion and sediment control and best management practices to attenuate stormwater runoff and to mediate pollutant loads before infiltration.



3.13 AQUATIC ECOLOGY

3.13.1 Affected Environment

Several anadromous fish species have been documented in the Southern Branch of the Elizabeth River (including white perch, striped bass, American shad, blueback herring, and alewife); however, poor water quality in the South Branch of the Elizabeth River has resulted in the degradation of aquatic habitat. As previously noted, this segment of the Southern Branch of the Elizabeth River is condemned for oyster harvesting. Cancer in mummichog fish is highest in the Southern Branch of the Elizabeth River as a result of high concentrations of polycyclic aromatic hydrocarbons (PAHs) in river bottom sediments. PAHs of creosote origin (a result of historic and unregulated facilities that treated lumber with this chemical) have been identified. The source of tributyltin (a biocide used to deter barnacles, etc.) is believed to be commercial port facilities. Sampling of benthic biological communities within the Elizabeth River watershed (including the south branch) by Old Dominion University determined that, in general:

“...species diversity and biomass were below reference condition levels while abundance values was [sic] above reference condition levels. Community composition was unbalanced with levels of pollution indicative species above and levels of pollution sensitive species below reference conditions... The high level of abundance exceeded the benthic restoration goals and is considered an indication of degradation because abundance levels are too high. The increased densities were due to opportunistic annelids...” (ODU, 2000).

3.13.2 Environmental Consequences

Fill placed for bridge abutments would be placed landward of mean high water. It is estimated that subaqueous bottom lost to the placement of bridge piles will be less than 905 square feet. The existing Steel Bridge will be demolished and the resulting debris will be removed or placed such that it would not pose a hindrance or threat to navigation. With implementation of appropriate best management practices, construction of a new bridge over the Southern Branch of the Elizabeth River is not expected to negatively affect habitat for aquatic species.

3.13.3 Mitigation

Temporary impacts during construction of the Proposed Build Alternative would be avoided or minimized by strict adherence to the aforementioned *VDOT Erosion and Sediment Control (E&SC) and Stormwater Management (SWM) Program Manual* (March 2004), and the requirements of the Virginia Stormwater Management Program. Subaqueous bottom lost to the placement of bridge piles will be mitigated through removal of the existing Steel Bridge. The resulting debris may be suitable for the construction of reef-like habitat for fish and other aquatic species, either in-situ or elsewhere in the lower Elizabeth River or Chesapeake Bay. Guidance from the Virginia Marine Resources Commission (VMRC) would be solicited to determine the feasibility of this option.

3.14 WETLANDS AND OTHER WATERS OF THE U.S.

In 2005, a delineation of wetlands and other “waters of the U.S.” were performed for the segment of Dominion Boulevard between the intersections of Great Bridge Road and Cedar Road (which includes the bridge crossing of the South Branch of the Elizabeth River). In 2006, delineation was completed for the southern section of Dominion Boulevard (from the Cedar Road intersection to the newly constructed U.S. Route 17). Both delineations have been confirmed by the U.S. Army Corps of Engineers as the limits of jurisdiction (Figure 3-4). References to wetlands and other waters of the U.S in the following sections and in the figures are based on the U.S. Fish and Wildlife Service classification system (Cowardin *et al*, 1979).

3.14.1 Navigable Waters

3.14.1.1 Affected Environment

The Southern Branch of the Elizabeth of the Elizabeth River is a tidal system (E1OW) that flows northwestward and converges with the Northern Branch of the Elizabeth River to form the Elizabeth River. The mouth of the Elizabeth River connects to the lower James River, which flows into the Chesapeake Bay. The width of the Southern Branch of the Elizabeth River at the existing Dominion Boulevard right-of-way



crossing is approximately 497 feet. Tidal data at the Money Point gage station (located approximately 3.5 miles north or downstream of the Dominion Boulevard drawbridge) indicates tidal fluctuations ranging between 2.99 feet at mean high water to 0.14 feet at mean low water. Based on navigation charts, the existing channel is approximately 125 feet wide and 12 feet deep. Water depth of the channel at the existing Steel Bridge is approximately 13 feet below mean sea level at its deepest point.

3.14.1.2 Environmental Consequences

The Proposed Build Alternative would include construction of a new bridge over the Southern Branch of the Elizabeth River with two lanes immediately west of the existing bridge and two lanes essentially in the same location as existing. The proposed bridge will maintain the existing channel conditions (i.e. 125 foot horizontal clearance and 12 foot depth). Therefore, no dredging should be required. In accordance with the Rivers and Harbors Act of 1899, a Section 9 permit will be required from the USCG and a Section 10 permit will be required from the U.S. Army Corps of Engineers. The USCG will require no less than 95 feet of vertical clearance for a fixed-span bridge in order to maintain consistent navigability for historic maritime uses of the channel.

3.14.1.3 Mitigation

By drastically reducing the number of required bridge openings, construction of a 95-foot fixed span bridge would serve to improve water-borne traffic patterns upon the Southern Branch of the Elizabeth River. Proposed bridge heights would not restrict river traffic associated with normal industrial operations at Norfolk Dredging and Tidewater/Skanska Construction. Bridge piers would be placed to accommodate and optimize future maintenance dredging operations. A “maintenance of river traffic plan” would be developed as part of the final design plans. The plan would be submitted for USCG approval during the Bridge Permit (Section 9) application process.

3.14.2 Waterways and Water Bodies

3.14.2.1 Affected Environment

Man-made surface water systems include various ponds and ditches found throughout the entire study area, some of which are jurisdictional (see Figure 3-3). Ditches in close proximity to the Southern Branch of the Elizabeth River either connect directly to the tidal channel or adjacent tidal marshes, thereby receiving tidal ebb and flow. The ditches found on the western and eastern side of Dominion Boulevard north of the Elizabeth River maintain a tidal influence for a distance of more than a mile from the nearest tidal marsh. Ditches south of the Elizabeth River maintain tidal influence to the shopping center at the northeast corner of the Cedar Road and Dominion Boulevard intersection via a ditch connection that runs west behind the shopping center. All jurisdictional ditches south of Cedar Road are non-tidal.

Palustrine, non-tidal excavated ponds (POWx) and ditches (PUBx) occur north and south of the South Branch of the Elizabeth River and function as a result of watershed runoff and/or groundwater lateral discharge. Jurisdictional ponds include the following facilities:

- A large pond located south of Pinewood Run;
- a stormwater management facility located just west of the intersection of Dominion Boulevard and Bainbridge Boulevard;
- a stormwater management facility located west of the right-of-way approximately 0.3 mile north of Cedar Road; and
- a farm pond located west of the alignment approximately 0.9 to 1.0 mile from the southern terminus of the project.

Tidal and non-tidal ditches vary in width, depth, and bottom composition depending on the location within the watershed. Marginally functional ditches (characterized by ephemeral/intermittent flow generally with sandy or silty sand bottoms) occur in the upper reaches of the sub-watersheds. Ditches with standing water or perennial flow occur in the lower reaches of the sub-watersheds, where the ditches were more deeply excavated to accommodate necessary flow gradients. Several ditches are so deeply incised as to maintain year-round standing water, and the ditch bottoms tend to be comprised of organic material and/or mud.



3.14.2.2 Environmental Consequences

For the Proposed Build Alternative, Table 3-14 summarizes effects to those ditches which the Corps has determined to be jurisdictional waters. In the southern section of the corridor, most of the effects are to non-tidal open ditches (approximately 5,500 linear feet). Impacts in the remainder of the corridor are a combination of tidally influenced and non-tidal jurisdictional ditches, as well as a small amount (0.02 acre) of open water ponds.

Table 3-14. Effects to Ditches Classified as Waters of the U.S.

Water of the U.S. Type	Effects (linear feet)
Tidal ditches	7,900
Non-tidal ditches	25,580
Total	33,480

3.14.2.3 Mitigation

At this time, agency consensus on whether or not mitigation will be required for impacts to jurisdictional ditches has not been ascertained. While the U.S. Army Corps of Engineers has indicated that they will not require mitigation for ditch impacts, additional coordination with the Virginia Department of Environmental Quality (DEQ) will be necessary to determine state mitigation requirements, if any.

3.14.3 Wetlands

3.14.3.1 Affected Environment

Wetlands (a subset of “waters of the U.S.”) are dominated by hydrophytic vegetation. Wetland types within the study area are summarized below.

Palustrine forested needle-leaf evergreen (PFO4). This 0.9-acre forested wetland occurs on a relatively broad flat approximately 50 feet west of Dominion Boulevard and approximately 700 feet north of Cedar Road. It is dominated by loblolly pine (*Pinus taeda*) and pond pine (*Pinus serotina*). Subdominants consist of sweet gum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), and wax myrtle (*Myrica cerifera*).

Palustrine forested broad-leaf deciduous (PFO1). These wetlands are scattered along the northern section of the Dominion Boulevard right-of-way, between Cedar Road and Great Bridge Boulevard. They generally occur as small depressions. They are dominated by loblolly pine, sweet gum, water oak (*Quercus nigra*), and red maple.

Palustrine forested mixed broad-leaf deciduous and needle-leaf evergreen (PFO1/4). A mixed pine/hardwood wetland (PFO1/4) occurs east of the right-of-way approximately 1,200 to 1,500 feet north of the Southern Branch of the Elizabeth River bridge. It is dominated by loblolly pine, sweet gum, red maple, water oak, and willow oak (*Quercus phellos*).

Palustrine persistent emergent (PEM1). Several non-tidal emergent wetlands occur within the study area, most of which are the result of some type of land disturbance where ponded water accumulates sufficiently for emergent hydrophytes to dominate. These are found south of the bridge. The one naturally occurring PEM1 wetland is located within the center of the mixed pine/hardwood wetland north and east of the bridge. This system maintains a depth and duration of surface water that appears to inhibit the establishment of tree seedlings. Dominant vegetation includes soft rush (*Juncus effusus*), smartweed (*Polygonum punctatum*), and common reed (*Phragmites australis*).

Palustrine scrub/shrub broad-leaf evergreen (PSS3). The PSS3 systems occur either as depressions or ditches dominated almost entirely by wax myrtle black willow (*Salix nigra*), and groundsel bush (*Baccharis halimifolia*).

Estuarine intertidal persistent emergent (E2EM1). Tidal wetlands within the project study area are comprised of persistent emergent wetlands adjacent to the Southern Branch of the Elizabeth River. They are found both south and north of the existing bridge. Dominant vegetation includes marsh elder (*Iva frutescens*), saltmarsh cordgrass (*Spartina alterniflora*), salt meadow grass (*Spartina patens*), soft rush, smartweed, and common reed. In addition, an extensive network of tidally influenced roadside ditches with emergent vegetation



(E2EMx, E2EM and E2EMx1) are found parallel to Dominion Boulevard north of Cedar Road. For purposes of this document, these systems are referred to as tidal ditches with vegetation.

3.14.3.2 Environmental Consequences

Effects to the six wetland types within the study area are summarized below for the Proposed Build Alternative.

Palustrine forested needle-leaf evergreen (PFO4) – The Proposed Build Alternative would affect approximately 0.5 acres of PFO4 wetlands in the vicinity of the Cedar Road interchange.

Palustrine forested broad-leaf deciduous (PFO1) – Effects to PFO1 wetlands would be approximately 1.6 acres.

Palustrine forested mixed broad-leaf deciduous and needle-leaf evergreen (PFO1/4) – The Proposed Build Alternative would not affect this wetland type.

Palustrine persistent emergent (PEM1) – The Proposed Build Alternative would affect 0.5 acres of non-tidal emergent wetlands.

Palustrine scrub/shrub broad-leaf evergreen (PSS3) – The Great Bridge Boulevard interchange design would affect 0.1 acres of this small wetland located adjacent to the shopping center at the southeast corner of the Great Bridge Boulevard and Dominion Boulevard intersection. In addition, 0.3 acres of PSS3 wetland would be affected just north of the Cedar Road/Dominion Boulevard intersection.

Estuarine subtidal persistent emergent (E2EM1) – Fill placed for bridge abutments would be placed landward of mean high water line along the Southern Branch of the Elizabeth River, thus, would not affect tidal emergent wetlands associated with the main channel. The Proposed Build Alternative would, however, affect approximately 3.7 acres of tidal emergent wetlands associated with tidally influenced depressions north and south of the river.

Table 3-15 summarizes effects to wetlands associated with the Proposed Build Alternative. Affected wetlands are shown above in Figure 3-3 and 3-4.

Table 3-15. Effects to Wetlands and Other Waters of the U.S.

Resource Type	Effects (ac)	Mitigation Estimate (ac)
Non-tidal Wetlands (acres)	3.0	5.2
Tidal Wetlands (acres)	3.7	3.7
Tidal Ditches with Vegetation (acres)	3.4	

3.14.3.3 Mitigation

Mitigation would be required specifically for tidal and non-tidal wetland impacts, and would be determined in consultation with the permitting agencies through the permit process during final design. For non-tidal palustrine wetland impacts, wetlands are typically compensated at a ratio of 2:1 for forested wetlands, 1.5:1 for scrub-shrub wetlands, and 1:1 for emergent wetlands. For tidal wetlands, effects are typically compensated at a 1:1 ratio. At this time, it is assumed that the roadside tidal ditches with vegetation will be primarily relocated alongside the new roadway. Any additional mitigation requirements for these ditches will be determined in consultation with the permitting agencies through the permit process during final design.

Based on a preliminary review of the corridor, it does not appear that sufficient opportunities exist for on-site mitigation for non-tidal wetland impacts. Another option would be the purchase of credits at an acceptable wetland mitigation bank within the same watershed. It is possible that opportunities exist near the Dominion Boulevard corridor for tidal wetland creation and/or restoration. A thorough evaluation of wetland compensation requirements and opportunities would occur once the exact impacts have been defined during the roadway/bridge final design and permit process.

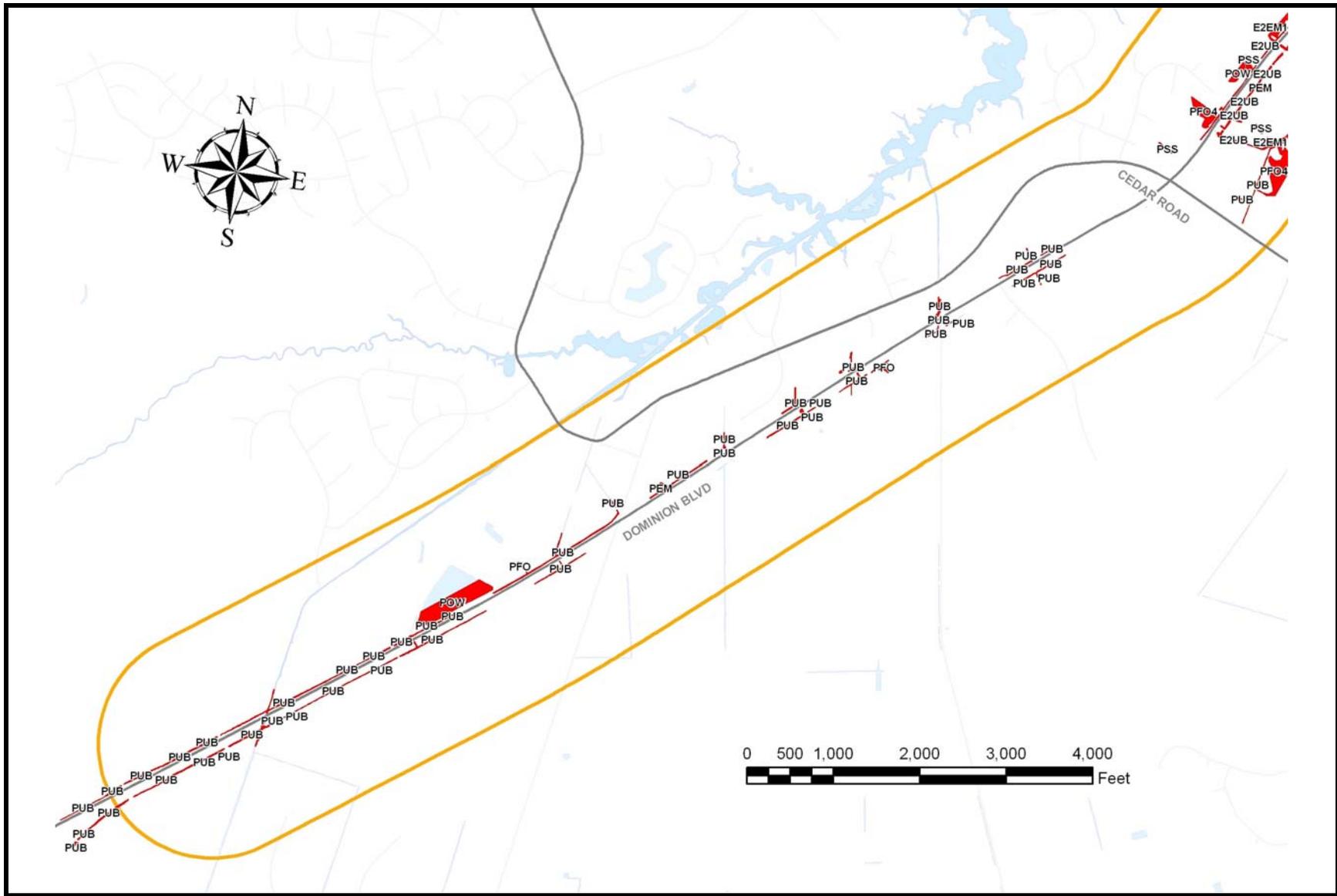


Figure 3-4. Wetlands and Other Waters of the U.S. South of Cedar Road

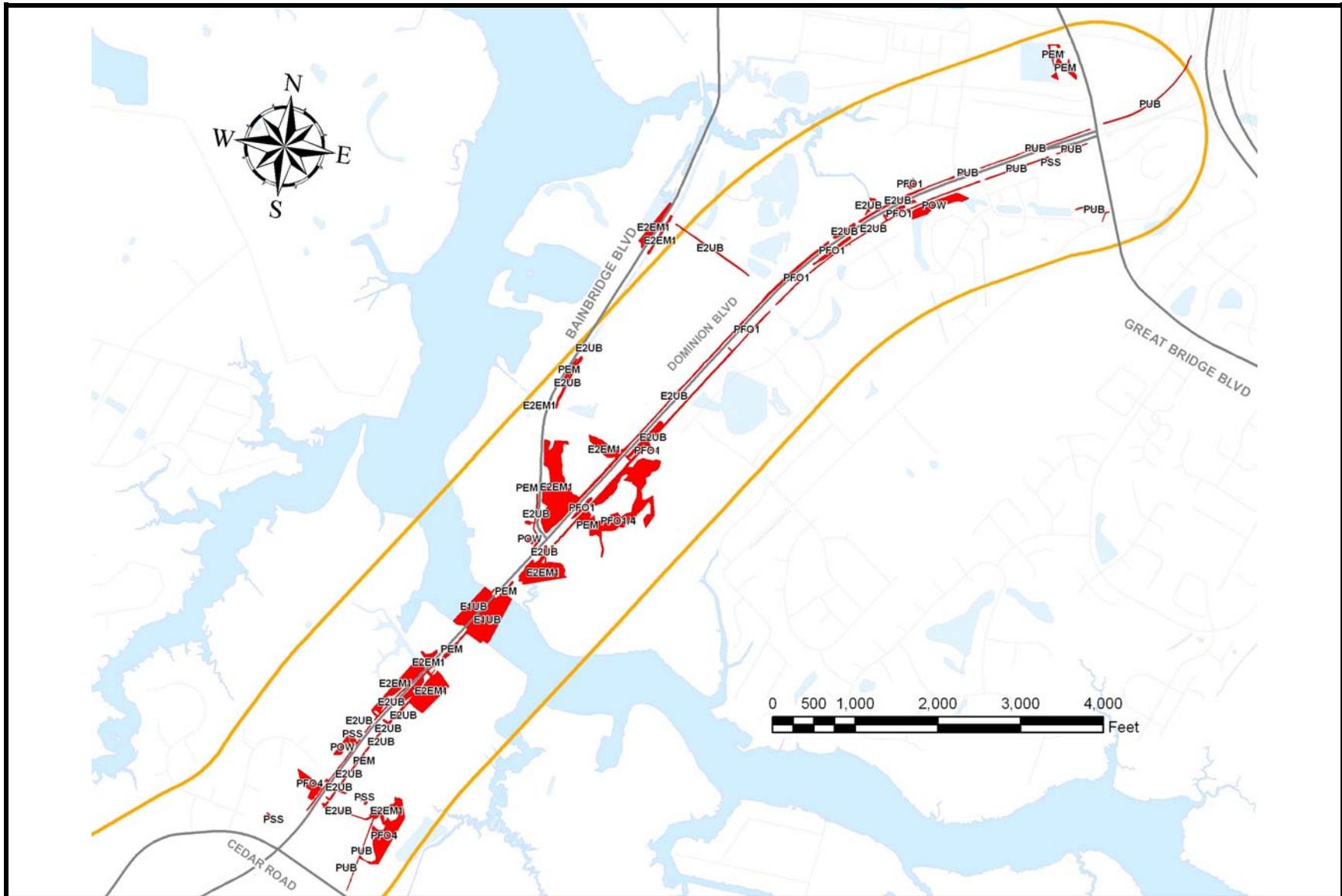


Figure 3-5. Wetlands and Other Waters of the U.S. North of Cedar Road



3.15 COASTAL ZONE MANAGEMENT ACT RESOURCES

3.15.1 Affected Environment

The City of Chesapeake is within Virginia's designated Coastal Resources Management Area. The Virginia Coastal Zone Management Program (CZM Program) is a network of state agencies and local governments that administer laws, regulations and policies pertaining to the protection of coastal resources including wetlands, fisheries, underwater lands (subaqueous lands of VMRC terminology), dunes and beaches, point source air and water pollution, shoreline sanitation, and coastal lands (Table 3-16).

Table 3-16. Coastal Zone Management Resources and Issues of Concern

Resource Areas	Issues of Concern
Coastal primary sand dunes	Point and non-point source water pollution
Tidal and non-tidal wetlands	Point and non-point source air pollution
Underwater lands	Shoreline sanitation
Fisheries	Coastal lands management

Source: Virginia Department of Environmental Quality, 1986.

The following resources subject to Virginia's CRMP are present within the study area: tidal wetlands, non-tidal wetlands, underwater lands, and fisheries.

3.15.2 Environmental Consequences

The Proposed Build Alternative would have reasonably foreseeable coastal effects on tidal and non-tidal wetlands and underwater lands (subaqueous bottoms) associated with the Southern Branch of the Elizabeth River. Construction of the Proposed Build Alternative would, however, be consistent with Virginia's Coastal Zone Management Plan (CZMP) by securing all appropriate environmental permits and ensuring compliance with the enforceable programs that comprise Virginia's program. In accordance with requirements for a consistency determination, potential project effects have been assessed with respect to the eight program components.

Fisheries Management: The Proposed Build Alternative would affect aquatic habitat due to the unavoidable crossing of the Southern Branch of the Elizabeth River. All practicable and appropriate steps would be taken to avoid or minimize adverse impacts to the river. Coordination with the DGIF and VMRC will continue during final design and permitting phases of the project. The project would not produce, sell, or use any tributyltin (TBT) boat paints and, therefore, would be consistent with the State TBT Regulatory Program. Demolition material derived from removal of the existing bridge could potentially be used to create artificial fish habitat. If this is done, the City would coordinate with DGIF to ensure the placement of material in an approved location.

Subaqueous Lands Management: The Proposed Build Alternative would affect subaqueous lands and would require a permit from the VMRC. The required permit would be secured and permit conditions complied with. The existing bridge would be removed and subaqueous lands would be passively restored.

Tidal and Non-Tidal Wetlands Management: The Proposed Build Alternative would affect tidal and non-tidal wetlands and would require a Virginia Water Protection Permit from the Virginia DEQ and a Section 404 Permit from the U.S. Army Corps of Engineers. The required permits would be secured and permit conditions complied with. Mitigation would be provided.

Dunes Management: The Proposed Build Alternative would not affect dunes regulated under the Primary Sand Dune Protection Act.

Non-point Source Water Pollution Control and Coastal Land Management: The Proposed Build Alternative would affect Resource Management Areas (RMAs) and Resource Protection Areas (RPAs) designated under the Chesapeake Bay Preservation Act (CBPA). To comply with the CBPA regulations, effects to RMAs and RPAs would be avoided or minimized and mitigated wherever practicable. In addition, appropriate erosion and sediment control and stormwater management plans would be developed during the design phase and implemented during the construction phase of the project. Compliance with these requirements would serve to control non-point source runoff.



Point-Source Pollution Control: Construction of the Proposed Build Alternative would create multiple point source discharges and would require a Virginia Pollutant Discharge Elimination System General Permit (VPDES) from the Virginia DEQ for the stormwater discharges from construction activities. All practicable and appropriate steps to avoid or minimize impacts to the water bodies affected by stormwater runoff would be developed, implemented, and monitored.

Shoreline Sanitation: The Proposed Build Alternative would not use a septic system and, therefore, would not require a septic system permit from the Virginia Department of Health. The project would not affect shoreline sanitation.

Air Pollution Control: The Proposed Build Alternative would affect air quality in the area. Project construction would require the use of fossil-fuel burning equipment for excavation and for transport of materials used in the project. Vehicles used by construction personnel would produce emissions, including carbon monoxide, hydrocarbons, and nitrogen oxides. In addition to vehicle emissions, the project construction would generate low levels of dust and wind-borne particulates from soils exposed during grading. The Proposed Build Alternative would be consistent with the State Implementation Plan for achieving compliance with the Clean Air Act.

Construction of the Proposed Build Alternative would require coordination and consultation with state agencies to be consistent with the CZMP. All appropriate permits and approvals for construction would be secured and permit conditions complied with. Unavoidable impacts to aquatic resources would be mitigated and conditions set forth by the permits and approvals will be complied with; therefore, the Proposed Build Alternative would be consistent with the Virginia CZMP.

3.15.3 Mitigation

All practicable and appropriate steps to avoid or minimize adverse effects associated with crossing of the Southern Branch of the Elizabeth River would be taken. If demolition material from removal of the existing bridge is placed in the river at an approved location, it would serve as fish habitat and in-situ subaqueous lands would be passively restored. Wetlands mitigation would be provided. Effects to RMAs and RPAs would be avoided or minimized and mitigated wherever practicable. Appropriate erosion and sediment control and stormwater management plans would be developed during the final design phase and implemented during the construction phase of the project. All practicable and appropriate steps to avoid or minimize adverse effects to the water bodies and waterways affected by stormwater runoff would be taken. Mitigation measures to control air/water pollution during construction would be implemented.

3.16 WILD AND SCENIC RIVERS

3.16.1 Affected Environment

According to the Virginia Outdoors Plan published by Virginia DCR in 2002, no state or federal wild and scenic rivers are located in or immediately downstream of the study area.

3.16.2 Environmental Consequences

No state or federal wild and scenic rivers would be affected by the Proposed Build Alternative.

3.16.3 Mitigation

Not applicable.

3.17 FLOODPLAINS (100-YEAR) AND REGULATED FLOODWAYS

3.17.1 Floodplains (100-Year)

3.17.1.1 Affected Environment

Based on "Flood Insurance Rate Maps" or FIRM mapping, most of the northern section of the Dominion Boulevard study area, from Shillelagh Road to Great Bridge Road, is within the 100-year floodplain associated with the Southern Branch of the Elizabeth River. The exception is the area currently occupied by the Higginson-Buchanan landfill.



3.17.1.2 Environmental Consequences

While a large proportion of the floodplain would be spanned by the new bridge, the Proposed Build Alternative would require encroachment into the floodplain along Dominion Boulevard as a result of the roadway widening and bridge approaches. Table 3-17 summarizes effects to the 100-year floodplain associated with the Proposed Build Alternative. Design modifications to eliminate or minimize encroachments to the extent practicable are required by Executive Order 11988. During final design, a detailed hydraulic survey and hydrology study would evaluate the effect of the proposed roadway improvements on stormwater discharge. The hydraulic study would ensure that no substantial increase in downstream flooding would occur. For these reasons the Proposed Build Alternative should have negligible impacts to natural and beneficial floodplain values.

Table 3-17. Impacts to 100-Year Floodplains

Floodplain Type	Effects (acres)
100-Year	100

3.17.1.3 Mitigation

Should it become necessary, fill placed for temporary construction causeways or work bridges would be removed and preconstruction floodplain conditions will be restored immediately following construction. Breastwalls and fill placed within floodplains for bridge abutments would be minimized to the fullest extent practicable. Appropriate drainage structures would be put into place to reduce the risk of flooding. In addition, erosion and sediment control structures would be used during construction.

3.17.2 Regulated Floodways

3.17.2.1 Affected Environment

A FEMA-regulated floodway is located within the Southern Branch of the Elizabeth River at the proposed bridge crossing.

3.17.2.2 Environmental Consequences

The proposed bridge would span the regulated floodway. Bridge piers would be designed and located such that no encroachment into the floodway would occur.

3.17.2.3 Mitigation

Encroachment into the floodway would be avoided or minimized to the fullest extent practicable following a detailed hydraulic survey and hydrology study and during development of final design plans.

3.18 PROTECTED SPECIES

3.18.1 Affected Environment

Virginia Department of Game and Inland Fisheries (DGIF) databases comprising the Virginia Fish and Wildlife Information Service (VAFWIS) indicate that two federal-listed protected species and five state-listed protected species have been identified as possibly being present within a two-mile radius of the project (Table 3-18). None of these species were observed during the field investigation; however, formal protected species surveys were not conducted.

Table 3-18. Federal-Listed Protected Species within Two-Mile Radius

Common Name	Scientific Name	Federal Status	State Status
Bald eagle	<i>Haliaeetus leucocephalus</i>	Not Listed	Threatened
Red-cockaded woodpecker	<i>Picoides borealis</i>	Endangered	Endangered
Canebrake rattlesnake	<i>Crotalus horridus</i>	Not Listed	Endangered
Southeastern Dismal Swamp Shrew	<i>Sorex longirostris fisheri</i>	Not Listed	Threatened
Loggerhead shrike	<i>Lanius ludovicianus</i>	Not Listed	Threatened



3.18.2 Environmental Consequences

The VAFWIS “Collections” database indicates that none of the protected species listed in Table 3-11 have been reported within areas that would be affected by proposed construction. Although marginally suitable habitat for the canebrake rattlesnake and the southeastern Dismal Swamp shrew were observed in the forested area immediately north of the Southern Branch of the Elizabeth River, none was observed within areas that would be affected by the Proposed Build Alternative. Suitable habitat for other species listed in Table 3-11 was not observed within areas that would be affected by proposed construction. According to information provided by DGIF as part of the Preliminary Environmental Inventory (PEI) of the State Environmental Review Process (SERP), bald eagle has been observed within the project vicinity; however, as verified by DGIF, the Proposed Build Alternative would fall outside both the primary and secondary management zones for the species.

3.18.3 Mitigation

Not applicable.

3.19 INVASIVE SPECIES

3.19.1 Affected Environment

For federal actions or actions funded with federal dollars, Executive Order 13112 (E.O. 13112) requires that federal agencies implement measures to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause. The VDCR Division of Natural Heritage and the Virginia Native Plant Society have identified 109 invasive alien plant species that threaten or potentially threaten natural areas, parks, and other lands in Virginia. This list has been subdivided into “highly invasive”, “moderately invasive”, and “occasionally invasive” according to their relative aggressiveness for colonization.

Dominion Boulevard is a heavily trafficked thoroughfare which has been in place since the early 1960s. Given its proximity to a major interstate highway (I-64), the industrial nature of the area (and the resulting nature of truck traffic), its overall high traffic volumes, and the regularly disturbed land surfaces along the Dominion Boulevard corridor (*i.e.*, mowed and graded road shoulders; maintenance dredged drainage ditches, and soil disturbances on adjoining parcels), the corridor has served as an idea site for the establishment of a wide diversity of opportunistic and invasive plant species. The following nine “highly invasive” plant species occur within close proximity to existing Dominion Boulevard: Chinese yam (*Dioscorea oppositifolia*), Chinese lespedeza (*Lespedeza cuneata*), Chinese privet (*Ligustrum sinense*), Japanese honeysuckle (*Lonicera japonica*), purple loosestrife (*Lythrum salicaria*), yellow sweet clover (*Melilotus officinalis*), Japanese stilt grass (*Microstegium vimineum*), common reed (*Phragmites australis*), and multiflora rose (*Rosa multiflora*). The following five “moderately invasive” plant species occur within close proximity to existing Dominion Boulevard: wild onion (*Allium vineale*), mugwort (*Artemisia vulgaris*), bull thistle (*Cirsium vulgare*), curled dock (*Rumex crispus*), and common chickweed (*Stellaria media*). The following seven “occasionally invasive” plant species occur within close proximity to existing Dominion Boulevard: redtop (*Agrostis gigantea*), mimosa (*Albizia julibrissin*), common dayflower (*Commelina communis*), crown vetch (*Coronilla varia*), Russian olive (*Elaeagnus angustifolia*), white mulberry (*Morus alba*), and Siberian elm (*Ulmus pumila*). With the exception of mosquito larvae (*Aedes albopictus*; *Ochlerotatus japonicus*), no Virginia-monitored invasive animal species are known to exist within or in the vicinity of the study area.

3.19.2 Environmental Consequences

Despite the fact that the Dominion Boulevard corridor is moderately to heavily populated with invasive plant species, the introduction additional species and/or the further import of existing species of non-native flora and fauna could cause further changes to regional ecology and impact agricultural resources and recreational opportunities. Because Dominion Boulevard has been in place since the early 1960s, it is unlikely that proposed improvements would further facilitate or exacerbate the spread of invasive species that could harm the environment, human health, or the economy to a substantial degree. Nevertheless, the disturbance associated with new construction for highways and their mitigation sites can create additional colonization potential for terrestrial and aquatic invasives. The land disturbance may enable invasive species to acquire a foothold in ecosystems in new areas by reducing competition, adversely affecting surface texture of soils, and changing the relative availability of life history resources including nutrients, water, and light. Evaluation of



means to prevent additional introduction and means to eliminate or control existing population would be addressed during permitting and final design phases of project development.

3.19.3 Mitigation

Appropriate preventative measures would be implemented for the Proposed Build Alternative to minimize the probability of an invasive species being introduced into the corridor during construction (on equipment or through the use of imported mulch, soil, gravel, or sod). Potential methods to eliminate and control invasive plant and animal species are inherent in VDOT's *Road and Bridge Specifications* (the "Specifications Manual"). Use of the Specifications Manual would serve to minimize the potential for encroachment or establishment of invasive species. In order to effectively control invasive species, contractors' bidding packages must include specific provisions that manage acquired rights-of-way for invasive species control by implementing the VDOT *Road and Bridge Specifications* applicable to the circumstances. While rights-of-way are at risk from invasive species colonization from adjacent properties, implementing these provisions would reduce or minimize potential for introduction, proliferation, and spread of invasive species. VDOT will not plant or allow the planting of prohibited noxious-weed seeds along the corridor. All seeds used by VDOT and its contractors are tested in accordance with the Virginia Seed Law and VDOT's standards and specifications to ensure that there are no prohibited noxious-weed seeds in the seed mixes. VDOT would work with the Virginia Department of Agriculture and Consumer Services to implement a plan to restrict the spread of any invasive species found to be present within a corridor prior to construction. Preventative measures that would be employed include the inspection and cleaning of construction equipment, commitments to ensure the use of invasive species-free mulches, topsoils and seed mixes, along with the VDOT requirement that cut slopes be seeded within 48 hours of being exposed. Disturbed sites would be monitored and eradication strategies deployed should invasion occur.

The City will have soil removal and redistribution activities monitored by a qualified ecologist who will determine appropriate disposal or treatment measures for soils known to or thought to have seed and/or latent root stock of invasive plants. Through such measures, a degree of corrective action can be provided to reduce and manage invasive plant populations that have become established along the corridor since the early 1960s.

3.20 INDIRECT EFFECTS AND CUMULATIVE IMPACTS

3.20.1 Indirect Effects

Indirect effects are defined as those that are "caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable" (40 CFR 1508.8). Indirect effects may include changes in employment, population, and development that may result from the transportation project, as well as social and environmental impacts of the induced land use.

As set forth in the City of Chesapeake's Comprehensive Plan, the portion of the City within which the project would be located is programmed as a growth area for residential, commercial, and industrial development. Development of areas surrounding the project is currently on-going, and growth in the area is expected to occur in accordance with the Comprehensive Plan with or without the project. Along with other regional transportation projects, the Dominion Boulevard / US 17 Improvements Project will serve in meeting transportation needs identified for the corridor and the Hampton Roads region. Indirect effects to water quality would consist of potential long-term increases in impervious surfaces and stormwater runoff resulting from development accommodated by roadway construction. Indirect impacts to water quality from future development within the corridor would be addressed by the City's Chesapeake Bay Preservation Ordinance and Stormwater Management Ordinance, which require provision of stormwater management facilities designed to address both water quantity and water quality. Based on the aforementioned factors, no substantial indirect effects are anticipated as a result of the project.

3.20.2 Cumulative Impacts

Cumulative impacts are defined as those impacts that "result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions" (40 CFR 1508.7). Reasonably foreseeable actions are generally defined as those for which a commitment has been made by the project sponsor to implement the project.



3.20.2.1 Past, Present, and Reasonably Foreseeable Actions

Since European settlement, the Hampton Roads / Elizabeth River hydrologic sub-basin has experienced an increase in impervious surface area of approximately 31,617 acres (a net increase of 19.16 percent). Currently, no more than 1,124 of these acres (or 3.6 percent of the historical 19.16 percent increase) can be attributed to transportation facilities. On a watershed-wide basis, impervious surface area associated with existing transportation projects presently comprises 0.68 percent of the total acreage within the Hampton Roads / Elizabeth River hydrologic sub-basin.

Presently evolving and reasonably foreseeable actions include development activities in the study area by private enterprise along with public works projects by the City of Chesapeake, the Hampton Roads Sanitation District, and VDOT (as identified in the City's Comprehensive Plan, VDOT's Six-Year Improvement Program, and the Hampton Roads Planning District Commission's (HRPDC's) financially constrained 2030 Transportation Plan). The HRPDC 2026 regional demand model was utilized as a basis for projecting future traffic volumes for the corridor. The HRPDC calibrated Year 2000 and 2026 models reflect the existing and projected roadway capacities and socio-economic data. In the immediate vicinity of the Dominion Boulevard study area, refinements were made to traffic analysis zones. A review of planned development and the comprehensive land use plan was used to consider updates to the land use data in the study area. A detailed review of special generators/attractors affecting the study area was also conducted. Described below are other reasonably foreseeable projects within the area that could affect the same resources that would be affected by the Proposed Build Alternative.

Several properties within the study area are under consideration for development in the reasonable foreseeable future. The environmental impacts of these developments would be the removal of vegetation, increased impervious surface, and increased traffic and pedestrian demand. These reasonably foreseeable private projects include:

- Dominion Commons – a 67-acre, 110,500-square-foot commercial development with 14 out-parcels for ultimate development located at the intersection of Dominion Boulevard and Shillelagh Road.
- Dominion Commerce Park – a 50-acre, 550,000-square-foot general office and light industrial development to be located on the east side of Dominion Boulevard between West Road and Shillelagh Road. Although a 20-year plan projects 2,300,000 square feet of development at build-out, only the aforementioned 550,000 square feet is currently considered “reasonably foreseeable”.
- Rose Garden Estates on Dominion Boulevard – a 27.4-acre, 30-lot subdivision with stormwater management facilities to be located near the intersection of Dominion Boulevard and Mullen Road.
- Bellwood Meadows – a 15-acre, 30-lot subdivision with stormwater management facility to be located near the intersection of Great Bridge Boulevard and Mains Creek Road.

Several public works projects are being completed, are currently under construction, or are in the conceptual or planning stage. These reasonably foreseeable public works projects include:

- Grassfield High School – a new 2,000-student public high school to be located on the east side of Dominion Boulevard between West Road and Shillelagh Road. The school will be open for attendance during the 2007/2008 school year.
- I-64 Battlefield Boulevard Interchange – major improvements to the I-64/Battlefield Boulevard interchange and I-64 approaches located to the north and east of the Dominion Boulevard Improvements Project.

The aforementioned projects could affect traffic volumes on the Dominion Boulevard / US 17 facility at some point in time; however, the Proposed Build Alternative is being designed to anticipate and accommodate traffic associated with construction of these projects.

3.20.2.2 Project-Specific Impacts

The Proposed Build Alternative would not be a major source of air pollution and is planned in conformance with the current State Implementation Plan. In addition, the region is in attainment with all National Ambient Air Quality Standards. The project will comply with VDOT construction standards during construction, which will control and limit air pollution. Local and state agencies' permits for the other reasonably foreseeable projects require similar air quality control standards; therefore, the project would not contribute to a significant cumulative impact on air quality. Certain receptors will be affected by proposed improvements. The I-64 Battlefield Boulevard Interchange project entails improvements to existing facilities and is not expected to



impact the same receptors as the Proposed Build Alternative. Noise effects attributed to the other non-transportation projects in the area are expected to be minimal. The Proposed Build Alternative would not significantly contribute to cumulative noise effects within the area.

Water quality in study area streams is already affected by the scale of current urban land use. The Proposed Build Alternative would result in a 51-acre net increase of impervious surfaces. Using typical percent coverage for land use types, it is estimated that other reasonably foreseeable projects within the area will add 143 acres of impervious surface to the Hampton Roads / Elizabeth River hydrologic sub-basin. The Hampton Roads / Elizabeth River hydrologic sub-basin is currently comprised of approximately 19 percent impervious surface. Construction of all reasonably foreseeable projects within the study area along with construction of the Proposed Build Alternative would increase the percent impervious surface area in the sub-basin by 0.08 percent and 0.03 percent, respectively. Stormwater management facilities are planned as part of the Proposed Build Alternative and are also required by local and state programs for the other reasonably foreseeable projects in the area. These projects will be required to comply with the city's stormwater management and floodplain management programs, which would require mitigation for adverse effects on water quantity and quality. Given the very small increase in impervious surface area on a basin-wide basis (0.03 percent) and the requirement to provide stormwater management, the Proposed Build Alternative would not significantly contribute to cumulative water quality effects within the area.

None of the other reasonably foreseeable projects in the area would be expected to result in any substantial cumulative effects on floodplains. Wetlands that will be affected by the Proposed Build Alternative would be compensated, as required by the Joint Permit Application process. Other reasonably foreseeable projects in the area do not affect the same wetlands as the Proposed Build Alternative; therefore, no cumulative effects are anticipated.

The Proposed Build Alternative would have a positive impact on the surrounding community and would improve mobility by vehicle, walking, and biking. Other projects planned and being developed in the area (the new high school, housing developments, and commerce parks) would contribute to enhancing the quality of life in the area by providing opportunities for employment, housing, and public education. The Proposed Build Alternative would also have a beneficial effect by providing transportation improvements necessary for the planned growth in the project area.