



INTERSTATE 64 PENINSULA STUDY

FINAL ENVIRONMENTAL IMPACT STATEMENT

DECEMBER 2013



PREPARED BY:

**THE FEDERAL HIGHWAY ADMINISTRATION
AND
THE VIRGINIA DEPARTMENT OF TRANSPORTATION**

COOPERATING AGENCIES:

**U.S. ARMY CORPS OF ENGINEERS
U.S. COAST GUARD
U.S. ENVIRONMENTAL PROTECTION AGENCY** **U.S. DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
U.S. FISH AND WILDLIFE SERVICE**



FHWA-VA-EIS-12-01-F

INTERSTATE 64 PENINSULA STUDY
FROM INTERSTATE 95 IN THE CITY OF RICHMOND TO INTERSTATE 664 IN THE CITY OF HAMPTON, VIRGINIA

Final Environmental Impact Statement

Submitted Pursuant to 42 U.S.C. 4332 (2)(c)
by the
U.S. Department of Transportation Federal Highway Administration
and the
Virginia Department of Transportation

Cooperating Agencies:

U.S. Army Corps of Engineers
U.S. Coast Guard
U.S. Environmental Protection Agency

U.S. Department of the Interior, U.S. Fish and Wildlife Service
U.S. Department of the Interior, National Park Service

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State Environmental Administrator, Virginia Department of Transportation



for
Division Administrator, Federal Highway Administration

Abstract: This Final Environmental Impact Statement identifies the current and future needs to increase capacity, eliminate roadway deficiencies and improve safety along the 75 mile long section of Interstate 64 from Interstate 95 in the City of Richmond to Interstate 664 in the City of Hampton, Virginia. Known as the Interstate 64 Peninsula Study, it evaluates the effectiveness of improvements in addressing the identified purpose and need. The goals of the study are to develop the solutions that meet the project purpose and need while avoiding and minimizing impacts to the human and natural environments. The Alternatives evaluated include the No-Build Alternative and a range of Build Alternatives consisting of roadway improvements that examine the number, location and type of lanes that would best address these needs. The potential effects of the Alternatives on the natural and human environment were assessed and impacts calculated. This Final Environmental Impact Statement identifies Alternative 1 as the Preferred Alternative. Alternative 1 allows the option to widen to the outside of the existing road corridor or within the median of the existing road corridor. The decision on whether to widen to outside or the inside of the roadway would be made on a section-by-section basis, and the development of these operationally independent sections would be closely coordinated with the Richmond Area Metropolitan Planning Organization, the Hampton Roads Transportation Planning Organization and other state and federal regulatory agencies.

A Federal agency may publish a notice in the Federal Register, pursuant to 23 USC 139(1), indicating that one or more Federal agencies have taken final action on permits, licenses or approvals for a transportation project. If such notice is published, claims seeking judicial review of those Federal agency actions will be barred unless such claims are filed within 150 days after the publication of the notice, or within such shorter time period as is specified in the Federal laws pursuant to which judicial review of the Federal agency action is allowed. If no notice is published, then the periods of time that otherwise are provided by the Federal laws governing such claims will apply.

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The Federal Highway Administration and the Virginia Department of Transportation are requesting comments on the Final Environmental Impact Statement as well as the phased approach for implementing the Preferred Alternative. All comments are due by January 27, 2014. Comments should be sent to Scott Smizik at the address above or to the following email address: Scott.Smizik@vdot.virginia.gov



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INTERSTATE 64 PENINSULA STUDY

EXECUTIVE SUMMARY



EXECUTIVE SUMMARY

A. Description of the Proposed Action

The Virginia Department of Transportation (VDOT), in cooperation with Federal Highway Administration (FHWA), has evaluated options to improve the 75 mile long Interstate 64 (I-64) corridor from the Exit 190 (Interstate 95 (I-95)) interchange in the City of Richmond to the Exit 264 (Interstate 664 (I-664)) interchange in the City of Hampton (**Figure ES.1**). This study is known as the *Interstate 64 Peninsula Study*. Alternative 1 has been identified as the Preferred Alternative. Alternative 1 involves adding general purpose lanes to the I-64 mainline to achieve a Level of Service (LOS) of C or better in the design year of 2040. Alternative 1 allows the option to widen to the outside of the existing road corridor or within the median of the existing road corridor, and it is designed to keep the proposed improvements within the existing right of way to the greatest extent practicable.

Funding is not presently identified in the current applicable transportation plans to fully implement the Preferred Alternative. Based on direction from the Commonwealth Transportation Board (CTB) and comments from cooperating agencies, VDOT and FHWA plan to implement the Preferred Alternative in phases, as described in **Appendix L - Phased Approach for Implementation - NEPA Process**.

B. Purpose and Need

Increased traffic congestion and an aging infrastructure have led to greater concerns for travelers along the I-64 corridor. Therefore, improvements to I-64 are needed to address the following.

1. Capacity

The LOS is a letter grade (A-F) which represents a qualitative measure of operational conditions within a traffic stream, generally in terms of such factors as speed and travel time, freedom to maneuver and traffic interruptions. For this study, LOS was determined using the procedures set forth in the *2010 HCM* published by the Transportation Research Board (TRB).

Approximately two-thirds of the I-64 mainline operates at a deficient LOS during Base Conditions, particularly the segment closest to I-95 at the western end of the corridor and virtually the entire stretch of I-64 from Exit 214 (Providence Forge) in New Kent County to Exit 264 (I-664) in the City of Hampton.

The 2011 traffic volumes on I-64 are higher than the current facility can adequately accommodate, particularly during peak

travel times. Traffic volumes are anticipated to increase in the future, exacerbating existing congestion issues. Traffic models show that the existing facility would be unable to accommodate the projected design year 2040 traffic volumes at an acceptable LOS. Improvements to I-64 would:

- Provide for increased capacity in order to reduce travel delays.
- Improve access to tourist attractions throughout the region.
- Improve connectivity to, from and between military installations.
- Provide for increased demand from the freight industry.
- Provide for the efficient transporting of freight in and out of the Port of Virginia.
- Support the current economic development needs along the corridor and in the region.

Additional information regarding the LOS conditions and goals are included in **Chapter I - Purpose and Need** and the *Purpose and Need Technical Memorandum*.

2. Roadway Deficiencies

There are a number of roadway and structure deficiencies throughout the corridor due to changes in the interstate design standards since I-64 was originally constructed as well as increasing traffic volumes creating wear and tear on the corridor infrastructure. Future increases in traffic volumes and the aging of the system would continue the deterioration of the corridor. Improvements to I-64 would:

- Minimize roadway geometric and structure deficiencies on the I-64 mainline and at the interchanges.

3. Safety

Existing traffic congestion, along with the aging roadway and design/structure deficiencies, have exacerbated safety concerns within the corridor. In many areas crash rates exceed statewide averages for similar roadway systems. Safety concerns are expected to increase. Improvements to I-64 would:

- Improve safety by reducing congestion and improving roadway design geometrics to meet current standards for interstate highways.

C. Alternatives

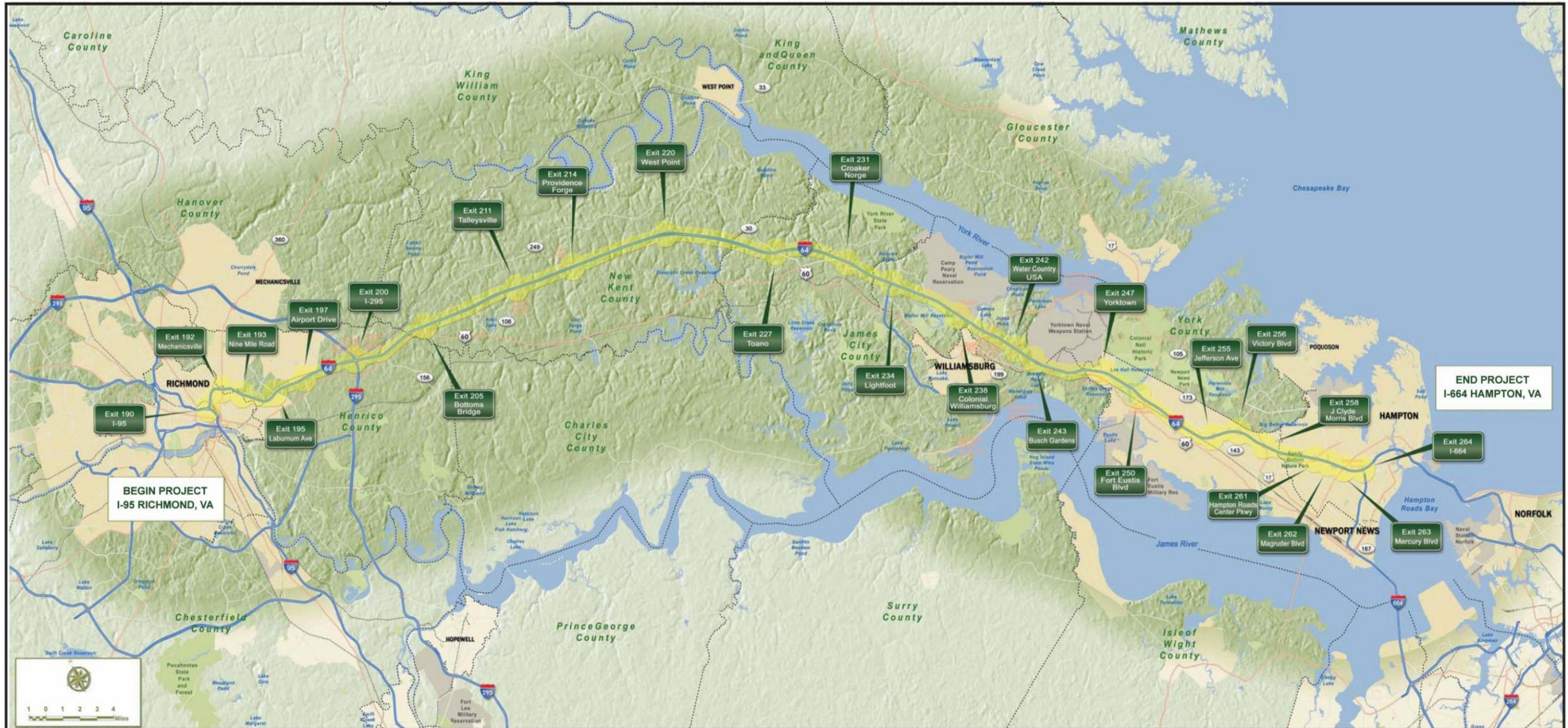
There are a number of possible solutions to address the need for improvements along the I-64 corridor. The goals of the study

are to develop the solutions that best meet the project purpose and need while avoiding and/or minimizing impacts to the human and natural environments. The Alternatives developed or investigated included a No-Build Alternative, a Transportation Systems Management (TSM)/Travel Demand Management (TDM) Alternative, an investigation of future passenger/freight rail and a range of highway Build Alternatives. Detailed descriptions of each of the Alternatives can be found in **Chapter II - Alternatives Considered** and in the *Alternatives Development Technical Memorandum*. The following summarizes the Alternatives considered and not carried forward for further study, the Alternatives analyzed in the **Draft Environmental Impact Statement (EIS)** and the Preferred Alternative.

1. Alternatives Considered and Not Carried Forward for Further Study

TSM/TDM – TSM/TDM options would involve only minor work to the existing I-64 corridor. TSM strategies improve traffic flow, improve signalization, convert existing general purpose lanes to managed lanes, improve intersections and implement traveler information programs. TDM encourages new driving habits through staggered commuting hours, telecommuting, car and vanpooling, ridesharing and the creation of park and ride facilities. In investigating these options a number of possible TSM/TDM opportunities for the I-64 corridor were examined.

While some TSM/TDM strategies have the potential to result in slight reductions in peak hour traffic volumes or slight shifts in traffic away from peak hours and towards off-peak hours, they could not reasonably be expected to impact traffic volumes on I-64 to the extent needed to preclude the need for mainline and interchange improvements. For the I-64 mainline, the TSM/TDM strategies would not provide any substantial improvements to the capacity nor remove enough vehicle trips required to obtain an acceptable LOS needed to meet either the existing or design year 2040 capacity needs for traffic on I-64. In evaluating the 25 interchange areas, TSM/TDM options could provide some improvements to existing geometric deficiencies such as capacity at the ramps, weaves and intersections and thus address some of the safety issues that arise from those deficiencies. However, the TSM/TDM strategies would not include any major work needed for interchange configurations such as reconstructing ramps and structures, and therefore these elements that contribute to the safety issues would continue. Therefore, the TSM/TDM strategies alone would not meet the purpose and need of the study and were not



BEGIN PROJECT
I-95 RICHMOND, VA

END PROJECT
I-664 HAMPTON, VA

Figure ES.1
Project Location



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carried forward for detailed study as an individual, stand alone alternative. However, TSM/TDM improvements can be pursued independently or as part of one of the Build Alternatives to provide for low-cost options for improving the transportation conditions within the I-64 study area.

Passenger/Freight Rail – As part of the intermodal study conducted for this study, both existing and planned passenger and freight railroad services were examined. Within the I-64 study area, there are two principal rail transportation facilities: (1) the existing CSX Transportation (CSXT)/Amtrak route from the City of Richmond to the City of Newport News, north of the James River on the Virginia Peninsula (Peninsula/CSXT) and (2) the Norfolk Southern Corporation (NS) rail route, south of the James River between the City of Petersburg and the City of Norfolk (Southside/NS). The Peninsula/CSXT route is parallel to I-64 while the Southside/NS route is parallel to U.S. 460. Improvements are currently planned and underway for both corridors.

In investigating passenger rail, the Virginia Department of Rail and Public Transportation (VDRPT) prepared the *Richmond/Hampton Roads Passenger Rail Tier I Final Environmental Impact Statement (EIS)* which evaluated multiple options for passenger rail in the City of Richmond to the Hampton Roads region, including the I-64 study area. As stated in the *Tier I Final EIS*, high-speed intercity passenger rail service attracts different types of ridership, and therefore it is unlikely that the additional rail trips generated by the Preferred Alternative would cause a measurable reduction in automobile traffic on major highways such as I-64 and I-95. In specifically examining the potential effects on traffic on I-64, the *Tier I Final EIS* states that a reduction of vehicles caused by diversion to rail would amount to only approximately 0.7% to 2.3% reduction in traffic on I-64 when using 2025 traffic volumes. This fraction is small enough that the resulting decrease in traffic would not be measurable, given the normal daily and seasonal fluctuations in traffic volume.

In investigating freight rail, a published report by the primary area railroads, *Freight Rail Investing in Virginia* (CSXT and NS, 2005) provides details on freight transportation within the Hampton Roads area and the City of Norfolk. One of their main cargo shipments is export coal. CSXT and NS projections estimate that the total tonnage of export coal would increase and that CSXT's freight trains on the Peninsula/CSXT route would increase by 70% between 2007 and design year 2040. With this increase CSXT recognizes that it needs to improve the freight service along the

Peninsula/CSXT Line and is evaluating projects to add passing siding and/or a second track throughout the corridor. Since most of the of CSXT Peninsula trains currently carry export coal, and export coal would not likely be carried by trucks in the future, the freight rail improvements on the Peninsula/CSXT Route would have little impact on the I-64 truck traffic.

Overall, the passenger and freight rail improvements that have been identified are not expected to remove enough general purpose vehicle trips from I-64 to obtain acceptable LOS needed to meet either the existing or design year 2040 capacity needs for traffic on I-64. New or improved rail lines and/or facilities within the I-64 corridor would not address the roadway deficiencies and safety needs identified for this study. Therefore, rail improvements would not meet the purpose and need of this study and were not carried forward for further study.

Highway Build Alternatives Considered and Not Carried Forward

Throughout the development of the Build Alternatives, an emphasis was placed on designing Alternatives which would meet the study purpose and need along with the established design criteria. Specific to meeting the study needs for capacity, the future (design year 2040) traffic volumes were projected and analyzed. As described in **Chapter I - Purpose and Need** and in the **Traffic and Transportation Technical Memorandum**, a LOS criteria of C or better was established for the I-64 mainline and for the merges/diverges/weaves. **Figures I.4 and I.10** in the **Chapter I - Purpose and Need** show the 2011 Base Conditions LOS and projected design year 2040 No-Build LOS for the corridor which was used to determine the number of lanes needed to address the capacity needs. The Build Alternatives developed were then specifically designed to include the number of lanes needed to achieve or exceed these LOS goals. The Alternatives that did not meet the LOS needs were not carried forward for further study. The Build Alternatives that were determined to meet these criteria were retained for detailed study and are described below.

2. Alternatives Analyzed in the Draft EIS

The Alternatives retained for detailed analysis in the **Draft EIS** include a No-Build Alternative and five separate highway Build Alternatives including:

- Alternative 1A – adding general purpose lanes to the outside of the existing general purpose lanes.
- Alternative 1B – adding general purpose lanes in the median.

- Alternative 2A – adding lanes to the outside and tolling all lanes.
- Alternative 2B – adding lanes to the median and tolling all lanes.
- Alternative 3 – adding managed lanes to the median.

These five Build Alternatives were specifically designed to meet the identified purpose and need of the study and thus were retained for analysis in the **Draft EIS**. This analysis has also been carried over to this **Final EIS**.

No-Build Alternative – The No-Build Alternative serves as a base line for the comparison of future conditions and impacts. The No-Build Alternative assumes that the projects currently programmed and funded in VDOT Fiscal Year 2013-2018 Six-Year Improvement Program (SYIP) would be implemented. In addition to the programmed VDOT projects, the Tidewater Super-Regional Travel Model developed by VDOT and used for this study includes other projects within the corridor that are part of the *Richmond Area Metropolitan Planning Organization (MPO) 2035 Long-Range Transportation Plan (LRTP)*, and the *Hampton Roads Transportation Planning Organization's (TPO) 2034 LRTP*, as well as the *2035 Rural LRTPs* (which are not fiscally-constrained) for the Richmond Regional Planning District Commission and the Hampton Roads TPO. Those projects form a part of the Base Conditions and the effects of these projects on I-64 traffic are accounted for in the design year 2040 No-Build analyses.

Alternatives 1A/1B General Purpose Lanes – These Alternatives involve adding additional general purpose travel lanes to the I-64 mainline to achieve a LOS C or better in the design year 2040. Although there are numerous possible combinations for adding these lanes, the analysis focused on adding the needed lanes within the existing right of way, to the greatest extent practicable, to either the outside of the existing lanes, which is Alternative 1A, or to the inside of the existing lanes within the median, which is Alternative 1B. For Alternative 1B, the lanes are also proposed in the median to the greatest extent practicable. However, not all sections of the corridor have sufficient median area to accommodate the needed additional lanes so in these areas the additional lanes are proposed to the outside of the existing general purpose lanes, with an effort to keep the proposed improvements within the existing right of way to the greatest extent practicable. Based on the conceptual engineering performed for Alternatives 1A/1B less than 10% or 13 miles of the 150 mile I-64 corridor (75 miles in each direction) may require additional right of way for the mainline widening

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improvements. The areas which may require additional right of way are located in the most urban areas of the corridor located at the western end in the City of Richmond and at the eastern end in the Cities of Newport News and Hampton.

For the 25 existing interchanges within the study area corridor, geometric deficiencies were examined along with design year 2040 traffic volumes and resulting LOS at each interchange location. Conceptual designs were investigated that would accommodate the future traffic, and assumptions were made and applied to each interchange to establish a study footprint that would allow for enough flexibility during the final design stage to accommodate other concepts not yet examined. Further engineering and traffic analyses would be performed at each interchange as the project progresses. During the *Interchange Modification Report* (IMR) process, which is required by FHWA before any changes can be made to interstate interchanges, each of these interchange configurations would serve as a starting point to be further studied and refined with a more in-depth examination of the needs at each location, in order to produce a constructible design.

The planning level estimated cost for Alternative 1A ranges from \$4.7 - \$7.3 billion. The planning level estimated cost for Alternative 1B ranges from \$4.7 to \$7.2 billion. Details of the cost estimates are included in **Table 5** of the *Alternatives Development Technical Memorandum*. This cost estimate, along with the estimates made for the other Alternatives analyzed in the **Draft EIS**, is preliminary and is used to inform the public and other stakeholders reviewing the **Draft** and **Final EIS**.

Alternative 2A/2B Full Toll Lanes – These Alternatives evaluate the impacts of tolling the entire facility. Because the use of tolls could be an option as a fund source to accomplish the needed improvements, alternatives that involve tolling were considered in the range of possible alternatives evaluated. For the purposes of this study, it was assumed that if the facility is tolled, the tolling would be for all vehicles traveling in both directions and for the entire length of the corridor from I-95 in the City of Richmond to I-664 in the City of Hampton. It was also assumed there would be toll collection stations, using overhead gantries and all-electronic tolling, for every interchange-to-interchange section of I-64. If Alternative 2A or 2B is selected, subsequent studies would refine the specifics of the tolling, such as whether or not it would encompass the entire length of the I-64 corridor along with the number and placement of the toll collection stations.

In order to determine the number of lanes needed for Alternatives 2A/2B, the traffic studies included a toll diversion analysis. As a result of this analysis, the tolling of I-64 is expected to have either a neutral effect or result in a decrease in traffic volumes on the I-64 mainline due to people choosing to avoid a tolled I-64 and using other parallel routes instead. The tolls are not expected to result in increased volumes at any location on the I-64 mainline. This analysis indicated possible reductions to traffic on the I-64 corridor, however these reductions are not projected to change the number of lanes needed to achieve a LOS C or better in the design year 2040 from those indicated for the General Purpose Lanes Alternatives. Therefore, the proposed disturbance limits for Alternatives 2A or 2B would be the same as Alternatives 1A or 1B, respectively.

Although there are numerous possible combinations for adding these lanes, the analysis focused on adding all that is needed within the existing right of way, to the greatest extent practicable, to either the outside of the existing lanes, which is Alternative 2A, or to the inside of the existing lanes within the median, which is Alternative 2B. For Alternative 2B, the lanes are also proposed in the median to the greatest extent practicable. However, not all sections of the corridor have sufficient median area to accommodate the needed additional lanes so in these areas the additional lanes are proposed to the outside of the existing general purpose lanes. Based on the conceptual engineering performed for Alternatives 2A/2B less than 10% or 13 miles of the 150 mile I-64 corridor (75 miles in each direction) may require additional right of way for the mainline widening improvements. The areas which may require additional right of way are located in the most urban areas of the corridor located at the western end in the City of Richmond and at the eastern end in the Cities of Newport News and Hampton.

In addition to the mainline improvements, due to only modest changes in traffic volumes, as determined in the toll diversion analysis, Alternatives 2A/2B also include the same improvements to the 25 interchanges as described with Alternatives 1A/1B.

The planning level estimated costs for Alternatives 2A and 2B range from \$4.8 to \$7.3 billion each. Details of the cost estimates are included in **Table 5** of the *Alternatives Development Technical Memorandum*. Each cost estimate is preliminary and would be refined if an Alternative is advanced. If any of the Alternatives that include tolling had been identified as the Preferred Alternative, additional information on collection stations (including the use of overhead gantries and all-electronic tolling), as well as

financial studies and subsequent traffic studies would have been developed.

Alternative 3 Managed Lanes – This Alternative involves the addition of separated, managed lanes located in the median. These managed lanes were examined for the entire length of the I-64 study area from Exit 190 (I-95) in the City of Richmond to Exit 264 (I-664) in the City of Hampton. As previously described, not all sections of the I-64 corridor have sufficient median area to accommodate the addition of any lanes. In these areas, the facility is proposed to be widened to the outside of the existing general purpose lanes in order to accommodate the managed lanes in the median between the eastbound and westbound general purpose travel lanes. Based on the conceptual engineering performed for Alternative 3 approximately 2% or three miles of the 150 mile I-64 corridor (75 miles in each direction) may require additional right of way for the mainline widening improvements. The areas which may require additional right of way are located in the most urban areas of the corridor located at the western end in the City of Richmond including both eastbound and westbound lanes between Exits 190 (I-95) and Exit 192 (Mechanicsville Turnpike).

Managed lanes can refer to many different strategies, including:

- High Occupancy Vehicle (HOV) Lanes.
- High Occupancy Toll (HOT) Lanes.
- Express Toll Lanes (ETL).
- Express Bus Lanes (EBL).

For any of the managed lanes that involve toll collection (HOT or ETL lanes), traditional toll plazas were not included. Rather, the toll collection would be conducted by overhead gantries with all-electronic tolling used to collect all tolls at highway speeds. This study does not identify what type of managed lanes would be constructed under this Alternative. Based on the results of the capacity analysis, the lane configurations developed for Alternative 3 along the I-64 corridor are described in **Table ES.1**.

In addition to the mainline improvements, due to only modest changes in traffic volumes, Alternative 3 also includes the same improvements to the 25 interchanges as described in Alternatives 1A/1B and 2A/2B.

The planning level cost estimate for Alternative 3 ranges from \$4.7 to \$7.3 billion, however this does not include potential costs for tolling gantries and equipment which could vary depending on the type of managed lanes implemented. Details of this cost estimate are included in **Table 5** of the *Alternatives Development*

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Table ES.1: Alternative 3 Characteristics*

From	To	Number of Managed Lanes Located in the Median Area**	Number of Additional General Purpose Lanes Added to the Outside
Exit 190 (I-95)	Exit 205 (Bottoms Bridge)	2 (Reversible)	0
Exit 205 (Bottoms Bridge)	Exit 247 (Yorktown)	2 (1 in each direction)	0
Exit 247 (Yorktown)	Exit 264 (I-664)	4 (2 in each direction)	One additional westbound lane from Exit 264 (I-664) to Exit 258 (J. Clyde Morris Boulevard)

* If Alternative 3 was identified as the Preferred Alternative, subsequent studies would define the specific type of managed lanes, lane needs and locations, access to and from the managed lanes, and end points and transition zones for the managed lanes along with the needed general purpose lanes.

** Not all sections of the I-64 corridor have sufficient median area to accommodate the addition of any lanes. In these areas, the facility is proposed to be widened to the outside in order to accommodate the managed lanes in between the eastbound and westbound general purpose travel lanes.

Technical Memorandum. If Alternative 3 had been identified as the Preferred Alternative, additional analysis would have been required to refine the specifics of the managed lanes throughout the I-64 corridor.

3. Preferred Alternative

Alternative 1 has been identified as the Preferred Alternative. Alternative 1 is within the range of options provided by Alternatives 1A and 1B. The basis for section of Alternative 1 as the Preferred Alternative is described in **Chapter II – Alternatives Considered, Section D** of this **Final EIS**. Alternative 1 allows the option to widen to the outside of the existing road corridor or within the median of the existing road corridor.

The number of lanes that are proposed to be added to the I-64 mainline under Alternative 1, along with typical sections, is the same as proposed under Alternative 1A and Alternative 1B. Like Alternatives 1A and 1B, Alternative 1 is designed to keep the proposed improvements within the existing right of way to the greatest extent practicable. As discussed for Alternatives 1A and 1B, confining future improvements to the existing right of way would not always be possible. For the purpose of the impact analysis in this **Final EIS**, Alternative 1 is assumed to have the same footprint as Alternative 1A. Since Alternative 1A widens to the outside of the existing roadway, this assumption provides the most conservative assessment of environmental impacts.

The projected capital cost in 2017 dollars is estimated to range between \$4.7 to \$7.3 billion. Details on these costs are shown in the **Alternatives Development Technical Memorandum** and in the **Right of Way Technical Memorandum**.

On June 19, 2013, the Commonwealth Transportation Board (CTB) approved the 2014-2019 SYIP that includes \$100 million in funding for Capacity Improvements to I-64 from the City of Newport News to the City of Williamsburg. The Hampton Roads TPO approved and adopted a resolution on June 20, 2013, endorsing the expansion of the operationally independent section of I-64 from Exit 255 (Jefferson Avenue) to Exit 242 (Humelsine Parkway) to six lanes, on the condition that this preference would not preclude the I-64 Peninsula expansion to eight lanes or future associated funding. Currently, the portion of I-64 identified in the Hampton Roads TPO resolution is proposed to become the first section advanced from this study. A copy of this resolution is included in **Appendix J – Resolutions** of this **Final EIS**. Additional operationally independent sections may be included in future planning documents, as described in **Section 2A of Appendix L - Phased Approach for Implementation - NEPA Process**.

4. Phased Approach for Implementation and Future NEPA Process

The Metropolitan Planning Regulations (23 CFR 450) and the Clean Air Act (CAA) Transportation Conformity Rule (40 CFR

93) require that a project located in a metropolitan planning area and/or in a CAA nonattainment or maintenance area be contained in a conforming, fiscally-constrained LRTP. FHWA may issue a **Record of Decision (ROD)** only if the project improvements are included in a conforming, fiscally-constrained LRTP.

As further discussed in **Appendix L - Phased Approach for Implementation - NEPA Process**, the implementation of Alternative 1 would occur via the construction of operationally independent sections as funding is identified. Operationally independent sections would have independent utility and would be designed to contribute to the purpose and need of the *I-64 Peninsula Study* (**Chapter I – Purpose and Need**). An operationally independent section can be built and function as a viable transportation facility even if the rest of the work described in this **Final EIS** is never built. It is possible that the full number of lanes associated with the Preferred Alternative for a particular operationally independent section may not be constructed initially. The **Final EIS** does not place any restrictions on the phasing for construction purposes for the operationally independent sections. Therefore, each future analysis update will be based on the scope of the operationally independent section to be covered by the **ROD**. As an operationally independent section is advanced, the environmental analysis in this **Final EIS** would be updated as necessary and, provided that the section has met the transportation planning and air quality requirements, FHWA would issue a **ROD** for that section.

The decision on whether to widen to the outside or the inside of the roadway would be made on a section-by-section basis, and the development of these operationally independent sections would be closely coordinated with the Richmond Area MPO, Hampton Roads TPO, and other state and federal resource and regulatory agencies. If any operationally independent sections have a cost that exceeds \$500 million, then the section would be considered a major project and a cost estimate review would be conducted by FHWA prior to the issuance of a **ROD** for the operationally independent section.

The identification of a Preferred Alternative for the entire corridor in this **Final EIS** is consistent with FHWA's objective of analyzing transportation solutions on a broad enough scale to provide meaningful analysis. The identification of an initial phase for implementation is consistent with the federal requirement to have funding identified before a **ROD** is issued.

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Table ES.2: Summary of Impacts

Category	Resource/Element Assessed	No-Build Alternative	Build Alternatives					
			Alternative 1* General Purpose Widening	Alternative 1A General Purpose Lanes Outside Widening	Alternative 1B General Purpose Lanes Median Widening	Alternative 2A Full Toll Lanes Outside Widening	Alternative 2B Full Toll Lanes Median Widening	Alternative 3 Managed Lanes with General Purpose Lanes
Right of Way and Relocations	Rural (number of parcels)	0	106	106	81	106	81	106
	Residential/Suburban Low Density (number of parcels)	0	418	418	410	418	410	413
	Outlying Business/Suburban High Density (number of parcels)	0	213	213	201	213	201	208
	Central Business District (number of parcels)	0	52	52	51	52	51	52
Socioeconomic and Environmental Justice	Disproportionate Impacts to Minority and Low Income Populations	0	No	No	No	No	No	No
	Estimated Lost Tax Revenue (dollars)	0	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Natural Resources	Wetlands Crossed – Tidal (acres within the limits of disturbance)	0	28	28	28	28	28	28
	Wetlands Crossed – Non-Tidal (acres within the limits of disturbance)	0	38	38	37	38	37	39
	Other Waters of the US Crossed – Tidal (linear feet within the limits of disturbance)	0	3,012	3,012	2,932	3,012	2,932	2,936
	Other Waters of the US Crossed – Non-Tidal (linear feet within the limits of disturbance)	0	109,225	109,225	110,612	109,225	110,612	109,580
	VDEQ 2010 Impaired Waters Crossed (number)	0	9	9	9	9	9	9
	100-Year Floodplains Crossed (acres within the limits of disturbance)	0	21	21	18	21	18	21
	Public Reservoirs Crossed, Including Tributaries (number)	0	5	5	5	5	5	5
Farmlands	Threatened and Endangered Species Habitat/Populations (number of species with potential habitat within the limits of disturbance)	0	3	3	3	3	3	3
	Prime Farmlands (acres)	0	65	65	65	65	65	65
	Farmlands of Statewide Importance (acres)	0	37	37	37	37	37	37
Public Parklands	Agricultural/Forestal Districts (acres)	0	1	1	<1	1	<1	1
	Park Facilities Affected (number)	0	2	2	2	2	2	2
Historic Properties	Use of Park Facilities (acres)	0	34	34	34	34	34	34
	Historic Sites/Districts Affected (number)	0	2	2	2	2	2	2
Air Quality	Archaeological Sites Affected (number)	0	6	6	6	6	6	6
	Battlefields Affected (number)	0	8	8	8	8	8	8
Noise	Conforms to National Ambient Air Quality Standards	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Common Noise Environments (number)	66	66	66	66	66	66	66
	Residences Impacted (number)	1,262	1,262	1,262	1,190	1,262	1,190	1,156
	Churches/Parks/Schools/Athletic Fields Impacted (number)	5	5	5	5	5	5	4
Contaminated Sites	Proposed Noise Barriers (number/linear feet)	0	39,376	39,376	39,376	39,376	39,376	37,321
	Sites Identified for Further Investigation (number)	0	13	13	13	13	13	13
Visual	Adversely Affected Visually Sensitive Areas	0	0	0	0	0	0	0
Capital Cost**	Cost in Billions (average expressed in year 2017 dollars)	0	\$4.7 - \$7.3	\$4.7 - \$7.3	\$4.7 - \$7.2	\$4.8 - \$7.3	\$4.8 - \$7.3	\$4.7 - \$7.3

*The Preferred Alternative has been identified as Alternative 1. To provide for the most conservative assessment of impacts, Alternative 1 is assumed to have the same footprint as Alternative 1A.

Details of the cost estimates are included in **Table 5 of the *Alternatives Development Technical Memorandum*.

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It is important to note that projects to maintain and improve the facility such as, but not limited to, the repair or replacement of pavement sections, bridges, guard rails, fencing, barriers, or other structures and implementation of additional intelligent transportation systems, could be implemented independently of operationally independent sections.

D. Environmental Impacts

A comprehensive investigation of each Alternative's impacts to the natural, historic and human environments was completed as part of this study. Impacts were identified based on the potential limits of disturbance footprint determined from the conceptual designs for each of the Build Alternatives. The impacts identified for each of the Build Alternatives were developed based on the best available estimate of potential impacts resulting from the current stage of project development and the level of conceptual engineering investigations. **Table ES.2** provides a summary of the impacts. The details of these impact investigations are found in **Chapter III - Environmental Resources, Impacts and Mitigation** of this **Final EIS** and in the following Technical Memorandums and documentation completed for this study:

- *Air Quality Technical Memorandum.*
- *Alternatives Development Technical Memorandum.*
- *Historic Properties Documentation.*
- *Indirect and Cumulative Effects Technical Memorandum.*
- *Natural Resources Technical Memorandum.*
- *Noise Technical Memorandum.*
- *Purpose and Need Technical Memorandum.*
- *Right of Way Technical Memorandum.*
- *Socioeconomic and Land Use Technical Memorandum.*
- *Traffic and Transportation Technical Memorandum.*

E. Other Major Actions and Proposals

In addition to the projects identified in VDOT SYIP and outlined in the No-Build Alternative for the 75 mile long project corridor, there are a number of other major actions and proposals within and adjacent to this study area being pursued or recently completed by government agencies. At the time of this document other actions identified include the following:

- The VDRPT *Richmond/Hampton Roads Passenger Rail Study* was completed for enhanced passenger rail service between the

City of Richmond and the Hampton Roads area. The *Record of Decision* was approved by the Federal Railroad Administration on December 7, 2012.

- The *Hampton Roads Regional Transit Vision Plan* provided high level recommendations for regional transit in the Hampton Roads area. The final report outlining numerous regional transit projects was completed in February 2011.
- The City of Newport News is currently engaged in designing the extension of Atkinson Boulevard which would include a new bridge over I-64.
- The City of Newport News is seeking services for master planning, business modeling, engineering and project management services related to a multi-modal transportation center and a supplementary downtown transit facility.
- VDOT and FHWA are conducting a study of the I-64 Hampton Roads Bridge-Tunnel corridor from I-664 in the City of Hampton to I-564 in the City of Norfolk.

F. Public and Agency Input

A comprehensive agency and public involvement program was completed for the study. This effort included 15 meetings and continuous telephone and e-mail coordination with interested citizens, organizations and agencies on a wide variety of topics. Throughout this coordination the following are the most notable project concerns that were expressed about the study.

Project Schedule/Timing for Construction – Throughout the public and agency interactions the topic of project schedule, including the timing for construction and project completion, was raised. Citizens and organizations were interested in how to quickly get the project moving and completed in order to address the project need.

Construction Travel Effects – In examining the large scale investment needed to complete a project of this magnitude the topic of investigating ways to construct the project was raised. Citizens asked about how the construction would occur and how it would affect travel time throughout the corridor.

Maintaining Trees in the Median – It has been expressed by a variety of citizens and organizations that it is important to preserve the aesthetics of the corridor by retaining the wooded median, particularly in the section of I-64 through the historic triangle area comprised of the Cities of Williamsburg and Yorktown and Jamestown.

Noise Impacts and Noise Walls – Throughout the public involvement process concerns were raised about the amount of increased noise additional lanes and increased traffic volumes on I-64 would generate. Concerns raised included the need to build new noise walls and how to maintain/rehabilitate the existing noise walls along I-64. Questions on the locations, types and colors of walls were expressed. The noise concerns were primarily concentrated in the urban areas near the City of Richmond on the western end and near the Cities of Newport News and Hampton on the eastern end of the study area.

Do Improvements Quickly and in Sections – Recognizing the magnitude of funding needed to construct the entire 75 mile project, it has been expressed that improvements be done in phases beginning with the most needed sections of I-64 and associated interchanges to improve safety and traffic conditions as soon as possible. These suggestions have included advancing improvements to the mainline section of I-64 between the Cities of Williamsburg and Newport News along with improving the Exit 250 (Fort Eustis Boulevard) and Exit 247 (Yorktown) interchanges since they have the highest accident rates.

Timing of this Project with the Hampton Roads Bridge-Tunnel Study – In examining the regional traffic flow on I-64, concerns have been raised as to the timing and interaction between this study and the *Hampton Roads Bridge-Tunnel Study*. Since both of these projects have a common end point at the Exit 264 (I-664) interchange, concerns have been raised as to the timing and viability of both large scale projects being completed.

G. Unresolved Issues

The following are the unresolved issues at the time of this **Final EIS**.

MPO/TPO Actions – Following the publication of the **Final EIS**, it is anticipated that the Richmond Area MPO and the Hampton Roads TPO would update their respective LRTPs to identify operationally independent section(s) as funding becomes available. Once that occurs and the environmental analyses are updated as necessary, FHWA would issue a **ROD** for that section.

Funding – The implementation of Alternative 1 would occur via the construction of operationally independent sections as funding is identified. Operationally independent sections would be designed to contribute to the purpose and need of the study (**Chapter I – Purpose and Need**). It is possible that the full number of

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lanes associated with the Preferred Alternative for a particular operationally independent section may not be constructed initially. The **Final EIS** does not place any restrictions on the phasing for construction purposes for the operationally independent sections. Therefore, each future analysis update will be based on the scope of the operationally independent section to be covered by the **ROD**, as further discussed in **Appendix L - Phased Approach for Implementation - NEPA Process**. As an operationally independent section is advanced, the environmental analysis in this **Final EIS** would be updated as necessary and, provided that the section has met the transportation planning and air quality requirements, FHWA would issue a **ROD** for that section.

On June 19, 2013, the CTB approved the 2014-2019 SYIP that includes \$100 million in funding for Capacity Improvements to I-64 from the City of Newport News to the City of Williamsburg. The Hampton Roads TPO approved and adopted a resolution on June 20, 2013, endorsing the expansion of the operationally independent section of I-64 from Exit 255 (Jefferson Avenue) to Exit 242 (Humelsine Parkway) to six lanes, on the condition that this preference would not preclude the I-64 Peninsula expansion to eight lanes or future associated funding. Currently, the portion of I-64 identified in the Hampton Roads TPO resolution is proposed to become the first section advanced from this study. A copy of this resolution is included in **Appendix J – Resolutions** of this **Final EIS**.

Tolling – As previously stated because the use of tolls could be an option as a fund source to accomplish the needed improvements, Alternatives that involve tolling were considered in the range of Alternatives evaluated. As described above and in detail in **Chapter 2 - Alternatives Considered, Section D** of this **Final EIS**, the Preferred Alternative has been identified as Alternative 1. If any of the Alternatives that include tolling had been identified as the Preferred Alternative, further information would have been developed.

H. Other Actions/Approvals Required

The construction of any of the Build Alternatives would require coordination with and approval from state and federal environmental resource and regulatory agencies. As previously noted, Alternative 1 allows the option to widen to the outside of the existing road corridor or within the median of the existing road

corridor. The decision on whether to widen to outside or the inside of the roadway would be made on a section-by-section basis, and the development of these operationally independent sections would be closely coordinated with the Richmond Area MPO, Hampton Roads TPO and other state and federal resource and regulatory agencies.

The following actions could be required for any operationally independent section.

- Waters of the United States, including wetlands, are regulated under Sections 401 and 404 of the Clean Water Act (CWA), the Virginia Water Protection Permit (VWPP) Program Regulation 9 VAC 25-210 and the Virginia Wetlands Act (Chapter 13, Title 28.2 of the Code of Virginia). There are both tidal and non-tidal wetland and stream systems located within the study area. Impacts to these systems resulting from the discharge of fill material into or otherwise encroachment in, on or over these systems may require a Section 404 United States Army Corps of Engineers (Corps) permit, a Virginia Department of Environmental Quality (VDEQ) VWPP, and a Virginia Marine Resources Commission (VMRC) Subaqueous Bottomlands Permit.
- Projects that are located within the Coastal Zone Management Area (CZMA) in Virginia which are, at least in part, federally-funded or require federal approval must undergo a federal consistency certification process. The goal of this process is to ensure that projects are designed to avoid and/or minimize impacts to specific coastal resources as identified by several enforceable policies related to fisheries, subaqueous lands, tidal and non-tidal wetlands, dunes, non-point and point source pollution control, shoreline sanitation, air pollution, and land management. In Virginia, the VDEQ is responsible for coordinating the Commonwealth’s review of federal consistency determination and certification with the appropriate agencies and responding to the appropriate federal agency or applicant. While the Joint Permit Application process required for the Sections 401 and 404 of the CWA and VMRC permits (described above) would address the resources and requirements associated with the CZMA Program, the completion of the CZMA checklist may also be required.
- Navigable Waters of the United States are regulated by both the Corps and the U.S. Coast Guard (USCG) under Section

10 of the Rivers and Harbors Act of 1899. There are two tidal stream systems, and associated wetlands, which are considered navigable waters within the study area. Authorization for work in these waters would be required from the Corps. In addition, if impacts occur to the navigable waters, a USCG bridge permit may be required for the individual bridge crossing.

- A Stormwater Pollution Prevention Plan would need to be prepared and the Virginia Stormwater Management Program Permit would need to be acquired from the Virginia Department of Conservation and Recreation. In addition, the construction work must be completed in accordance with applicable local requirements and practices.
- There are nine surface waters intersecting the study area corridor that have been listed as impaired waters (Categories 4 and/or 5) on the VDEQ 2010 303(d) list. Relevant regulations and requirements including the strict adherence to appropriate erosion and sediment control measures, the appropriate use of fertilizers, limiting clearing practices, and the implementation of stormwater management plans designed specifically to address the particular condition as appropriate would need to be followed as part of construction.
- Due to the presence of federal and state listed threatened and endangered species and/or habitat documented within the vicinity of the study area, construction time-of-year restrictions may be required. These restrictions would be determined through the permitting process. Also, habitat assessments and species surveys may be required to determine the presence of a threatened or endangered species or habitat. These species surveys, if needed, would be completed by an agency certified or approved specialist, and may have restrictions on time-of-year when the surveys can be conducted. Additional design or construction considerations, such as the use of bubble curtains, maintaining construction buffer widths, etc., may also be requested or required by the agencies.
- For any adverse effect to Agricultural/Forestral Districts, close coordination with the appropriate localities, agencies, and affected property owners would be required to ensure that land use conversions are consistent with local land use policies and plans. Any land use conversions that are inconsistent with land use policies would require appropriate mitigation measures. Impacts to Agricultural/Forestral Districts would be coordinated with each of the localities prior to project commencement.

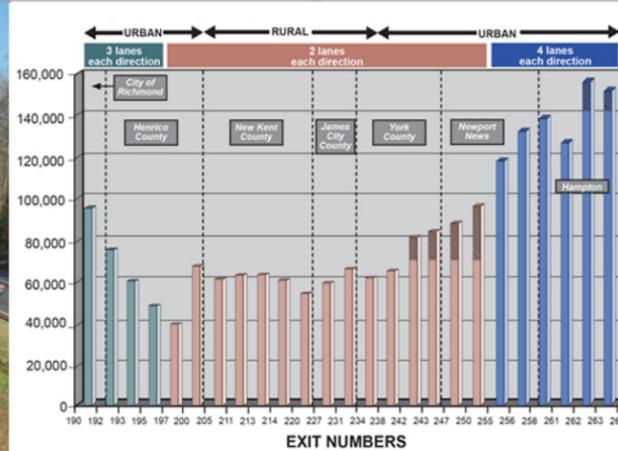
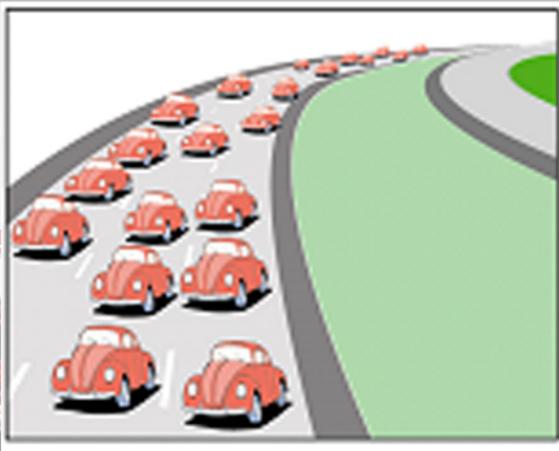
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- A Programmatic Agreement has been developed to satisfy the requirements under Section 106 of the National Historic Preservation Act, as outlined in 36 CFR 800.14(b)(ii), and can be found in **Appendix K - Programmatic Agreement** of this **Final EIS**. This Programmatic Agreement outlines the process by which historic properties potentially affected by the undertaking should be handled during final design and/or construction. This includes identification of archaeological resources, final effect determinations and opportunities to avoid, minimize or mitigate adverse effects on historic properties. As part of the commitments outlined in the Programmatic Agreement, consultation with consulting parties would continue for specific resource needs that may be identified. This coordination would be initiated by VDOT and FHWA as an operationally independent section is advanced. Details of this process can be found in **Appendix L - Phased Approach for Implementation - NEPA Process**.



INTERSTATE 64 PENINSULA STUDY

I. PURPOSE and NEED



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A. Study Area

1. Description

The Virginia Department of Transportation (VDOT), in cooperation with Federal Highway Administration (FHWA), is evaluating options to improve the 75 mile long Interstate 64 (I-64) corridor from the Exit 190 (Interstate 95 (I-95)) interchange in the City of Richmond to the Exit 264 (Interstate 664 (I-664)) interchange in the City of Hampton (**Figure I.1**). This study is known as the *Interstate 64 Peninsula Study*.

The number of lanes on existing I-64 varies through the study area. In the vicinity of the City of Richmond, from Exit 190 (I-95) to Exit 197 (Airport Drive), there are generally three travel lanes in each direction. Between Exit 197 (Airport Drive) and mile marker 254, there are generally two travel lanes in each direction. Beginning at mile marker 254 and continuing east to the City of Hampton area, I-64 widens to four lanes in each direction with three general purpose lanes and one 2+ person High Occupancy Vehicle (HOV 2+) lane during the AM and PM peak periods. There are some additional lanes between closely spaced interchanges at the eastern end of the corridor to provide for easier merging of traffic on and off of the I-64 mainline.

2. Corridor Functions

I-64 is part of the National Highway System (NHS) and the Strategic Highway Network (STRAHNET) and is designated by VDOT as a Corridor of Statewide Significance in *VTrans 2035* (Virginia's statewide multimodal transportation policy plan). I-64 traverses east to west through the middle of Virginia and within the 75 mile project study area, connects the City of Norfolk/Hampton Roads region and the City of Richmond metropolitan areas. In addition to being a connecting corridor between urban areas, the corridor serves numerous purposes, including:

- Daily commuting for residents and business trips.
- Providing access to tourist attractions throughout the region.
- Providing access to, from and between military facilities.
- Transporting freight in and out of the Port of Virginia.
- Acting as an emergency evacuation route, particularly during hurricane events affecting the Hampton Roads region.

Within the study area, the I-64 corridor includes 25 interchanges and 109 major bridge structures on or over the interstate. There are several park and ride lots near interchanges along the corridor, along with two rest stops (one in each direction) which includes a Welcome Center in New Kent County. Additionally there are weigh stations in each direction between Exits 200 (Interstate 295 (I-295)) and 205 (Bottoms Bridge). The corridor is also paralleled by a CSX Railroad, which supports freight rail service as well as Amtrak passenger rail operations between the Cities of Richmond and Newport News.

B. History

Construction of the interstate within the project study area was initiated in the early 1960s. Since then, a number of studies and improvement projects have been completed along the corridor including:

- *Major Investment Study* (June 1999).
- Widening projects at several locations (various projects between 1979 and 2006).
- Interchange upgrades (various projects between 1981 and 2006).
- Addition of HOV lanes in the Hampton Roads area (2001).
- A contraflow lane reversal system from Exit 200 (I-295) to Route 60 east of the Hampton Roads Bridge-Tunnel, put in place to help evacuate motorists from the Hampton Roads area in the event of a hurricane event (2006).
- Reconstruction of 24 of the 109 major bridge structures on or over I-64 within the last 30 years.

C. Needs

The specific needs for the study were developed based on a comprehensive review of previous studies along with the analysis of current data compiled for this study, including information collected through numerous meetings with federal, state and local agencies; cooperating and participating agencies; project stakeholders and the public.

1. Base Conditions

After reviewing the land use, traffic and roadway conditions throughout the I-64 corridor, it was determined that multiple

deficiencies exist creating three categories of needs for improvements within the I-64 corridor:

Capacity

- Provide for increased capacity in order to reduce travel delays.
- Improve access to tourist attractions throughout the region.
- Improve connectivity to, from and between military installations.
- Provide for increased demand from the freight industry.
- Provide for the efficient transporting of freight in and out of the Port of Virginia.
- Support the current economic development needs along the corridor and in the region.

Roadway Deficiencies

- Minimize roadway geometric and structure deficiencies on the I-64 mainline and at the interchanges.

Safety

- Improve safety by reducing congestion and improving roadway design geometrics to meet current standards for interstate highways.

Further descriptions of each of these identified needs are presented in the following sections and elaborated upon in the *Purpose and Need Technical Memorandum*.

a. Capacity - The 2011 traffic volumes on I-64 are higher than the current facility can adequately accommodate, particularly during peak travel times. Traffic volumes are anticipated to increase in the future, exacerbating existing congestion issues.

Figure I.2 shows the current (2011) average annual daily traffic (AADT) for I-64, indicates the rural versus urban portions of the project study area and identifies the number of travel lanes through the study corridor. As shown in **Table I.1**, the *2010 Highway Capacity Manual* (HCM) provides AADT ranges correlating to stable traffic flow for an interstate corridor in urban and rural areas. The stretches of I-64 that exceed stable traffic flow AADT ranges are highlighted with hatching on the bars in **Figure I.2**. Traffic volumes are generally highest at the western and eastern ends of the project area between Exits 190 (I-95) and 192 (Mechanicsville) in the City of Richmond and between Exits 255 (Jefferson Avenue) and 264 (I-664) in the Cities of Newport News and Hampton.

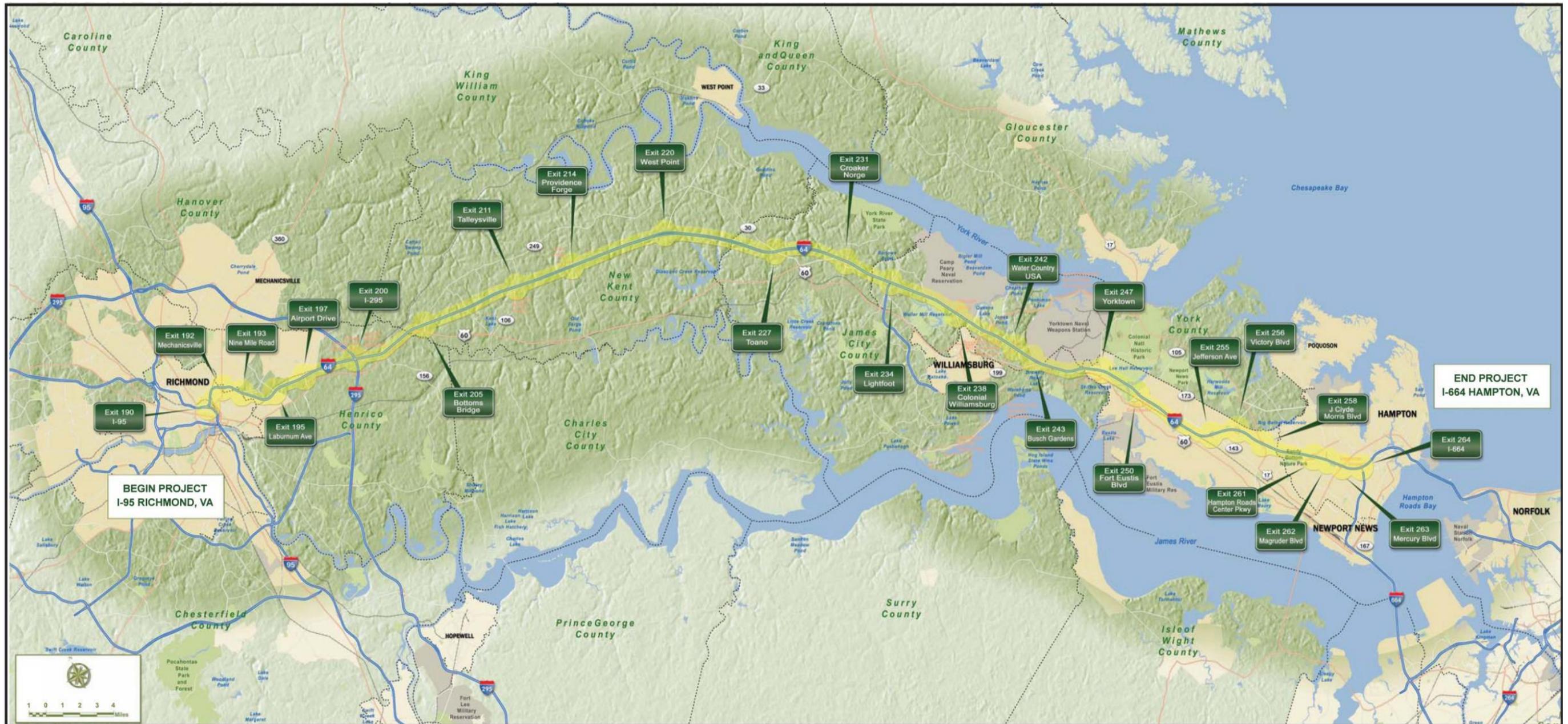
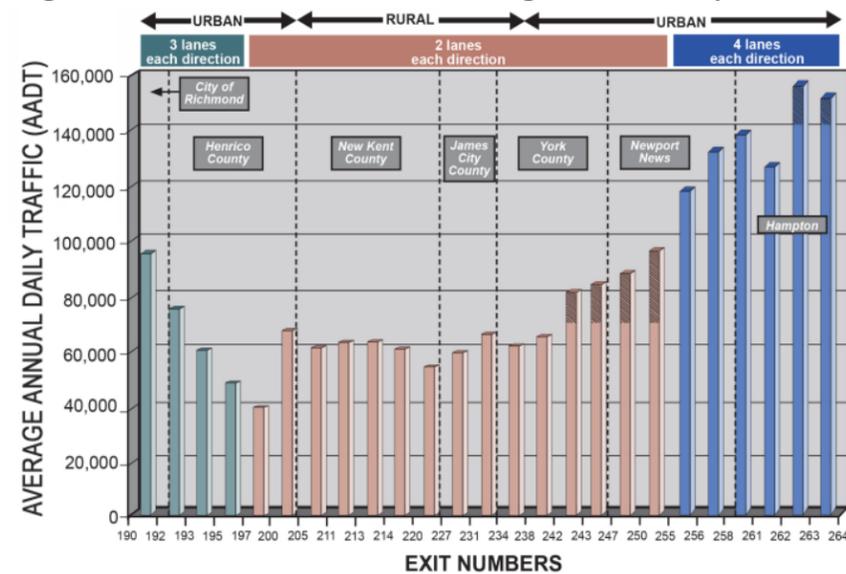


Figure I.1
Project Location



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Figure I.2: 2011 Base Conditions Average Annual Daily Traffic*



■ Exceeds stable traffic flow AADT ranges.
 *Capacity calculations assume most traffic uses the general purpose lanes and not the HOV lanes for a section.

Table I.1: General Ranges of Average Annual Daily Traffic for Urban and Rural Freeway Facilities Operating at Level of Service C

Element	Urban Areas	Rural Areas
Four-Lane Highway (2 lanes in each direction)	65,000 – 75,000 AADT	50,000 – 55,000 AADT
Six-Lane Highway (3 lanes in each direction)	100,000 – 113,000 AADT	74,000 – 82,000 AADT
Eight-Lane Highway (4 lanes in each direction)	134,000 – 150,000 AADT	99,000 – 110,000 AADT

Note: Vehicles per day are shown assuming a LOS C.
 Source: 2010 HCM

After reviewing the traffic data collected and obtained, it was determined that the weekday morning peak period is 6:30 AM to 9:00 AM, while the weekday evening peak period falls between 4:00 PM and 6:00 PM. Within the eastern portion of the corridor, the summer peak periods are during Saturday mornings (9:00 AM – 10:00 AM) and Sunday afternoons (2:00 PM – 3:00 PM).

As a result of a speed study conducted for this project, it was determined that travel speeds drop to as low as 20 mph between mile markers 254 and 257, as shown in Figures I.3A and I.3B. Furthermore, this congestion and decrease in travel speeds can negatively affect incident response, which is related to safety concerns described later in this chapter. The listed average travel speeds represent the worst case of either AM peak hour, PM peak hour, summer Saturday, or summer Sunday peak hour conditions.

A Policy on Geometric Design of Highways and Streets, published by the American Association of State Highway and Transportation Officials (AASHTO), is referenced in the Code of Federal Regulations and is used to provide the level of service (LOS) standard for highways on the NHS, which includes I-64. The LOS standard for mainline operations along freeway facilities is LOS B in rural areas and LOS C in urban areas. Based on FHWA guidelines, I-64 is considered both a rural and an urban freeway in different sections of the corridor. To be consistent, a goal of LOS C or better was established for the mainline segments of I-64. The same goal would be applied to the ramps and weave areas (the crossing of two or more traffic streams traveling in the same direction along a substantial length of highway) on I-64.

As shown in Figure I.4, under 2011 Base Conditions, there are numerous mainline segments, ramps, weaving areas, and intersections within the corridor that currently operate below those acceptable LOS thresholds.

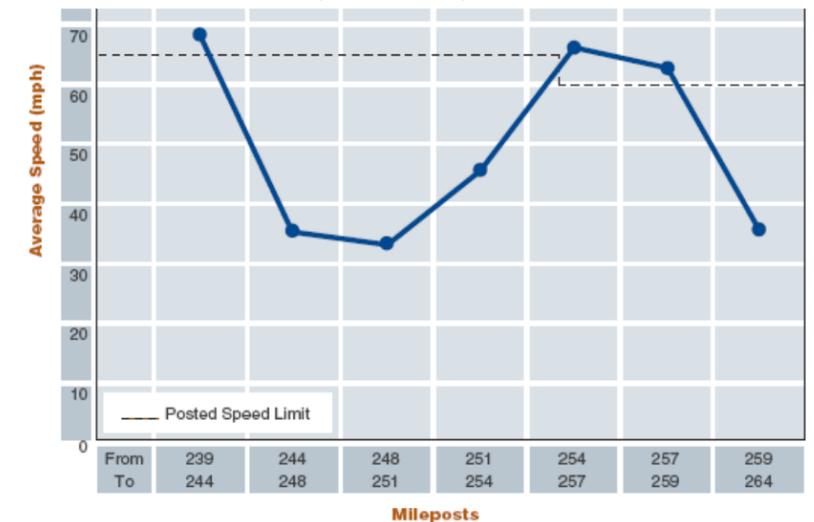
Approximately two-thirds of the I-64 mainline operates at a deficient LOS during Base Conditions, particularly the segment closest to I-95 at the western end of the corridor and virtually the entire stretch of I-64 from Exit 214 (Providence Forge) in New Kent County to Exit 264 (I-664) in the City of Hampton.

The LOS is a letter grade (A-F) which represents a qualitative measure of operational conditions within a traffic stream, generally in terms of such factors as speed and travel time, freedom to maneuver and traffic interruptions. For this study, LOS was determined using the procedures set forth in the 2010 HCM published by the Transportation Research Board (TRB). Figure I.5 shows LOS grades corresponding to different traffic conditions/operations.

There are two ramps along westbound I-64 at Exits 258 (J. Clyde Morris Boulevard) and 261 (Hampton Roads Center Parkway) and one weaving area along eastbound I-64 between Exits 262 (Magruder Boulevard) and 263 (Mercury Boulevard) that currently operate at LOS F during the PM peak hour. Some of

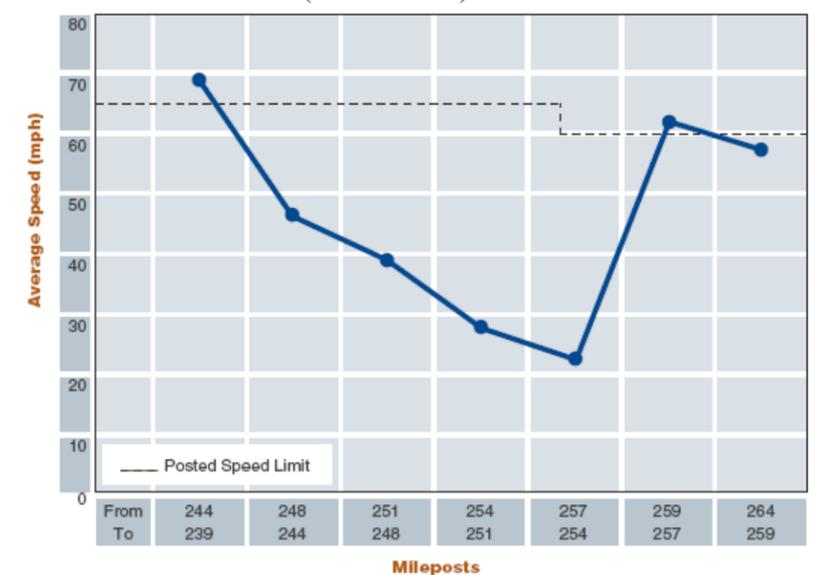
the intersections at the ramp termini, particularly at Exits 247 (Yorktown) and 255 (Jefferson Avenue) experience traffic volumes that exceed what the roadway is able to accommodate. These capacity constraints cause ramp backups that can extend onto the I-64 mainline, creating serious operational and safety concerns.

Figure I.3A: 2011 Average Travel Speeds Between Mile Markers 239 and 264 (Eastbound)



Source: McCormick Taylor Inc., I-64 Travel Time Study, 2011

Figure I.3B: 2011 Average Travel Speeds Between Mile Markers 239 and 264 (Westbound)



Source: McCormick Taylor Inc., I-64 Travel Time Study, 2011

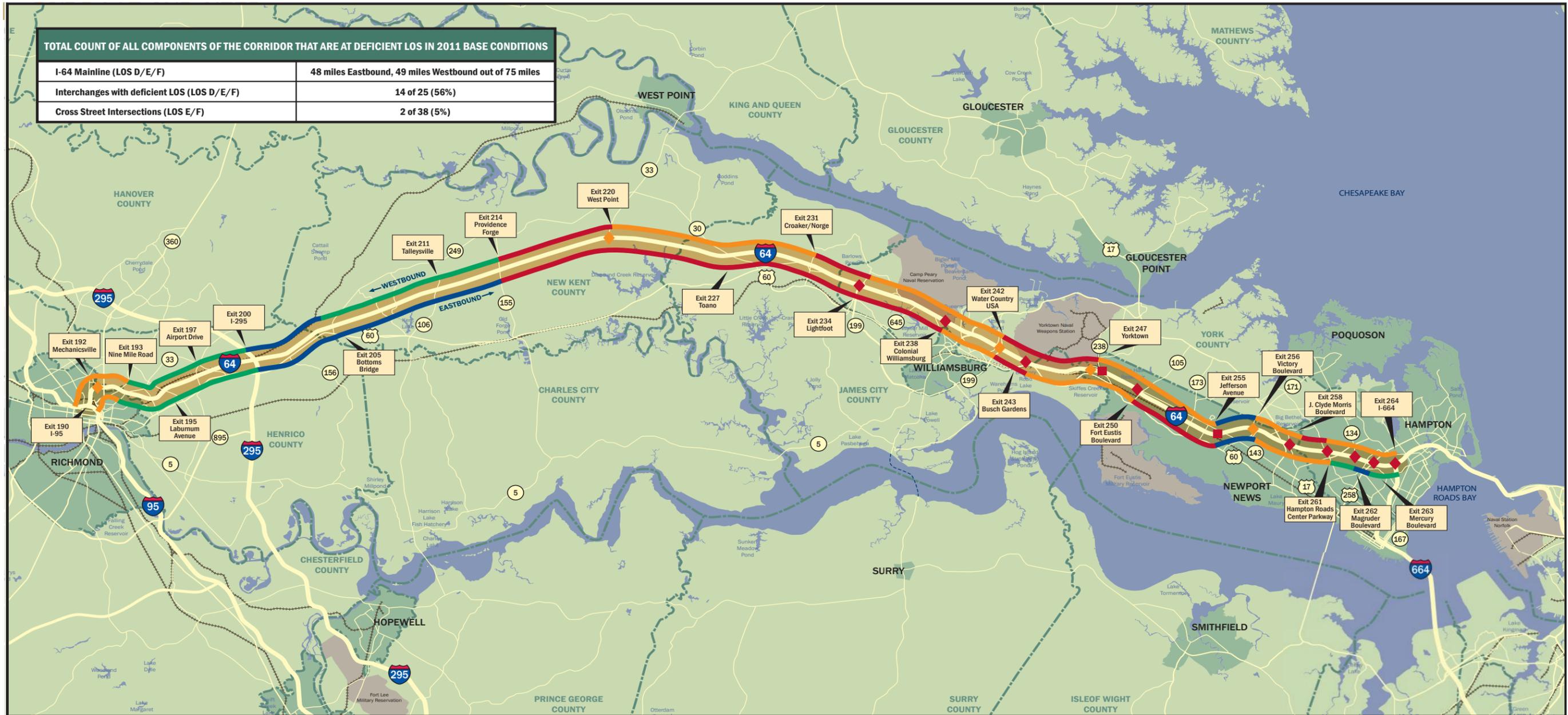
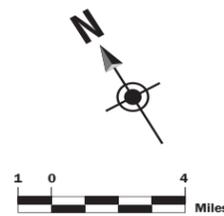


Figure I.4

I-64 Eastbound and Westbound Level of Service – Mainline and Deficient Ramp/Weave/Intersection 2011 Base Conditions



LEGEND

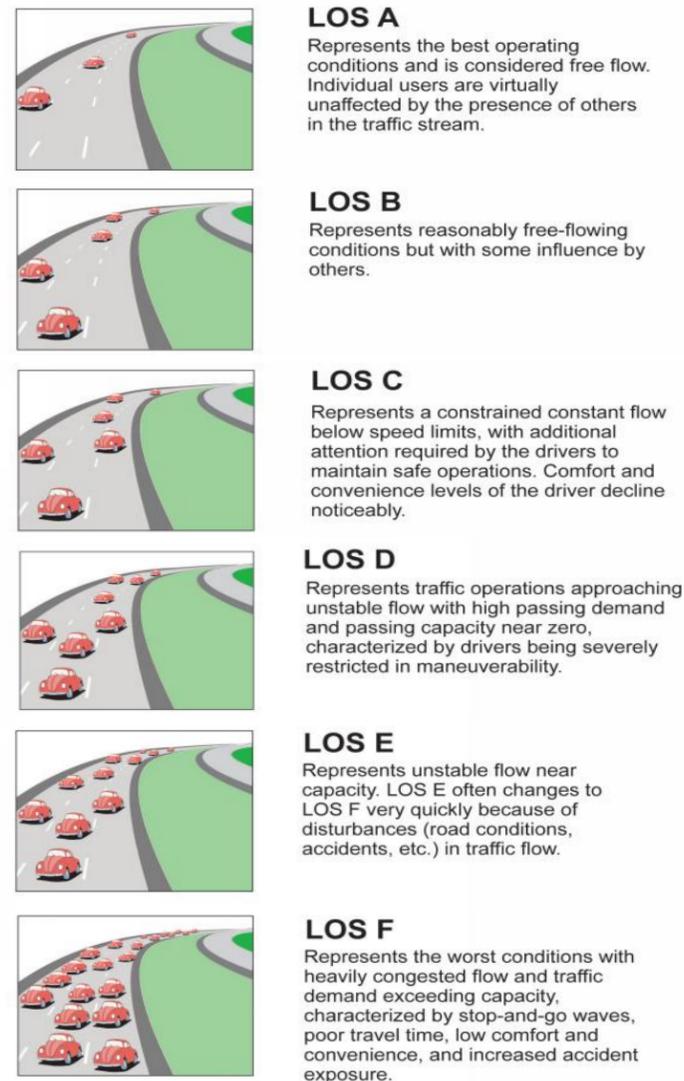
- █ = Freeway Level of Service A/B
- █ = Freeway Level of Service C
- █ = Freeway Level of Service D
- █ = Freeway Level of Service E/F
- ◆ = Ramp/Weave at Level of Service D
- ◆ = Ramp/Weave at Level of Service E/F
- = Cross Street Intersection at Level of Service D
- = Cross Street Intersection at Level of Service E/F

Note:
Level of Service indicated represents worst case of AM, PM, Saturday and/or Sunday peak period analyses.



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Figure I.5: Level of Service



The LOS is a letter grade (A-F) which represents a qualitative measure of operational conditions within a traffic stream, generally in terms of such factors as speed and travel time, freedom to maneuver and traffic interruptions. For this study, LOS was determined using the procedures set forth in the 2010 HCM published by the TRB. Figure I.5 shows LOS grades corresponding to different traffic conditions/operations.

In addition to daily commuting and tourist needs, the following factors contribute to the I-64 capacity issues between the Cities of Richmond and Hampton.

Military Facilities and Movement - There is a large military presence in Hampton Roads and throughout the Tidewater area, with each branch of the armed forces represented. In September 2011, the Hampton Roads Transportation Planning Organization (TPO) completed the *Hampton Roads Military Transportation Needs Study* outlining issues involving military mobility throughout the Hampton Roads region and along I-64. The following describes the needs of these military facilities in relation to the I-64 corridor:

- During a typical weekday, approximately 125,000 personnel travel to the military facilities.
- Existing (2011) traffic congestion/inadequate roadway capacity hinders military troop and supply movement between the facilities and installations along the I-64 corridor and within the region.
- Recent reorganization relocated many military personnel and their families from Fort Monroe to Fort Eustis, shifting travel

patterns and increasing commuter volumes in and around the Fort Eustis area.

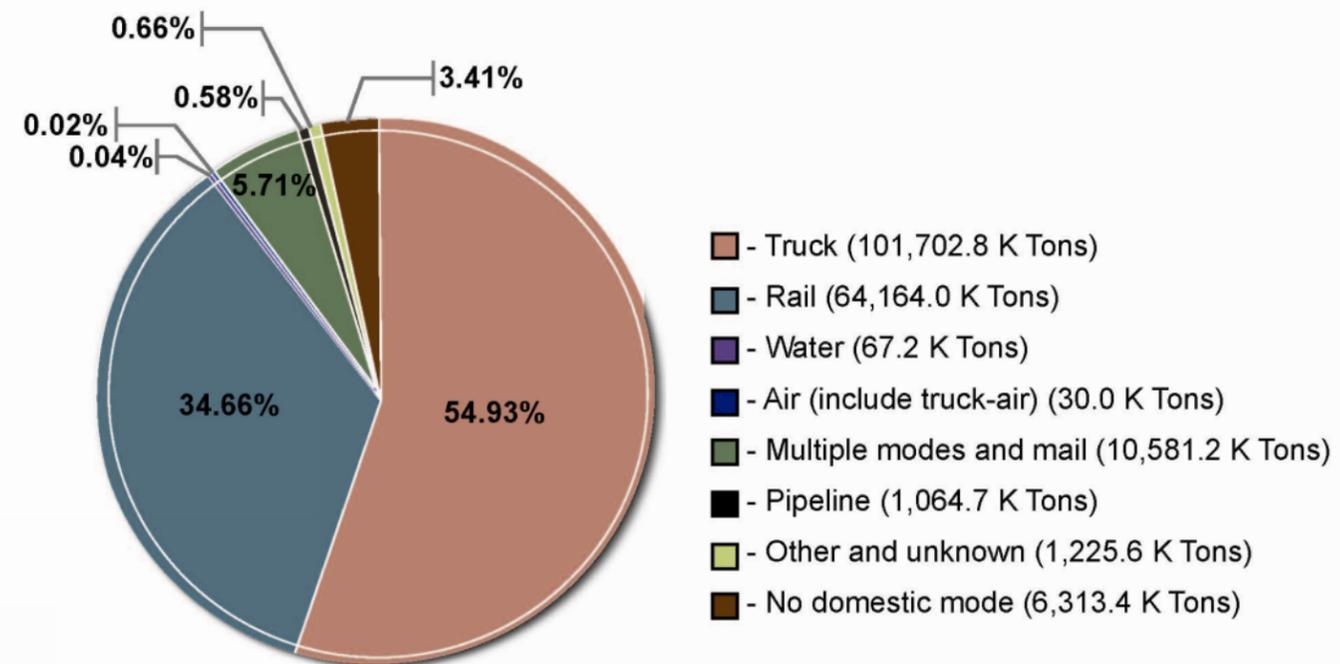
- Congestion limits the military’s ability to maintain military personnel or bring additional personnel to the Hampton Roads region.

Freight Movement - As described in the intermodal study conducted as a part of this project, and shown in Figure I.6, most of the freight in the region is shipped via truck (54.93%), with 34.66% shipped via rail. Other modes of shipping are used much less frequently.

Within the I-64 corridor, the percentage of trucks is lower at the two project limits (2-4% at Henrico County and the City of Newport News), and higher in the middle (7-8% at New Kent, James City and York Counties) primarily due to the higher volume of urban commuting traffic in the denser population centers near the Cities of Richmond and Hampton.

Although the percentage of trucks is relatively small in comparison to the vehicular traffic, one truck uses the capacity of three passenger cars. Congestion during peak travel periods is an issue,

Figure I.6: Mode Share of Total Regional Freight Tonnage (2007)



Source: FHWA, *Freight Analysis Framework, Version 3, 2011*

I. PURPOSE AND NEED

particularly in the Hampton Roads area, and many of the congested areas (such as I-64 in the Cities of Hampton and Newport News) are heavily traveled by trucks. At the western end of the I-64 study area, the Exit 190 (I-95) interchange is one of FHWA’s 100 identified freight bottlenecks.

The intermodal study conducted as a part of this project discusses the needs and assumptions used to determine ongoing and future expansion efforts affecting freight movement within the region:

- The existing I-64 cannot effectively accommodate the truck and freight traffic in addition to the passenger vehicle volumes, resulting in traffic congestion and safety concerns.
- The importance of I-64 to freight movement and the regional/state economy continues to increase due to continued economic development and ongoing Port of Virginia expansion projects.

Economic Development - The I-64 study area is comprised of land uses ranging from the urban areas surrounding the Cities of Richmond, Williamsburg, Newport News and Hampton to the more rural areas of New Kent, York and James City Counties. A combination of population growth, addition/expansion of tourist destinations and growth in the Port of Virginia has added traffic to I-64. Review of data obtained from the counties and cities in the I-64 study area and review of potentially developable land shows a large amount of developable land available in the project area. Transportation access and mobility is an important consideration in siting new development/relocating businesses. The current I-64 capacity and operating concerns are carefully considered in locating future developments. Traffic added to I-64 by planned new developments would add to the already unacceptable LOS caused by the existing traffic volumes on I-64, worsening travel conditions.

b. Roadway Deficiencies - Due to changes in the interstate design standards and almost 50 years of traffic volumes creating wear and tear on the corridor infrastructure, there are a number of roadway and structure deficiencies throughout the corridor.

When I-64 was constructed in the 1960s, it was designed for considerably less traffic than it currently experiences and was based on the roadway and structure design standards of that time. As time has passed, data about safety requirements for high-capacity and high-speed facilities has accumulated and roadway design standards have been revised based on the knowledge gained. For example, as speeds increase along a corridor, sight distance requirements grow substantially, which over time has led

to deficiencies based on current design standards compared to the design standards at the time I-64 was initially constructed in the 1960s.

The design standards used for the existing facility were reviewed and compared to the current design standards for this classification of roadway. This information can be found in the *Alternatives Development Technical Memorandum, Appendix A* and *Appendix D*.

I-64 Mainline and Interchanges - **Figure I.7** identifies the locations along the I-64 corridor which do not meet the current AASHTO and VDOT requirements for interstate geometry. These include deficient vertical curves on the I-64 mainline and interchanges with deficient geometric features (acceleration/ deceleration lane length, taper length, weave length, stopping sight distances on ramps). In addition, 14 of the 25 interchanges in the project study area do not meet current design standards.

Structures - There are 109 major bridge structures along the I-64 study corridor (47 on the I-64 mainline and 62 that cross over I-64). Bridges are inspected regularly to ensure that they are safe for the volumes and type of traffic using them. They are evaluated using a measurement called the sufficiency rating, represented by a percentage ranging from 0-100 (100 being excellent condition). The sufficiency rating takes into account aspects of the structure such as its structural adequacy and safety, necessity of the structure to the surrounding community, and serviceability and functional obsolescence. A bridge is considered eligible for federal funds for reconstruction if its sufficiency rating falls below 80% and is eligible for funds for replacement when the sufficiency rating falls below 50%. **Table I.2** summarizes the ages of the bridges in the corridor and the number of bridges with current sufficiency ratings below 80% and below 50%.

In addition, there are 12 bridges crossing over I-64 which do not possess the required minimum 16.5 feet of vertical clearance per current AASHTO and VDOT interstate design standards. **Figure I.7** identifies the approximate locations of these bridge structures.

c. Safety - Existing traffic volumes along with aging roadway and structural deficiencies have exacerbated safety concerns within the corridor.

A safety analysis of the I-64 corridor was conducted to examine crash locations along the corridor. The current VDOT crash data from January 2008 to December 2010 was analyzed and plotted. This data does not include minor “fender-bender” collisions that were not reported to police or did not meet the \$1,500 threshold for reportable crashes and are therefore not included in VDOT’s Statewide Crash Database.

The results of this analysis revealed that there were 3,802 crashes over the three year period from mile marker 191, just east of Exit 190 (I-95), to mile marker 264, east of Exit 264 (I-664). There were 20 fatal crashes in that period, representing 0.5% of total crashes. While 31% of crashes resulted in injuries, 68% of the crashes resulted only in property damage. The 20 fatal crashes were spread throughout the corridor, however a majority (15 of 20) occurred within the rural four lane section of the corridor between Exit 200 (I-295) and Exit 243 (Busch Gardens Boulevard).

Collision types included the following:

- 48% of the crashes were rear end.
- 30% of the crashes involved a fixed object.
- 10% of the crashes were sideswipe collisions involving vehicles traveling in the same direction.
- 3% of the crashes were angle, non-collision, and deer incidents, each with approximately 125 crashes per type.
- 3% of the crashes were considered miscellaneous.

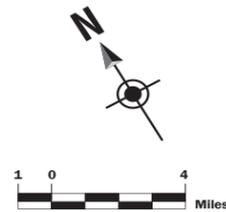
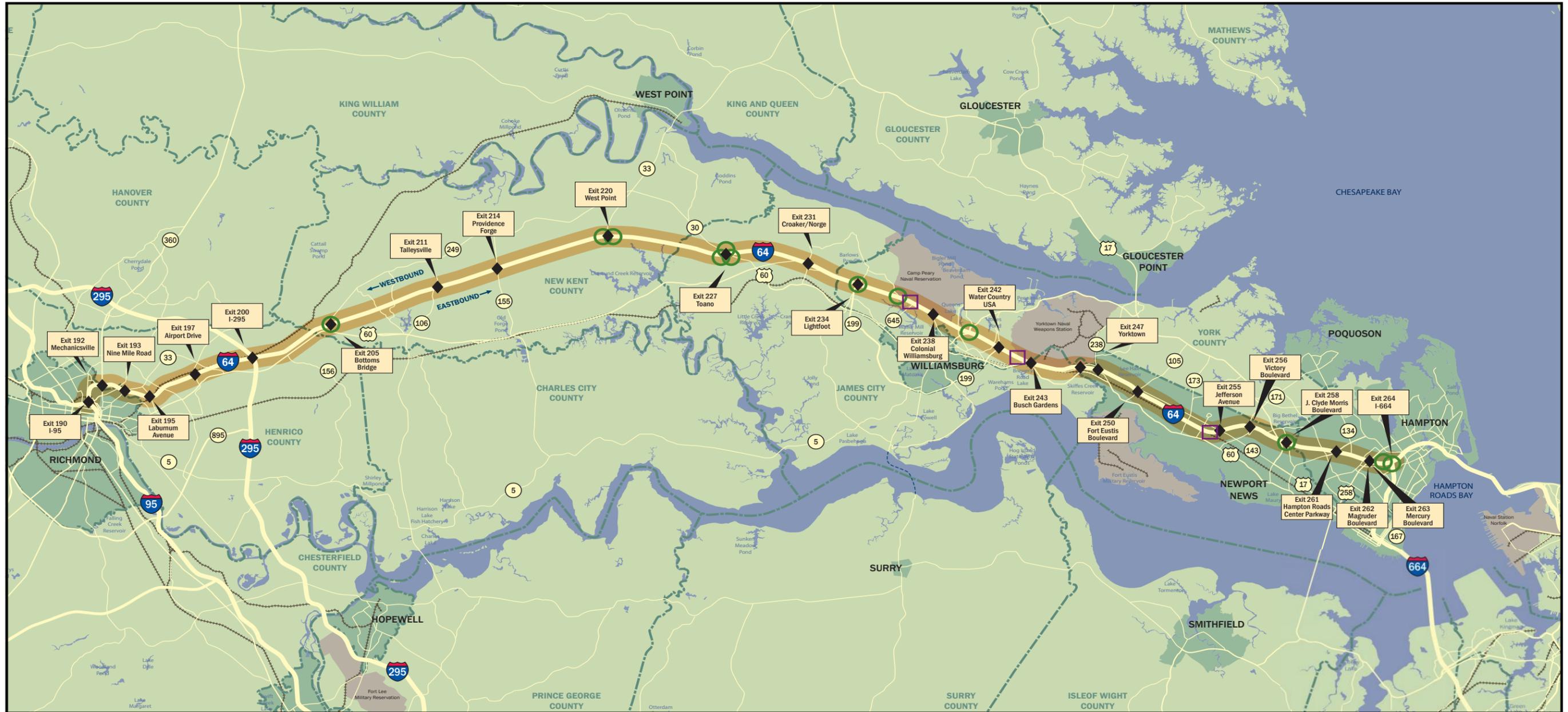
Crash rates were calculated for the I-64 corridor and compared to the statewide average for similar interstate facilities (72 crashes per 100 million vehicle miles traveled, as of 2008). Segments with rates above the statewide average are shown on **Figure I.8**.

In addition to the mainline crashes, each interchange and associated at-grade intersection was reviewed to identify where

Table I.2: Sufficiency Ratings, Ages and Vertical Clearances of I-64 Structures Sufficiency Rating

	Sufficiency Rating Below 80%	Sufficiency Rating Below 50%	Structures Older than 30 Years	Structures Older than 60 Years	Structures with <16.5 feet Vertical Clearance
Number of Structures (2011)	50	5	74	0	12

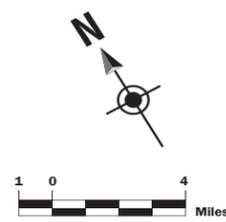
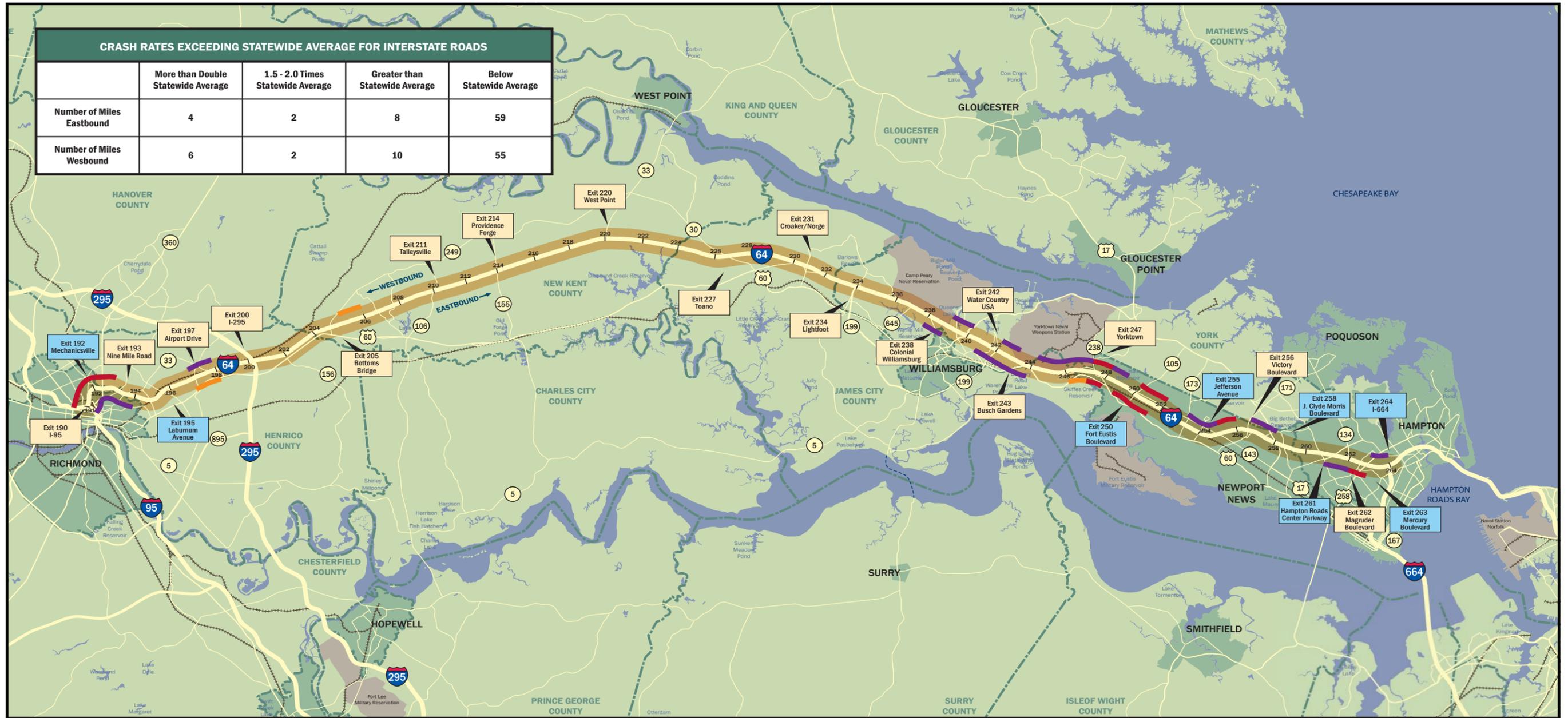
Note: Total number of structures on or over I-64 = 109 | Source: VDOT *Bridge Inspection Reports*, 2011



- LEGEND**
- = Substandard Vertical Clearance
 - ◆ = Substandard Interchange
 - = Substandard Vertical Curve

Figure I.7
Roadway Deficiencies





LEGEND

- █ 1.0 to 1.5 times statewide average
- █ > 1.5 to 2.0 times statewide average
- █ > 2.0 times statewide average
- 206 Approximate milepost location
- Ramps/Intersections with > 10 crashes from 2008 - 2010

- Notes:
- Crashes data provided by VDOT from statewide database. Does not include crashes not reported to the state system.
 - Statewide average crash rate is based on VDOT analysis of crashes that occurred on all Virginia interstates in the year 2008.
 - Crash rates calculated per one-mile segment.

Figure I.8
Crash Rates Above the Statewide Average per Direction 2008 - 2010 Crashes



I. PURPOSE AND NEED

high numbers of collisions were occurring. Intersections where a high number of crashes (greater than 10) occurred over the three year period from 2008 to 2010 are indicated on **Figure I.8**.

Higher crash rates predominately occurred in the congested areas of the corridor, including the City of Richmond area and the section from the City of Williamsburg east to Exit 264 (I-664). Changes in speed and stop and go traffic are often contributing factors to rear-end collisions. Exits 250 (Fort Eustis Boulevard) and 255 (Jefferson Avenue) had mainline collisions more than twice the statewide average and a high number of ramp/intersection collisions. Based on VDOT's Geographic Information Systems crash data, the majority of ramp collisions occurred at the merge/diverge area with I-64 mainline or with the merge/diverge of the adjacent street.

2. Future Conditions

The demand for travel between and within the City of Richmond and the Hampton Roads area is expected to continue to increase over the coming years. This increase in demand is projected to lead to an increased number of vehicles using the I-64 corridor, exacerbating the potential for delays and collisions already experienced under the current conditions. The following factors, many of which are interrelated, contribute to the future needs for improvements to the study corridor:

- Projected increases in traffic volumes.
- Continued aging of the mainline and structures along the corridor.
- Increased safety concerns resulting from increased traffic volumes.
- Access to, from and between military facilities and installations during peak hours of travel and times of emergency.
- Future Port of Virginia expansion increasing the demand for freight transportation.
- Local and regional plans for economic development.

As previously stated in the Base Conditions section, multiple conditions exist that create several needs for improvements within the I-64 corridor. These identified needs would continue into the future and are projected to worsen over time. They have been grouped into three categories including: capacity, roadway

deficiencies and safety. Further descriptions of each of these identified needs are presented as follows and expanded upon in the *Purpose and Need Technical Memorandum*.

a. Capacity - *The existing facility would be unable to accommodate the projected future (design year 2040) traffic volumes within the corridor at an acceptable LOS, particularly during peak travel times.*

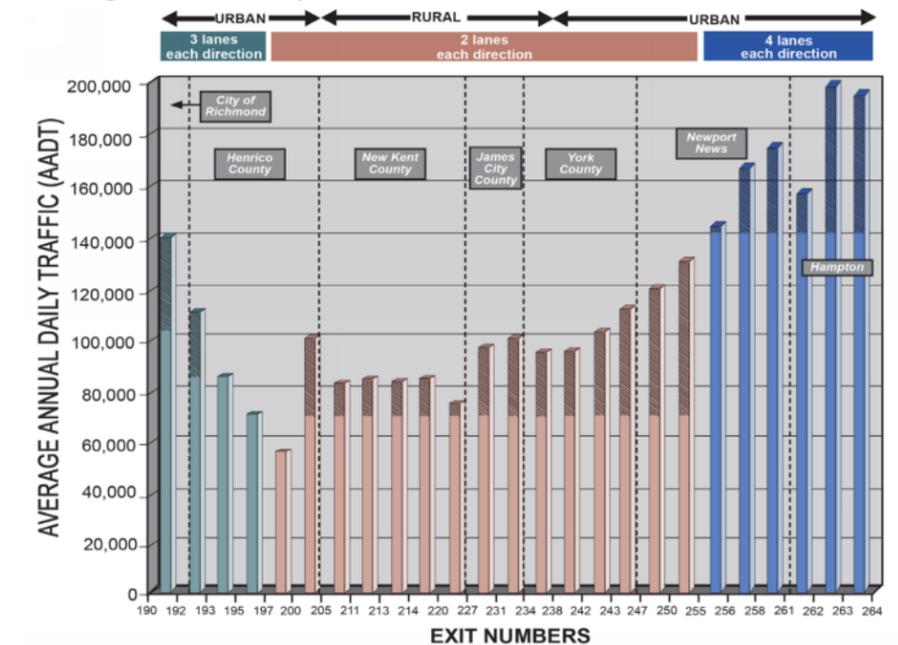
Future traffic volumes were projected to the design year 2040 using the Tidewater Super-Regional Travel Model, a VDOT travel demand model that incorporates the models and the future population and employment forecasts estimated by the Richmond Area and the Tri-Cities Metropolitan Planning Organizations (MPO), and the Hampton Roads TPO. The Tidewater Super-Regional Travel Model also encompasses the inter-regional areas (generally New Kent and James City Counties) between the City of Richmond and Hampton Roads metropolitan areas. The Tidewater Super-Regional Travel Model takes into account other regional projects that are included on the long-range transportation plans for the Richmond Area MPO and the Hampton Roads TPO. This includes the City of Richmond/Hampton Roads Passenger Rail project, which would enhance existing Amtrak passenger rail service on the Peninsula between the Cities of Richmond and Newport News as well as provide new passenger rail service on the Southside between the Cities of Richmond and Norfolk. The Southside rail service began on December 11, 2012.

As shown in **Figure I.9**, future traffic volumes on I-64 are projected to range from 55,300 AADT between Exits 197 (Airport Drive) and 200 (I-295) to 199,200 AADT between Exits 262 (Magruder Boulevard) and 263 (Mercury Boulevard). Traffic volumes are generally highest between Exits 190 (I-95) and 192 (Mechanicsville) in the City of Richmond and between Exits 255 (Jefferson Avenue) and 264 (I-664) in the Cities of Newport News and Hampton.

As previously stated, acceptable LOS values for this project are LOS C or better for interstate facilities. **Figure I.10** shows that there are a greater number of mainline segments, ramps, weaving areas, and intersections within the corridor that are projected to operate below those acceptable LOS thresholds during the weekday morning and evening peak hour periods, as compared to Base Conditions.

As previously noted, there are numerous future development and growth factors included in the Tidewater Super-Regional Travel

Figure I.9: Design Year 2040 No-Build Future Conditions Average Annual Daily Traffic*



■ Exceeds stable traffic flow AADT ranges.
 *Capacity calculations assume most traffic uses the general purpose lanes and not the HOV lanes for a section.

Model that would result in continued future growth within the I-64 corridor and within the region. This growth would result in increased traffic volumes that are anticipated to cause future capacity issues and increased congestion throughout the I-64 corridor.

Also as described in the Base Conditions section, there are a number of other key factors contributing to the capacity issues within the section of I-64 from the City of Richmond to the City of Hampton which are expected to be maintained and/or increased in the future, including: military personnel, civilian workforce and freight movements to, from and between military facilities; a wide variety of freight traffic in and out of the Port of Virginia; and economic development needs associated with new and expanding facilities along the I-64 corridor and in the region. Specifically, freight traffic is expected to increase within the region by 50% mainly as a result from the Port of Virginia expansions and improvements discussed in the intermodal study. Furthermore, future development of residential, commercial, and industrial facilities is expected to continue to increase in future

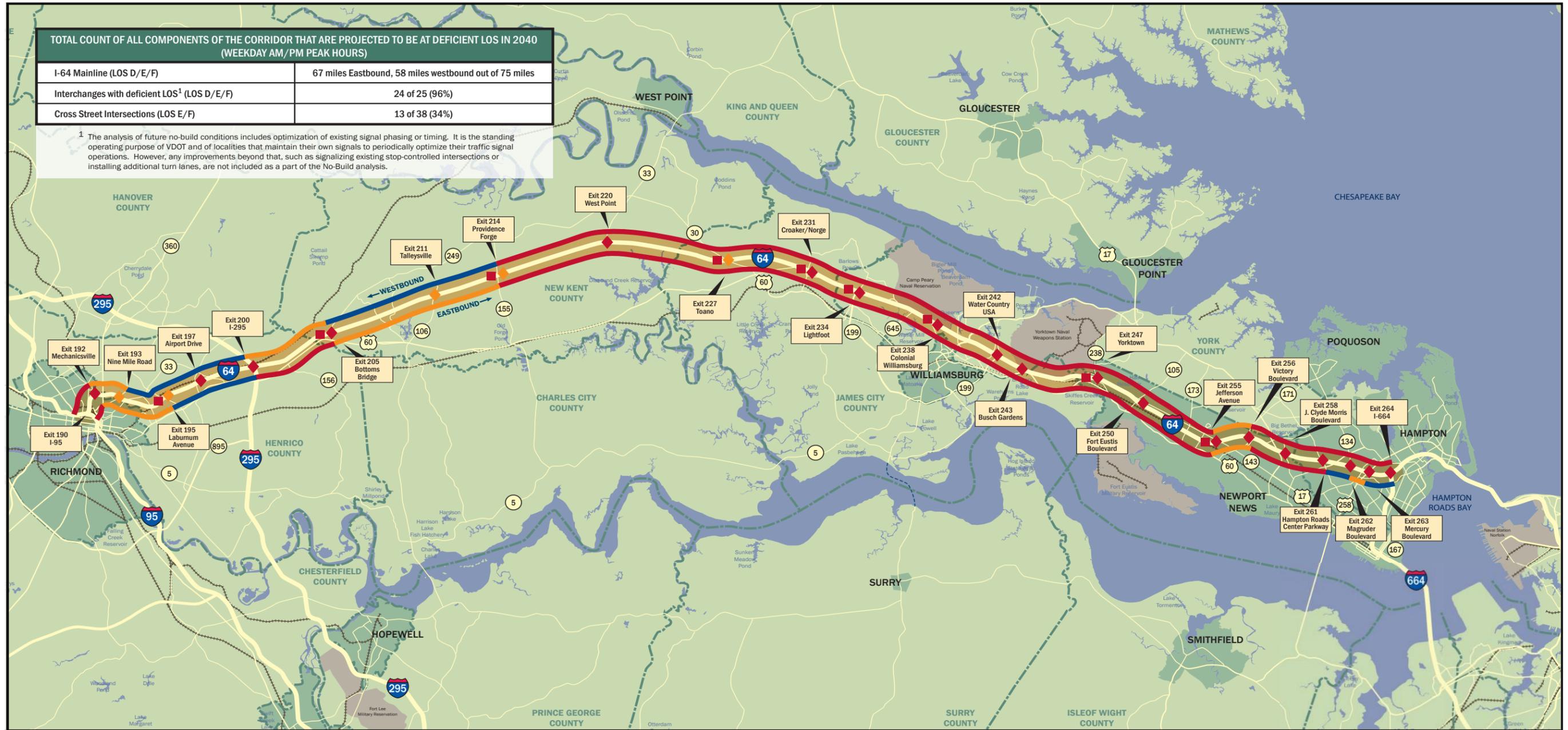


Figure I.10
I-64 Eastbound and Westbound Level of Service –
Mainline and Deficient Ramp/Weave/Intersection
2040 No-Build Condition

LEGEND

- █ = Freeway Level of Service A/B
- █ = Freeway Level of Service C
- █ = Freeway Level of Service D
- █ = Freeway Level of Service E/F
- ◆ = Ramp/Weave at Level of Service D
- ◆ = Ramp/Weave at Level of Service E/F
- = Cross Street Intersection at Level of Service D
- = Cross Street Intersection at Level of Service E/F

Note:
 Level of Service indicated represents worst case of AM, PM, Saturday and/or Sunday peak period analyses.



I. PURPOSE AND NEED

years according to the data in the Tidewater Super-Regional Travel Model. Overall, each of these components is anticipated to add to the existing capacity issues and would result in continued and additional unacceptable levels of service for the I-64 mainline and the interchanges.

b. Roadway Deficiencies - Future increase in traffic volumes and continued aging of the corridor would cause deterioration of the mainline infrastructure. Existing structures would continue to deteriorate in future years without major rehabilitation or replacement.

Increasing traffic volumes between 2011 and design year 2040 would continue to contribute to wear and tear of the mainline, interchanges and bridge structures along the I-64 study corridor. The 2011 bridge sufficiency ratings shown in **Table I.2** would continue to decline if no action is taken to repair and/or reconstruct these structures. As previously stated, and shown in **Figure I.7**, there are currently horizontal/vertical roadway and bridge clearance issues on I-64. If not corrected and combined with increased traffic volumes, these deficiencies would lead to exacerbated operational and safety concerns.

c. Safety - Increased traffic congestion along with aging roadway and structural deficiencies would result in increased safety considerations within the corridor.

In examining the crash data, it was determined that the areas with the highest rear-end crashes directly correlate with the areas experiencing the greatest traffic congestion. If no improvements are made, it is anticipated that the number of crashes within the I-64 corridor would increase over time as traffic volumes increase and the I-64 corridor experiences slowed or stopped traffic for an increased number of hours in the day.

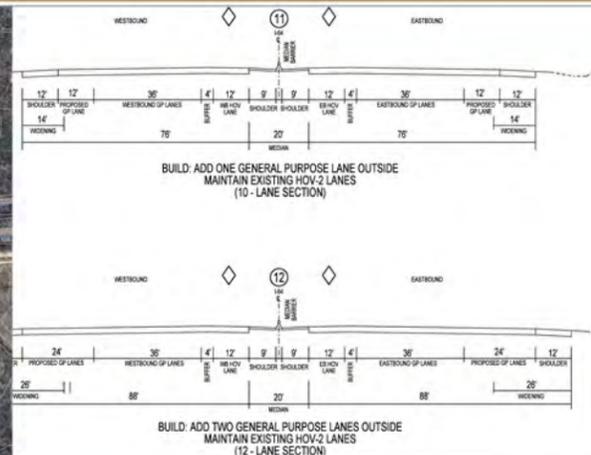
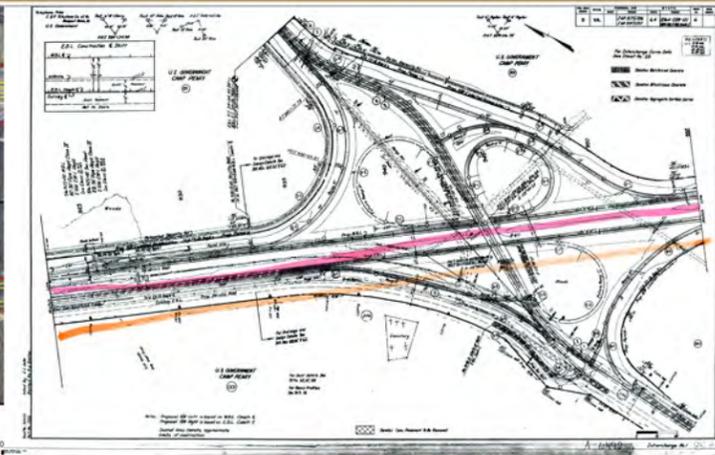
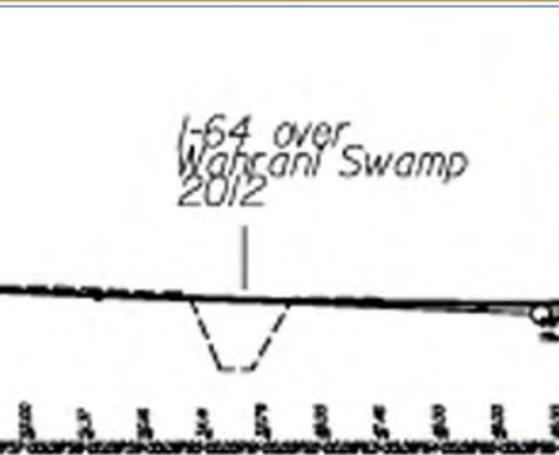
D. Purpose/Summary

The purpose of this study is to alleviate existing congestion, accommodate future capacity and improve roadway deficiencies and safety in the corridor between the Cities of Richmond and Hampton in Virginia. This purpose and need builds on previous analyses by compiling and developing the information necessary to best identify a full range of reasonable Alternatives to address the existing and future needs identified for the I-64 corridor.



INTERSTATE 64 PENINSULA STUDY

II. ALTERNATIVES CONSIDERED



II. ALTERNATIVES CONSIDERED

This chapter describes the Alternatives development process for the *Interstate 64 (I-64) Peninsula Study*. The Alternatives development process began with the identification of the purpose and need of the study and the establishment of design criteria, which were utilized in developing a reasonable range of Alternatives. These Alternatives were then evaluated to determine whether they would address the purpose and need established for this study. As a result of this analysis, Alternatives were either not carried forward for further study or retained for detailed study. Agency coordination and public involvement played key roles throughout the Alternatives development process.

A. Alternatives Development Process

Purpose and Need – Before any Alternatives were developed, the study purpose and need was clearly defined. This effort included analyzing both the base year (2011) and design year (2040) conditions along the I-64 corridor. The project Purpose and Need was described in summary in **Chapter I – Purpose and Need** of this **Final Environmental Impact Statement (EIS)** and in detail in the **Purpose and Need Technical Memorandum**. The current and future needs identified include increasing capacity, eliminating roadway deficiencies and improving safety along the 75 mile long section of I-64 from Interstate 95 (I-95) in the City of Richmond to Interstate 664 (I-664) in the City of Hampton.

Establishment of Design Criteria – Engineering design criteria for the Build Alternatives are based on the Virginia Department of Transportation’s (VDOT) standards and guidelines, as published in VDOT’s *Road Design Manual* (2005, revised January 2012) and meet the standard for the National Highway System (NHS). All Alternatives assume project termini of I-95 in the City of Richmond and I-664 in the City of Hampton. Detailed tables showing the mainline I-64 design criteria and the interchange and ramp design criteria are found in the **Alternatives Development Technical Memorandum**. Overall, the design criteria are based on the functional classification for each section of the roadway as shown in **Figure II.1**. A summary of the engineering design criteria is shown in **Table II.1**.

Alternatives Development – After defining the study purpose and need along with establishing the design criteria, a reasonable range of study Alternatives was developed. The goals in developing Alternatives were to develop solutions that would meet the needs and criteria while avoiding and minimizing impacts to the

human and natural environments. The Alternatives developed or investigated included a No-Build Alternative, a Transportation Systems Management (TSM)/Travel Demand Management (TDM) Alternative, an investigation of future passenger/freight rail and a range of highway Build Alternatives which focused on:

- The **number of lanes** required to achieve a level of service (LOS) C or better in the design year 2040. LOS is a letter grade rating the traffic operations of a freeway, ramp, weaving section, or intersection, as described further in the **Traffic and Transportation Technical Memorandum**. LOS C has been identified as the required minimum LOS for the I-64 mainline for this study.
- The **type of lanes** including general purpose travel lanes, tolled lanes and/or managed lanes, such as High Occupancy Toll (HOT) lanes, High Occupancy Vehicle (HOV) lanes, Express Toll Lanes (ETL) and Express Bus Lanes (EBL).
- The **locations of lanes**, specifically widening to the inside within the median, widening to the outside of the existing lanes and combinations of the two, making an effort to stay within the existing right of way to the greatest extent practicable.
- Preserving and improving pedestrian/bicyclist accommodations for roads crossing over or under I-64.
- Preserving and expanding location and size of park and rides and rest areas within the corridor.
- Promoting rail and barge freight service as an Alternative to truck freight.

B. Alternatives Considered and Not Carried Forward for Further Study

The Alternatives considered and not carried forward for further study include the following:

TSM/TDM – TSM/TDM would involve only minor work to the existing I-64 corridor. TSM strategies improve traffic flow, improve signalization, convert existing general purpose lanes to managed lanes, improve intersections and implement traveler information programs. TDM encourages new driving habits through staggered commuting hours, telecommuting, car and vanpooling, ridesharing and the creation of park and ride facilities. Possible TSM/TDM opportunities for the I-64 corridor include:

- Optimizing traffic signal timing, and pursuing strategies to better coordinate traffic signals such as adaptive signal control.

- Encouraging commuters to carpool/vanpool to work by expanding park and ride lots, using educational campaigns to promote carpooling and working with major regional employers (e.g. the Navy in the Hampton Roads area and state government in the City of Richmond area) to promote staggered work hours and/or telecommuting.
- Making minor geometric improvements to improve safety and capacity, such as correcting existing geometric deficiencies and providing weaving lanes between closely-spaced interchanges where none currently exist.
- Encouraging transit as an alternative to driving, by enhancing existing transit options within the corridor, particular in the urban areas at either end of the corridor.
- Preserving and improving pedestrian/bicyclist accommodations for roads crossing over or under I-64.

While some TSM/TDM strategies have the potential to result in slight reductions in peak hour traffic volumes or slight shifts in traffic away from peak hours and towards off-peak hours, they could not reasonably be expected to impact mainline traffic volumes on I-64 to the extent needed to preclude the need for mainline capacity improvements. It should also be noted that the improvements described in utilizing TSM/TDM strategies (telecommuting, vanpooling, etc.) are generally geared towards typical weekday commuters. However, a major component of the need for capacity improvements to I-64 is the summer weekend traffic. Based on summer travel patterns this type of traffic is less likely to change their travel patterns due to TSM/TDM improvements. In addition, the TSM/TDM strategies have limited opportunity to reduce single-occupancy driving since there are already park and ride lots with ample capacity located throughout the corridor. In addition, the existing pavement width that provides for the general purpose lanes could not be restriped or reconfigured to provide for HOV/HOT operations without adversely impacting capacity or safety. Lastly, it should be noted that TSM/TDM strategies typically work best when applied to commuters within highly congested urban areas; however, as shown in **Figure II.1**, approximately half of the 75 mile long I-64 corridor is classified as rural and primarily serves intercity (as opposed to intracity) travelers.



Figure II.1
Functional Classification



II. ALTERNATIVES CONSIDERED

Table II.1: Engineering Design Criteria

Functional Classification	Interstate
Access	<ul style="list-style-type: none"> Limited access on mainline and interchanges.
Design Speed	<ul style="list-style-type: none"> 75 mph for rural interstate and 70 mph for urban interstate.
Travel Lanes	<ul style="list-style-type: none"> Widths are to be 12 feet wide. Two 12 feet wide travel lanes in each direction shall be maintained on the mainline at all times with a minimum of 1 foot offset to the barrier service (concrete barrier temporarily put in place to separate traffic from construction work zones) during construction unless otherwise approved by VDOT. At least one travel lane in each direction shall be maintained on the crossroads at all times. The width of the travel lane is to be approved by VDOT.
Shoulders	<ul style="list-style-type: none"> 12 feet full depth paved shoulders are to be provided on each side of the roadway; graded at a 5% cross slope. Outside shoulder widths, cut and fill, shall be 17 feet. The graded portion (5 feet) beyond the edge of the paved shoulder shall be 5/8":1' governed by the GS-11 Standard. Median shoulder widths, cut and fill, shall be 17 feet. The graded portion (5 feet) beyond the edge of the paved shoulder shall be 5/8":1' governed by the GS-11 Standard.
Side Slopes	<ul style="list-style-type: none"> Side slopes shall be in accordance with CS-4E Standards.
Median	<ul style="list-style-type: none"> Any median 60 feet or less in width is to have concrete median barrier (tall wall) as conditions dictate. Concrete median barrier (tall wall) is to be considered for median widths ranging from 60 – 68 feet.
Interchanges	<ul style="list-style-type: none"> The interchanges are to remain functional during mainline construction activities unless otherwise determined by VDOT. The interchanges would have a minimum of 1200 feet acceleration lanes for on ramps and 800 feet deceleration lanes for off-ramps. Lengths of acceleration lanes and deceleration lanes are to be in accordance with the latest standards except for minimum lengths as noted. Longer than standard lengths may be needed in special situations.
Bridges	<ul style="list-style-type: none"> Mainline bridges would be designed with 14 feet shoulders on both sides of the roadway. The bridge clearances over mainline I-64 are to be 16.5 feet for the total paved cross section, including paved shoulders. Roadways under mainline I-64 shall have 14 feet vertical clearance. Mainline bridges shall be designed so they can be widened economically in the future.

In evaluating the 25 interchange areas, TSM/TDM strategies could provide some improvements to existing geometric deficiencies such as capacity at the ramps, weaves and intersections and thus address some of the safety issues that arise from those deficiencies. However, TSM/TDM would not include any major work needed for interchange configurations such as reconstructing ramps and structures and therefore these elements that contribute to the safety issues would continue.

The TSM/TDM strategies would not provide any substantial improvement to the capacity nor remove enough vehicle trips required to obtain an acceptable LOS needed to meet either the existing or design year 2040 capacity needs for traffic on I-64. Therefore, the TSM/TDM strategies alone would not meet the purpose and need of the study and were not carried forward for further study as an individual, stand alone Alternative. However, TSM/TDM improvements can be pursued independently or as part

of one of the Build Alternatives to provide for additional low-cost options for improving the transportation conditions within the I-64 study area.

Passenger/Freight Rail – In Virginia, railroads are owned and operated by private entities focused on the transport of freight. The railroad corporations allow passenger rail service to operate on their infrastructure through agreements with various organizations, including the Virginia Department of Rail and Public Transportation (VDRPT), Amtrak and the Virginia Railway Express (VRE). As part of the intermodal study conducted for this study, both existing and planned passenger and freight railroad services were examined. These efforts included a review of recently completed studies along with those currently underway in the City of Hampton to the City of Richmond corridor by both public and private organizations. Further information from the intermodal study is included in the *Traffic and Transportation Technical Memorandum*.

Within the study area, there are two principal rail transportation facilities: (1) the existing CSX Transportation (CSXT)/Amtrak route from the City of Richmond to the City of Newport News, north of the James River on the Virginia Peninsula (Peninsula/CSXT) and (2) the Norfolk Southern Corporation (NS) rail route, south of the James River between the Cities of Petersburg and Norfolk (Southside/NS). The Peninsula/CSXT Route is parallel to I-64 while the Southside/NS route is parallel to U.S. 460. Improvements are currently planned and underway for both corridors.

The VDRPT has been investigating improved passenger rail service between the City of Richmond and the Hampton Roads area for a number of years. This service would ultimately connect to the Southeast, Northeast and Mid-Atlantic regions as an extension of the Southeast High Speed Rail Corridor. The VDRPT prepared the *Richmond/Hampton Roads Passenger Rail Tier I Final Environmental Impact Statement (EIS)* which evaluated

II. ALTERNATIVES CONSIDERED

multiple options for passenger rail from the City of Richmond to the Hampton Roads region, including the *I-64 Peninsula Study* area. The *Tier I Final EIS*, approved in August 2012, identifies Build Alternative 1 (Higher-Speed Southside/Conventional Speed Peninsula at maximum authorized speeds of up to 90 mph) as the Preferred Alternative. The *Record of Decision* was approved by the Federal Railroad Administration on December 7, 2012.

As stated in the *Tier I Final EIS*, high-speed intercity passenger rail service attracts different types of ridership and therefore it is unlikely that the additional rail trips generated by the Preferred Alternative would cause a measurable reduction in automobile traffic on major highways such as I-64 and I-95. In specifically examining the potential effects on traffic on I-64, the *Tier I Final EIS* states that a reduction of vehicles caused by diversion to rail would amount to only approximately 0.7% to 2.3% reduction in traffic on I-64 when using 2025 traffic volumes. This fraction is small enough that the resultant decrease in traffic would not be measurable, given the normal daily and seasonal fluctuations in traffic volume. If a travel time savings did occur on the I-64 or I-95 routes, the savings likely would be immediately offset by the induced demand of additional vehicles that would divert to the affected routes.

The U.S. 460 corridor between the City of Norfolk and the City of Petersburg is part of the NS's Heartland Corridor, the primary rail route serving the Port of Hampton Roads. The Heartland Corridor began handling double-stacked container trains in August 2010, providing a more direct route between the City of Norfolk and the Midwest.

The VDRPT has issued an \$87 million Rail Enhancement Fund grant designed to restart rail passenger service in the corridor between the Cities of Norfolk and Richmond and the Northeast by upgrading the NS tracks so that they are suitable for use by passenger trains. Projects include upgraded signaling, track extensions and connections, passenger train turning and servicing facilities and a track and platform near the City of Norfolk's Harbor Park for the passenger trains. Also included is construction of a new connection between the NS and the CSXT tracks near the City of Petersburg. These improvements would enable passenger trains to run on the NS's busy Heartland Corridor route. Slated to begin service in December 2012, the trains would be part of Amtrak Virginia's regional service and would operate at speeds up to 79 mph between the Cities of Norfolk and Petersburg. The service would begin with one departure in each direction per day with additional departures introduced as funding allows.

The CSXT and the NS transport large amounts of freight shipments on their railroads within Virginia. The published report, *Freight Rail Investing In Virginia* (CSXT and NS, 2005), provides details on freight transportation by the two entities within the Hampton Roads area and the City of Norfolk. One of this regions main cargo shipments is export coal. According to Federal Highway Administration's (FHWA) *Freight Analysis Framework 3rd Version*, 2011, in 2007, 99.9% of export coal was shipped to the region by rail. The CSXT and the NS do not anticipate the proportion of shipment methods to change by design year 2040.

The CSXT and the NS projections estimate that the total tonnage of export coal would increase from 36.9 million tons to 62.7 million tons. With this projection, the CSXT's freight trains on the Peninsula/CSXT route would increase by 70% between 2007 and design year 2040, from 12-15 trains per day to 21-26 trains per day to account for the increased tonnage. Even though tonnage is increasing by approximately 50% and the number of trains are increasing approximately 70%, each train set varies in length and tonnage carried. With these increases, the CSXT recognizes that it needs to improve their freight service along the Peninsula/CSXT Line and is evaluating projects to add passing siding and/or a second track throughout the corridor. The current railroad right of way could accommodate an additional track, however there is currently no funded capital improvement program for this action. Since most of the CSXT Peninsula trains currently carry export coal, and export coal would not likely be carried by trucks in the future, the freight rail improvements on the Peninsula/CSXT Route would have little impact on the I-64 truck traffic.

Overall, the passenger and freight rail improvements that have been identified are not expected to remove enough general purpose vehicle trips from I-64 to obtain the acceptable LOS needed to meet either the existing or design year 2040 capacity needs for traffic on I-64. New or improved rail lines and/or facilities within the I-64 corridor would not address the roadway deficiencies and safety needs identified for the study. Therefore, rail improvements would not meet the purpose and need of the study and were not carried forward for further study.

Highway Build Alternatives Considered and Not Carried Forward – Throughout the development of the Build Alternatives, an emphasis was placed on designing Alternatives which would meet the study purpose and need along with the established design criteria. Specific to meeting the study needs for capacity, the design year 2040 traffic volumes were projected and analyzed. As

described in **Chapter I - Purpose and Need** and in the *Traffic and Transportation Technical Memorandum*, a LOS criteria of C or better was established for the I-64 mainline and for the merges/diverges/weaves. **Figures I.4 and I.10** in the **Chapter 1 - Purpose and Need** show the 2011 Base Conditions LOS and projected design year 2040 No-Build LOS for the corridor which was used to determine the number of lanes needed to address the capacity needs. The Build Alternatives developed were then specifically designed to include the number of lanes needed to achieve or exceed these LOS goals. The Alternatives that did not meet the LOS needs were not carried forward for further study. The Build Alternatives that were determined to meet these criteria were retained for detailed study and are described as follows.

C. Alternatives Analyzed in the Draft EIS

The Alternatives retained for detailed analysis in the **Draft EIS** include a No-Build Alternative and five separate highway Build Alternatives including:

- Alternative 1A – adding general purpose lanes to the outside of the existing general purpose lanes.
- Alternative 1B – adding general purpose lanes in the median.
- Alternative 2A – adding lanes to the outside and tolling all lanes.
- Alternative 2B – adding lanes to the median and tolling all lanes.
- Alternative 3 – adding managed lanes to the median.

These five Build Alternatives were specifically designed to meet the identified purpose and need of the study and thus were retained for analysis in the **Draft EIS**.

No-Build Alternative – The No-Build Alternative serves as a baseline for the comparison of future conditions and impacts. As shown in **Figure II.2**, within the 75 mile corridor there are three areas along I-64 with different lane configurations for the mainline. Typical sections showing the existing lane configurations within each of the three areas are shown in this figure.

This Alternative also assumes that the projects currently programmed and funded in VDOT's Fiscal Year 2013-2018 Six-Year Improvement Program (SYIP) would be implemented. These projects are shown in **Table II.2**.

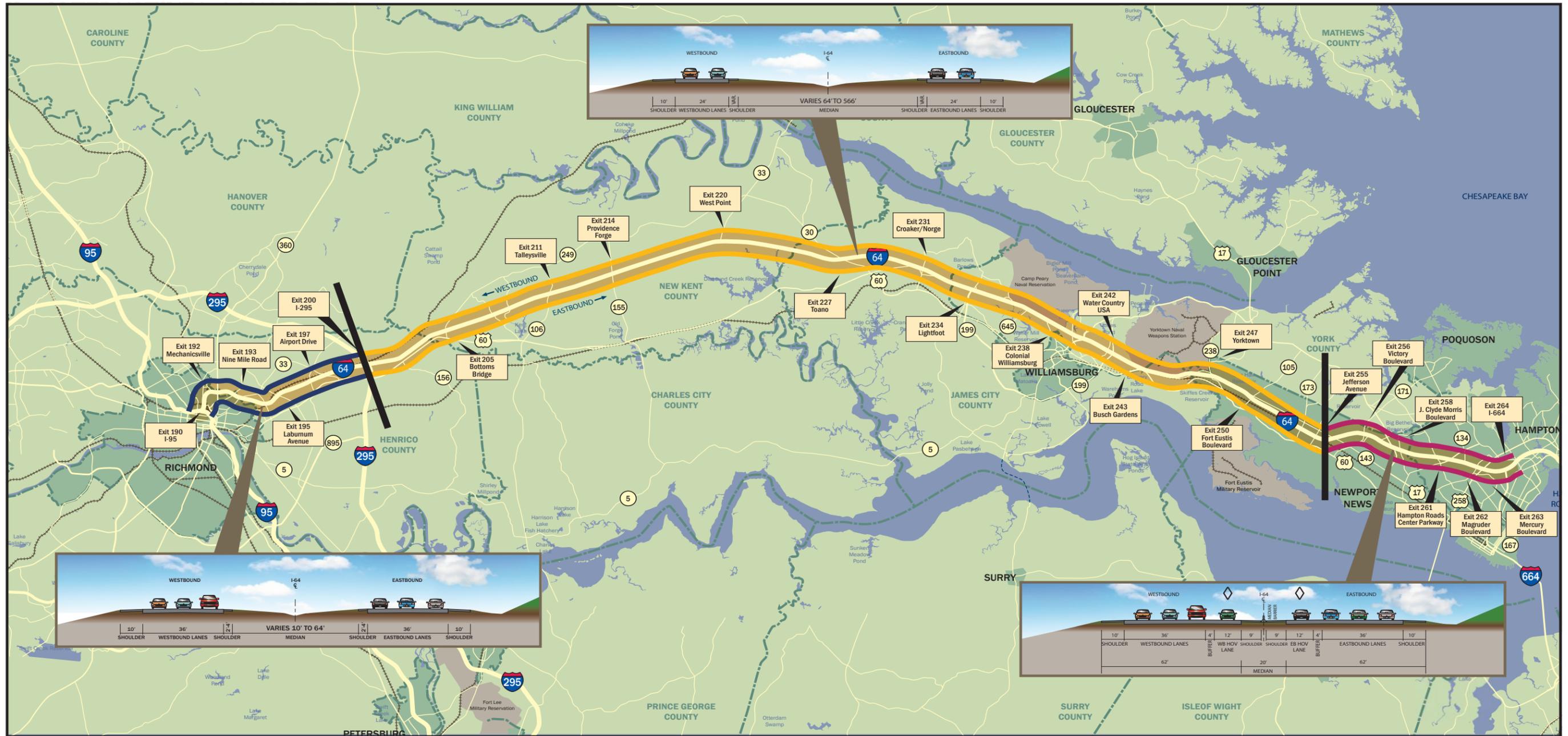
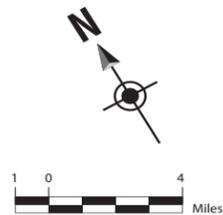


Figure II.2
Existing Number of Lanes/No-Build Alternative



LEGEND

- = Existing Two-Lanes
- = Existing Three-Lanes
- = Existing Three-Lanes with one HOV Lane



II. ALTERNATIVES CONSIDERED

Table II.2: I-64 Projects on the Virginia Department of Transportation’s Fiscal Year 2013-2018 Six-Year Improvement Program

Locality	UPC	Description
City of Richmond	N/A	No projects listed.
Henrico County	97565	Rehabilitate or replace I-64 eastbound bridge over Route 156.
Henrico County	97566	Rehabilitate or replace I-64 westbound bridge over Route 156.
New Kent County	11800	Pavement rehabilitation and widening from the Henrico line to the James City County line.
James City County	N/A	No projects listed.
York County	98098	Install variable-message signs, and lengthen ramp/weave area on I-64 westbound near milepost 242.
City of Newport News	93077	Replace Denbigh Boulevard bridge over I-64 and CSX Railroad.
City of Hampton	12834	Hampton Roads Third Crossing (preliminary engineering funding only).
VDOT Hampton Roads District	71598	I-64 lighting and electrical upgrades.

Note: These projects are listed in the SYIP.

In addition to the programmed VDOT projects, the Tidewater Super-Regional Travel Model developed by VDOT and used for this study includes other projects within the corridor that are part of the *Richmond Area Metropolitan Planning Organization (MPO) 2035 Long-Range Transportation Plan (LRTP)*, and the *Hampton Roads Transportation Planning Organization’s (TPO) 2034 LRTP*, as well as the *2035 Rural LRTPs* (which are not fiscally-constrained) for the Richmond Regional Planning District Commission and the Hampton Roads TPO. These projects form a part of the Base Conditions and the effects of these projects on I-64 traffic are accounted for in the design year 2040 No-Build analyses. Some of the projects mentioned in these LRTPs include the following:

- The U.S. 460 Corridor Improvements Project, a proposed toll road paralleling existing U.S. 460 between the Cities of Petersburg and Chesapeake.
- The proposed City of Richmond-Hampton Roads area passenger rail improvements, including the new rail service from the City of Richmond through the City of Petersburg to the City of Norfolk.
- The Fort Eustis Boulevard bridge replacement at the Lee Hall Reservoir.
- The I-64 Interchange at LaSalle Avenue (east of the study area).
- The VA 150 Fort Eustis Boulevard widening from a 2-lane undivided to a 4-lane divided arterial from east of Jefferson Avenue to west of George Washington Memorial Highway.

- The I-64 Peninsula widening, from Exit 255 (Jefferson Avenue) to Exit 250 (Fort Eustis Boulevard). This project is not included in the traffic analysis, see the *Traffic and Transportation Technical Memorandum* for details.
- The Atkinson Boulevard extension project including a new 4-lane divided arterial with a new bridge over I-64 in the area between Exit 250 (Fort Eustis Boulevard) and Exit 255 (Jefferson Avenue).
- The Denbigh Boulevard Bridge Replacement, which includes building a replacement 4-lane undivided arterial bridge over I-64 and the CSX Railroad.

The details of the input parameters used to analyze the No-Build Alternative are shown in the *Traffic and Transportation Technical Memorandum*.

Alternatives 1A/1B General Purpose Lanes – These Alternatives involve adding additional general purpose travel lanes to the I-64 mainline. The result is that Alternatives 1A/1B are projected to result in a LOS C or better for the sections of mainline I-64, thus meeting the criteria established in **Chapter I – Purpose and Need**. This is true even after using the travel demand model to estimate the increase in traffic on I-64 due to the improvements in I-64 capacity. The modeling of Alternatives 1A/1B and the capacity analysis calculations for these Alternatives are further described in the *Traffic and Transportation Technical Memorandum*. The number of lanes that are proposed to be added to I-64 mainline along with typical sections showing the lane configurations are

shown in **Figure II.3** for Alternatives 1A and 2A and in **Figure II.4** for Alternatives 1B and 2B.

Although there are numerous possible combinations for adding these lanes, Alternative 1A involves widening exclusively to the outside of the existing general purpose lanes, while Alternative 1B involves widening into the median. Both Alternatives are designed to keep the proposed improvements within the existing right of way to the greatest extent practicable. **Figure II.6** shows a representation of the possible disturbance footprints for Alternatives 1A and 1B. Not all sections of the corridor have sufficient median area to accommodate the needed additional lanes so in these areas the additional lanes are proposed to the outside of the existing general purpose lanes, with an effort to keep the proposed improvements within the existing right of way to the greatest extent practicable. These areas include the sections of the I-64 corridor from Exit 190 (I-95) to Exit 192 (Mechanicsville) in the City of Richmond/Henrico County and from Exit 255 (Jefferson Avenue) to Exit 264 (I-664) in the Cities of Newport News/Hampton area. These sections currently have a narrow median with concrete median barrier, meaning that Alternative 1B is identical to Alternative 1A in these sections.

The proposed typical sections show 12 foot wide travel lanes along with 12 foot wide shoulders on both the outside and median side for Alternatives 1A/1B respectively. Based on the conceptual engineering performed for Alternatives 1A/1B less than 10% or 13 miles of the 150 mile I-64 corridor (75 miles in each direction) may require additional right of way for the mainline widening improvements. The areas which may require additional right of way are located in the most urban areas of the corridor located at the western end in the City of Richmond and at the eastern end in the Cities of Newport News and Hampton. The areas which may require additional right of way include both eastbound and westbound between Exits 190 (I-95) and Exit 192 (Mechanicsville), eastbound from mile post 257 to mile post 259.5 and westbound from Exits 264 (I- 664) to Exit 258 (J. Clyde Morris Boulevard).

For the 25 existing interchanges within the study corridor, geometric deficiencies were examined along with design year 2040 traffic volumes and resulting LOS at each interchange location.

Conceptual designs were investigated that would accommodate the future traffic and assumptions were made and applied to each interchange to establish a study footprint that would allow for

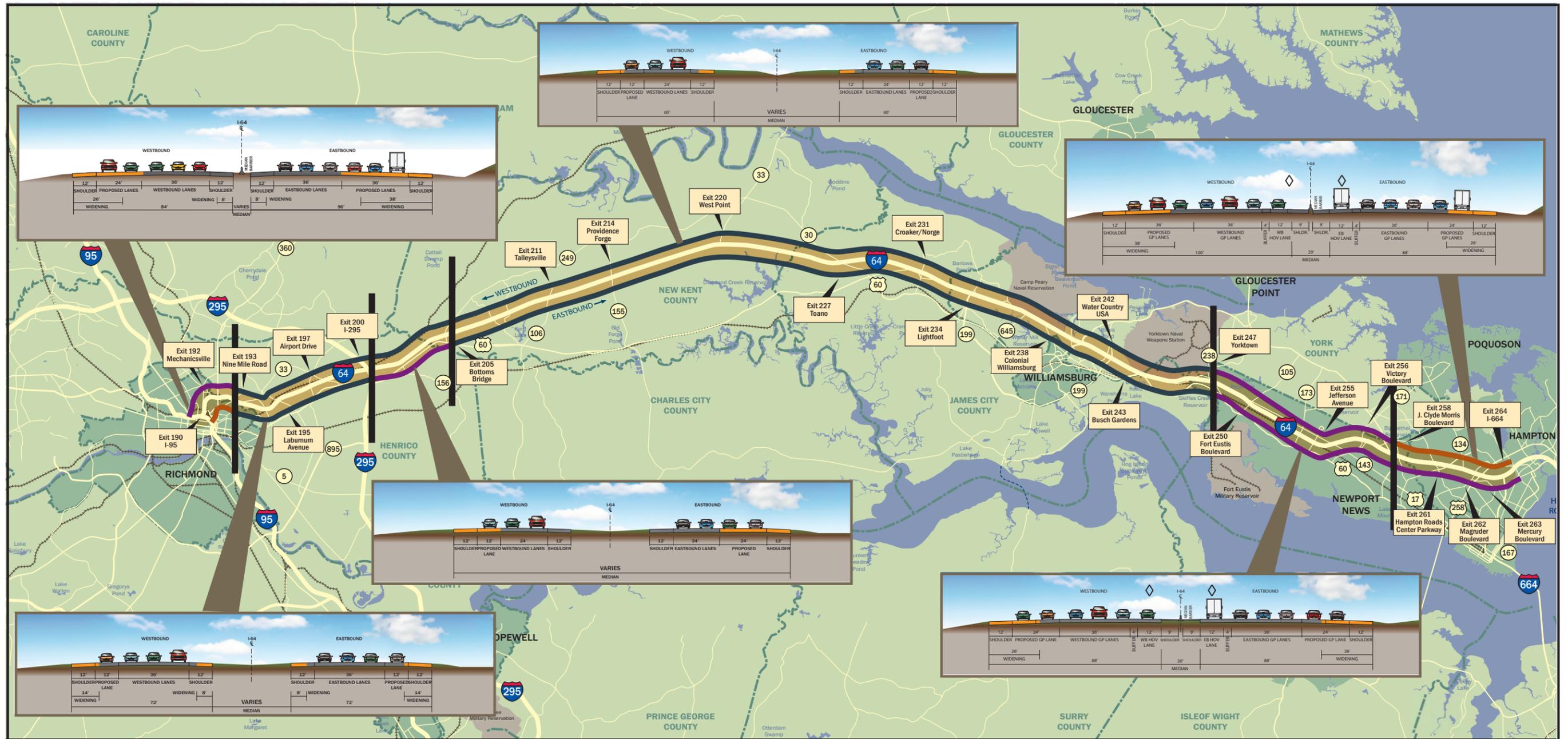
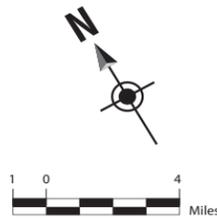


Figure II.3
Proposed Number of Additional Lanes for Build Alternatives 1A and 2A.



- LEGEND**
- = One Additional Lane
 - = Two Additional Lanes
 - = Three Additional Lanes



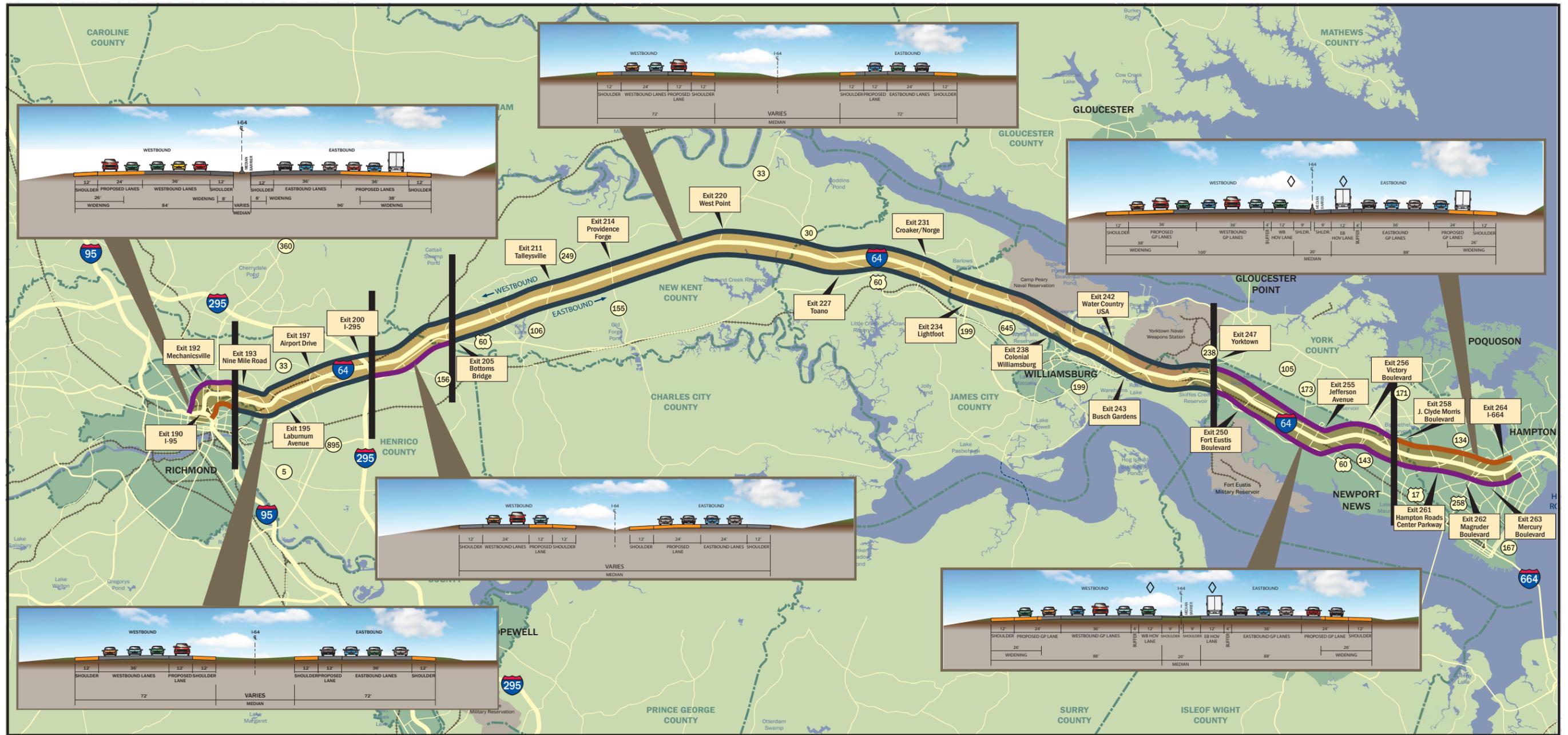
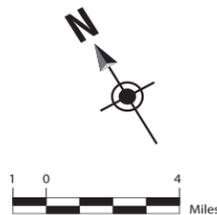


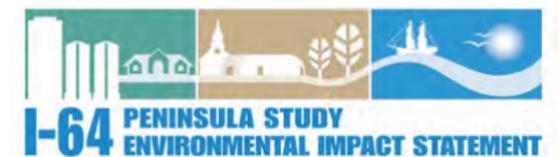
Figure II.4
Proposed Number of Additional Lanes for Build Alternatives 1B and 2B



LEGEND

- = One Additional Lane
- = Two Additional Lanes
- = Three Additional Lanes

* Not all sections of the I-64 corridor have sufficient median area to accommodate the addition of any lanes. In these areas, the facility is proposed to be widened to the outside in order to accommodate the managed lanes in between the eastbound and westbound general purpose travel lanes.



II. ALTERNATIVES CONSIDERED

flexibility during final design. Note that the study footprints shown are starting points for design and are not approved design concepts. While the final designs are expected to lie within these footprints, the footprints do not serve as limits to what can be examined during the design phase. In order to be moved forward, any design concept would need to be shown to provide safe traffic operation commensurate with the design speed in the design year 2040.

Table II.3 provides a summary of the improvements proposed for each of the interchanges while **Figures II.7A** and **II.7B** show the proposed study area footprints for each of the 25 interchanges.

At 15 of the 25 interchanges, the footprint increases considerably from the current footprint in order to provide for ramps that meet the horizontal and vertical curvature design standards established for this project, as well as providing adequate weave areas and acceleration/deceleration lane lengths. For the 10 interchanges that do not show any additional study area improvements outside of the existing right of way, there are improvements that would be needed to these interchange areas however it is anticipated that these improvements could be done within the existing right of way.

The designs for Exit 190 (I-95) interchange utilize the conceptual designs being prepared as part of VDOT's *I-95/I-64 Overlap*

Planning Study. The conceptual design for the Exit 264 (I-664) interchange has been coordinated with and uses the same conceptual design as the *Hampton Roads Bridge-Tunnel EIS* that begins at this same interchange location. Further engineering and traffic analyses would be performed at each interchange as the project progresses. During the interchange modification report process that would follow completion and approval of this **Final EIS**, each of these interchange configurations would serve as a starting point to be further studied and refined in a more in-depth examination of the needs at each location.

Table II.3: Interchange Improvement Summary

Exit	Interchange	Locality	Improvement Description	Additional Right of Way Required
190	I-95 (Shockoe Valley)	City of Richmond	Revise westbound to southbound ramp.	Yes
192	US 360 (Mechanicsville Turnpike)	City of Richmond/Henrico County Line	Full reconfiguration of the ramps in the quadrants.	Yes
193	VA 33 (Nine Mile Road)	Henrico County	Full reconfiguration of the ramps in the quadrants.	Yes
195	Laburnum Avenue	Henrico County	Reconfiguration of ramps in northeast quadrant.	Yes
197	VA 156 (Airport Drive)	Henrico County	Full reconfiguration of the ramps in the quadrants.	Yes
200	I-295	Henrico County	None.	No
205	VA 249 (Bottoms Bridge)	New Kent County	Reconfiguration of ramps in northeast and southeast quadrants.	Yes
211	VA 106 (Talleysville)	New Kent County	None.	No
214	VA 155 (Providence Forge)	New Kent County	None.	No
220	VA 33 (West Point)	New Kent County	None.	No
227	VA 30 (Toano)	James City County	Reconfiguration of ramps in southwest quadrant.	Yes
231	Route 607 (Croaker)	James City County	Full reconfiguration of the ramps in the quadrants.	Yes
234	VA 199 (Lightfoot)	York County	Reconfiguration of ramps in northwest, southwest and northeast quadrants.	Yes
238	VA 143 (Colonial Williamsburg)	York County	Reconfiguration of ramps in northwest, southwest and northeast quadrants.	Yes
242	VA 199 (Water Country USA)	York County	Full reconfiguration of the ramps in the quadrants.	Yes
243	Busch Gardens	York County/James City County	Construction of Collector-Distributor roads to join with Exit 242 based on proximity.	Yes
247	VA 238 (Yorktown)	City of Newport News	None.	No
250	VA 105 (Ft Eustis Blvd)	City of Newport News	Full reconfiguration of the ramps in the quadrants.	Yes
255	VA 143 (Jefferson Ave)	City of Newport News	Full reconfiguration of the ramps in the quadrants.	Yes
256	VA 171 (Victory Blvd)	City of Newport News	Full reconfiguration of the ramps in the quadrants.	Yes
258	US 17 (J Clyde Morris Blvd)	City of Newport News	Full reconfiguration of the ramps in the quadrants.	Yes
261	Hampton Roads Center Pkwy	City of Hampton	Reconfiguration of ramps in northwest, northeast quadrants.	Yes
262	VA 134 (Magruder Blvd)	City of Hampton	None.	No
263	US 258 (Mercury Blvd)	City of Hampton	None.	No
264	I-664	City of Hampton	Full reconstruction of flyover ramps, connect direction slip ramps.	Yes

II. ALTERNATIVES CONSIDERED

The planning level estimated cost for Alternative 1A ranges from \$4.7 to \$7.3 billion. The planning level estimated cost for Alternative 1B ranges from \$4.7 to \$7.2 billion. Details of the cost estimates are included in **Table 5** of the *Alternatives Development Technical Memorandum*. This cost estimate, along with the estimates made for the other Alternatives analyzed in the **Draft EIS**, is preliminary and is used to inform the public and other stakeholders reviewing the **Draft** and **Final EIS**.

Alternatives 2A/2B Full Toll Lanes – These Alternatives evaluate the impacts of tolling the entire facility. Because tolling could be a future option, these Alternatives were considered in the range of possible Alternatives evaluated. For the purposes of this study, it was assumed that if the facility is tolled, the tolling would be for all vehicles traveling in both directions and for the entire length of the corridor from I-95 in Richmond to I-664 in Hampton. It was also assumed that there would be toll collection stations, using overhead gantries and all-electronic tolling (i.e. all tolls would be collected at highway speeds), for every interchange-to-interchange segment of I-64. **Figure II.8** provides a typical section showing an overhead gantry. However, if Alternative 2A or 2B is selected, subsequent design and financial studies would refine the specifics for tolling operations.

In order to determine the number of lanes needed for Alternatives 2A/2B, the traffic studies included a toll diversion analysis. This toll diversion analysis is included in the *Traffic and Transportation Technical Memorandum*. As a result of this analysis, the tolling of I-64 is expected to have either a neutral impact or result in a decrease in traffic volumes on the I-64 mainline due to people choosing to avoid a tolled I-64 and using other parallel routes instead. The main parallel route which is projected to see the largest increase in traffic volumes is US Route 60, which parallels I-64 for most of the corridor. This road is projected to see traffic volumes increasing anywhere from 0-33%, depending on the section of US Route 60 and whether a lower or higher toll rate is used, with the largest increases projected to occur on the section of US Route 60 between Route 155 and Route 30 in eastern New Kent/western James City Counties. Note that this tolling analysis also included the proposed US 460 tolled freeway between Petersburg and Suffolk, as that project is already included on the Tri-Cities MPO and Hampton Roads MPO Constrained Long-Range Plans.

The tolls diversion analysis showed that tolling I-64 would not increase traffic volumes at any location along the I-64 mainline.

This analysis indicated possible reductions to traffic on the I-64 corridor, however these reductions are not projected to change the number of lanes needed to achieve a LOS C or better in the design year 2040 from those indicated for the General Purpose Lanes Alternatives (Alternatives 1A and 1B). Therefore, the proposed disturbance limits for Alternatives 2A/2B would be the same as Alternatives 1A/1B, respectively.

The number of lanes that are proposed to be added to the I-64 mainline along with typical sections showing the lane configurations are shown in **Figure II.3** for Alternative 2A and in **Figure II.4** for Alternative 2B. **Figure II.6** shows a representation of the possible disturbance footprint for Alternatives 2A and 2B.

Although there are numerous possible combinations for adding these lanes, the analysis focused on adding all that is needed within the existing right of way to the greatest extent practicable, to either the outside of the existing general purpose lanes or to the inside of the existing lanes within the median. These areas include the sections of the I-64 corridor from Exits 190 to 192 in Richmond/Henrico County and from Exits 255 to 264 in Newport News/Hampton. These sections currently have a narrow median with concrete median barrier, meaning that Alternative 2B is identical to Alternative 2A in these sections.

The proposed typical sections show 12-foot wide travel lanes along with 12-foot wide shoulders on both the outside and median side for Alternatives 2A/2B respectively. Based on the conceptual engineering performed for Alternatives 2A/2B less than 10% or 13 miles of the 150 mile I-64 corridor (75 miles in each direction) may require additional right of way for the mainline widening improvements. The areas which may require additional right of way are located in the most urban areas of the corridor located at the western end in the City of Richmond and at the eastern end in the Cities of Newport News and Hampton. The areas which may require additional right of way include both eastbound and westbound between Exits 190 (I-95) and Exit 192 (Mechanicsville Turnpike), eastbound from mile post 257 to mile post 259.5 and westbound from Exits 264 (I-664) to Exit 258 (J. Clyde Morris Boulevard).

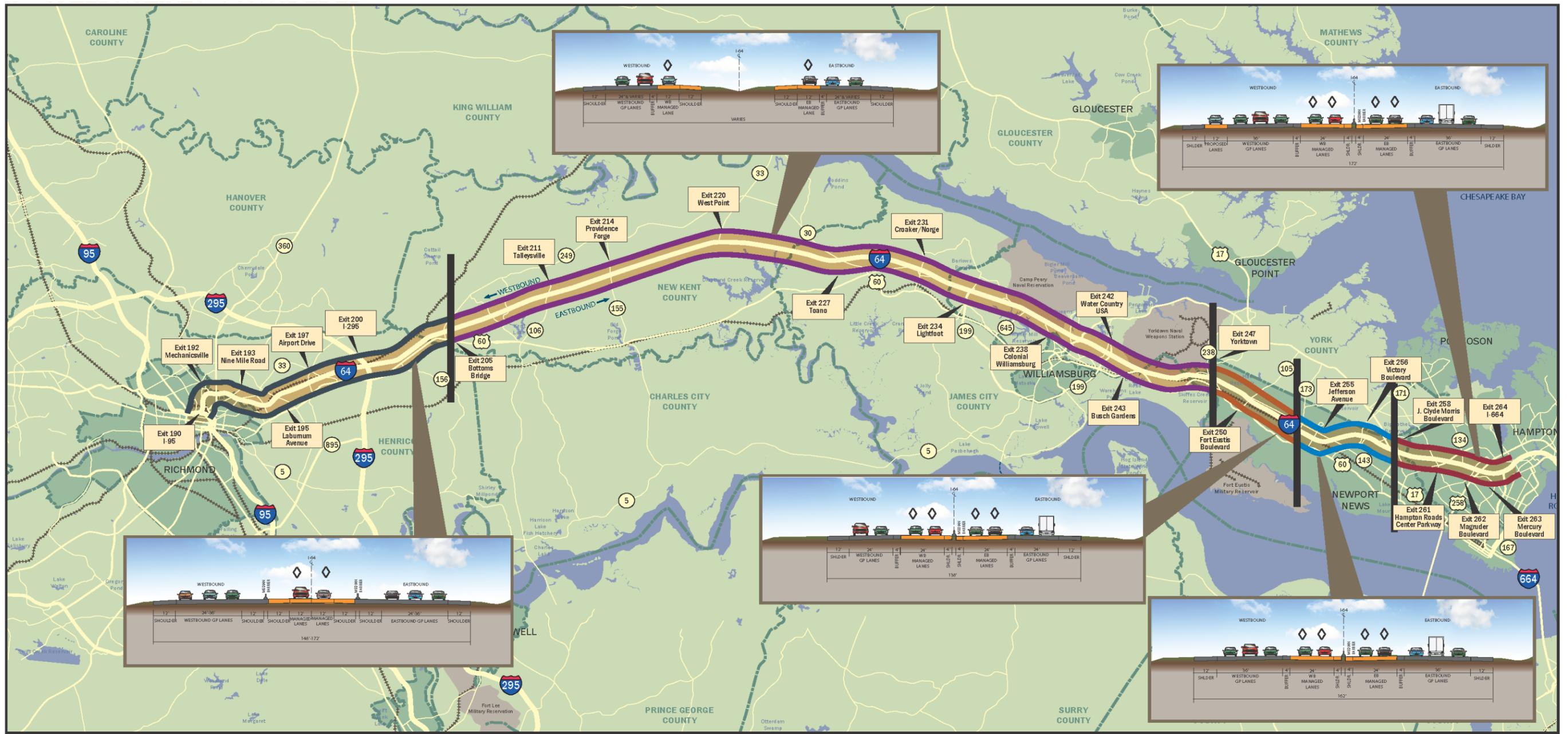
In addition to the mainline improvements, due to only modest changes in traffic volumes, as determined in the toll diversion analysis, Alternatives 2A/2B also includes the same improvements to the 25 interchanges as described in Alternatives 1A/1B. **Table II.3** provides a summary of the improvements proposed for each of the interchanges while **Figures II.7A** and **II.7B**

The planning level estimated costs for Alternatives 2A and 2B range from \$4.8 to \$7.3 billion each. Details of the cost estimates are included in **Table 5** of the *Alternatives Development Technical Memorandum*. This cost estimate, along with the estimates made for the other Alternatives analyzed in the **Draft EIS**, is preliminary and is used to inform the public and other stakeholders reviewing the **Draft** and **Final EIS**. If any of the Alternatives that include tolling had been identified as the Preferred Alternative, additional information on collection stations (including the use of overhead gantries and all-electronic tolling), as well as financial studies and subsequent traffic studies would have been developed.

Alternative 3 Managed Lanes - This Alternative involves the addition of separated, managed lanes located in the median. These managed lanes were examined for the entire length of the I-64 study area from Exit 190 (I-95) in the City of Richmond to Exit 264 (I-664) in the City of Hampton. The number of lanes that are proposed to be added to I-64 mainline along with typical sections showing the lane configurations are shown in **Figure II.5** for Alternative 3. As previously described, not all sections of the I-64 corridor have sufficient median area to accommodate the addition of any lanes. In these areas, the facility is proposed to be widened to the outside of the existing general purpose lanes in order to accommodate the managed lanes in between the eastbound and westbound general purpose travel lanes.

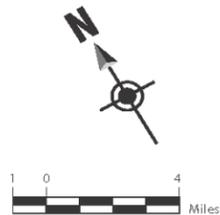
Managed lanes can refer to many different strategies, including:

- HOV lanes - lanes that are open only to vehicles with multiple occupants. Typically HOV lanes allow buses but exclude trucks. Variables include:
 - Extent of HOV lanes (i.e. where do they start and end).
 - Number of HOV lanes.
 - Occupancy restrictions (2+ occupants or 3+ occupants).
 - Time of day/day of week restrictions, if any.
 - Locations of access points to and from the HOV lanes, at intermediate locations as well as the end points.
 - Separation between the HOV lanes and the general purpose lanes (barrier/bollards/pylons, painted buffer area, double white line).
- HOT lanes - very similar to HOV lanes except that single-occupant vehicles can also drive in the HOT lanes if they pay a fee. Variables include:
 - Extent of HOT lanes (i.e. where do they start and end).
 - Number of HOT lanes.
 - Occupancy restrictions (2+ occupants or 3+ occupants).



LEGEND

- = Two Reversible Managed Lanes in the Median
- = One Managed Lanes in Each Direction in the Median
- = Two Managed Lanes in Each Direction in the Median
- = Two Managed Lanes in Each Direction in the Median
- = Two Managed Lanes in Each Direction in the Median Plus One Additional Westbound Lane

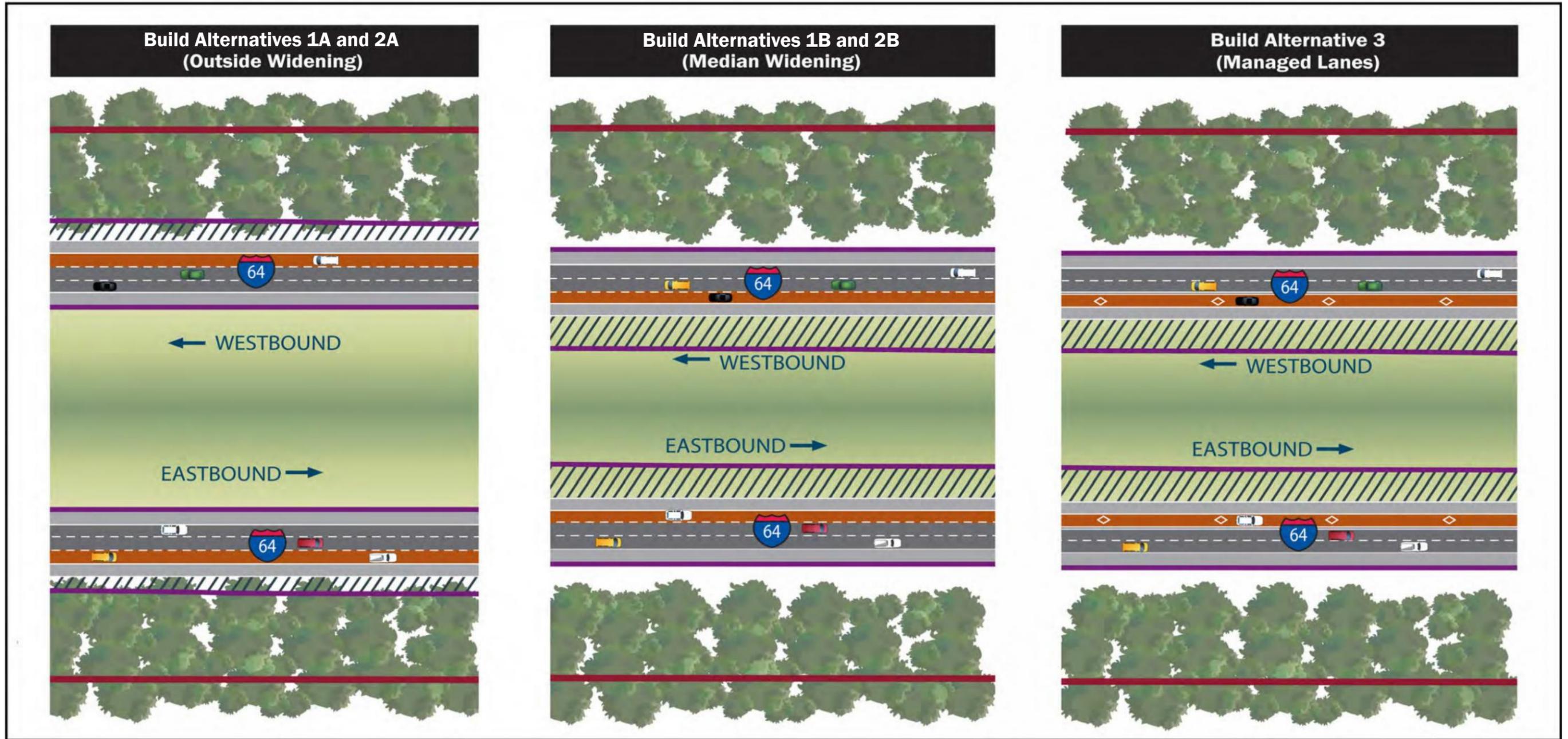


* If Alternative 3 is selected, subsequent studies will define the specific type of managed lanes, lane needs and locations, access to and from the managed lanes, along with end points and transition zones for the managed lanes along with the needed general purpose lanes.

** Not all sections of the I-64 corridor have sufficient median area to accommodate the addition of any lanes. In these areas, the facility is proposed to be widened to the outside in order to accommodate the managed lanes in between the eastbound and westbound general purpose travel lanes.

Figure II.5
Proposed Number of Additional Lanes for Build Alternative 3





LEGEND

-  = Existing Right of Way
-  = Existing Lane
-  = Alternative Footprint
-  = Conceptual Lane
-  = Conceptual Shoulder
-  = Potential Disturbance Area

* Note: The representative section shown is located in New Kent County.

Figure II.6
Representative Alternative Footprints





Figure II.7A
Proposed Interchange Study Area Footprint



LEGEND

- = Study Area Inside Existing Right of Way
- = Study Area Outside Existing Right of Way





Figure II.7B
Proposed Interchange Study Area Footprint



LEGEND
 — = Study Area Inside Existing Right of Way
 — = Study Area Outside Existing Right of Way



II. ALTERNATIVES CONSIDERED

- Toll rate (variable or fixed) for single-occupant vehicles.
- Locations of access points to and from the HOT lanes, at intermediate locations as well as the end points.
- Separation between the HOT lanes and the general purpose lanes (barrier/bollards/pylons, painted buffer area, double white line).
- ETL - very similar to HOT lanes except there are no discounts for multiple-occupancy vehicles. Variables include:
 - Extent of ETL lanes (i.e. where do they start and end).
 - Number of ETL lanes.
 - Toll rate (variable or fixed).
 - Locations of access points to and from the ETL lanes, at intermediate locations as well as the end points.
 - Separation between the ETL lanes and the general purpose lanes (barrier/bollards/pylons, painted buffer area, double white line).
- EBL – lanes for the exclusive use of public transit buses. These could potentially include bus transit stations within the highway right of way. Variables include:
 - Extent of EBL lanes (i.e. where do they start and end).
 - Locations of access points to and from the EBL lanes, at intermediate locations as well as the end points.
 - Location of express bus transit stations, if any.

- Separation between the EBL lanes and the general purpose lanes (barrier/bollards/pylons, painted buffer area, double white line).

For any of the managed lanes that involve toll collection (HOT or ETL lanes), traditional toll plazas were not included. The toll collection would be done by overhead gantries with all-electronic tolling used to collect all tolls at highway speeds. **Figure II.8** shows a typical section showing an overhead gantry. The study does not identify what type of managed lanes would be constructed. If Alternative 3 had been identified as the Preferred Alternative, additional analysis would have been required to refine the specifics of the managed lanes throughout the I-64 corridor.

A methodology for projecting traffic volumes and analyzing capacity for Alternative 3 was developed as outlined in the *Traffic and Transportation Technical Memorandum*. It was determined that the LOS goal for Alternative 3 was to provide a LOS B or better for the managed lanes and a LOS D or better for the general purpose lanes. The rationale for providing a lower LOS threshold for the general purpose lanes is that, if the general purpose lanes are free of congestion, there is no incentive to use the managed lanes.

As a part of this analysis, reversible managed lanes (similar to the existing HOV lanes on I-95 in northern Virginia) were also considered.

Reversible lanes may be appropriate when there is a distinct directionality in the projected traffic flow, e.g., predominant inbound flow during the AM peak and predominant outbound flow during the PM peak. If the difference in inbound and outbound volumes exceeds the capacity of one or more lanes, a reversible lane can reduce the necessary footprint of disturbance. In the City of Richmond area, projected traffic volumes exhibit this characteristic and therefore reversible lanes may be possible. In the Hampton Roads area and throughout the center of the study area, the preliminary analysis shows that there is no distinctive directional traffic flow and that the placement of managed lanes for use in each direction may be the best option. Note that reversible lanes require considerable infrastructure in terms of gates, signing, etc. to eliminate any possibility of wrong-way entry into the managed lanes. There are also considerable operating costs associated with performing the daily switchovers from eastbound to westbound operations or vice versa.

The following assumptions were made for Alternative 3:

- The managed lanes would stretch the entire length of the I-64 corridor.
- As shown in **Figure II.8** reversible managed lanes must be separated from the adjacent general purpose lanes by a barrier. For locations with nonreversible managed lanes, it was assumed that a four-foot buffer area would be used to separate the managed lanes from the general purpose lanes. **Figure II.9** shows an example of a nonreversible managed lane section (I-495 Express, Northern Virginia).
- Although there are numerous possible combinations for adding managed lanes, the analysis focused on the conditions which would result in the widest area of proposed disturbance. Therefore, any additional general purpose lanes required were added to the outside of the existing general purpose lanes.

Based on the results of this capacity analysis, the lane configurations developed for Alternative 3 along the I-64 corridor are described in **Table II.4**. The numbers of lanes that are proposed to be added to the I-64 mainline along with typical sections showing the lane configurations are shown in **Figure II.5** for Alternative 3. **Figure II.6** shows a representation of the possible disturbance footprint for Alternative 3.

Based on the conceptual engineering performed for Alternative 3, approximately 2% or 3 miles of the 150 mile I-64 corridor (75 miles in each direction) may require additional right of way for the

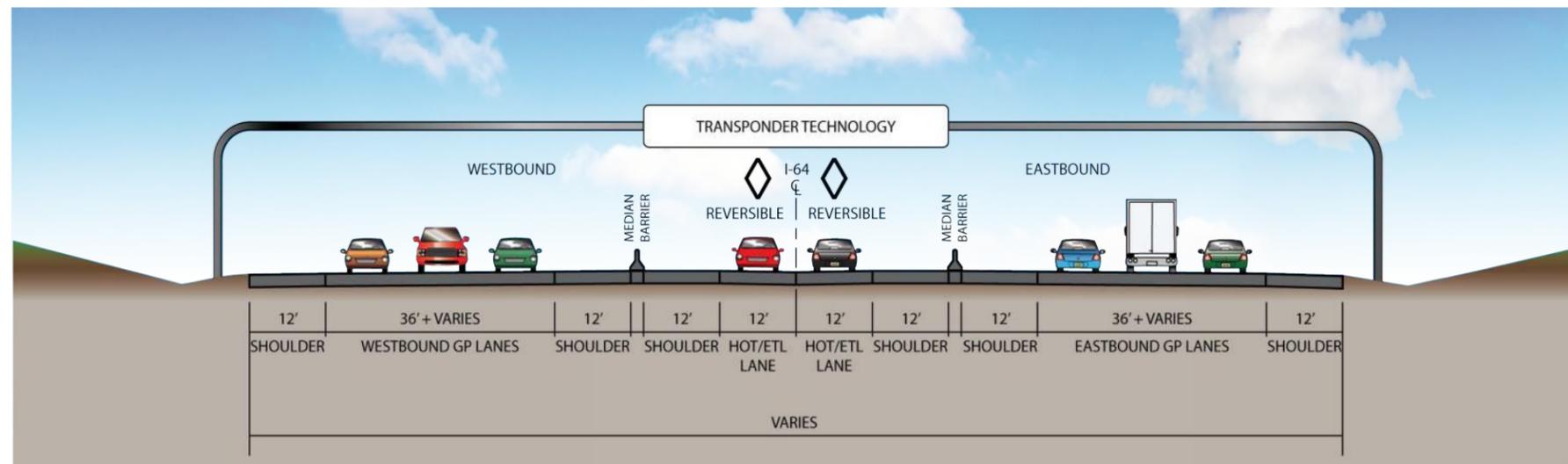


Figure II.8: Typical Section of a toll collection station for managed lanes, using overhead gantries and all-electronic tolling

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Figure II.9: Example of a Nonreversible Managed Lane Section (I-495, Northern Virginia)

mainline widening improvements. The areas which may require additional right of way are located in the most urban areas of the corridor located at the western end in the City of Richmond including both eastbound and westbound between Exits 190 (I-95) and Exit 192 (Mechanicsville).

In addition to these mainline improvements, due to only modest changes in traffic volumes, Alternative 3 also includes the same improvements to the 25 interchanges as described in Alternatives 1A/1B. Table II.3 provides a summary of the improvements proposed for each of the interchanges, while Figures II.7A and II.7B show the proposed study area footprints for each of the 25 interchanges.

The planning level cost estimate for Alternative 3 ranges from \$4.7 to \$7.3 billion, however this does not include potential costs for tolling gantries and equipment which could vary depending on the type of managed lanes implemented. Details of the cost estimate are included in Table 5 of the *Alternatives Development Technical Memorandum*. This cost estimate, along with the estimates made for the other Alternatives analyzed in the *Draft EIS*, is preliminary and was used to inform the public and other stakeholders reviewing the *Draft* and *Final EIS*.

Table II.4: Alternative 3 Characteristics*

From	To	Number of Managed Lanes Located in the Median Area**	Number of Additional General Purpose Lanes Added to the Outside
I-95 (Exit 190)	Bottoms Bridge (Exit 205)	2 (Reversible)	0
Bottoms Bridge (Exit 205)	Yorktown (Exit 247)	2 (1 in each direction)	0
Yorktown (Exit 247)	I-664 (Exit 264)	4 (2 in each direction)	One additional westbound lane from Exit 264 (I-664) to Exit 258 (J. Clyde Morris Boulevard)

* If Alternative 3 was the Preferred Alternative, subsequent studies would define the specific type of managed lanes, lane needs and locations, access to and from the managed lanes and end points and transition zones for the managed lanes along with the needed general purpose lanes.

** Not all sections of the I-64 corridor have sufficient median area to accommodate the addition of any lanes. In these areas, the facility is proposed to be widened to the outside in order to accommodate the managed lanes in between the eastbound and westbound general purpose travel lanes.

D. The Preferred Alternative – Alternative 1 General Purpose Widening

This section of the *Final EIS* includes a description of Alternative 1 along with the basis for its selection as the Preferred Alternative. Funding is not presently identified in the current applicable transportation plans to fully implement the Preferred Alternative. Based on direction from the Commonwealth Transportation Board (CTB) and comments from cooperating agencies, VDOT and FHWA plan to implement the Preferred Alternative in phases, as described in **Appendix L - Phased Approach for Implementation - NEPA Process**.

Description of Alternative 1 (Preferred Alternative)

Alternative 1 allows the option to widen to the outside of the existing road corridor or within the median of the existing road corridor. Alternative 1 is within the range of options provided by Alternatives 1A and 1B. The decision on whether to widen to the outside or the inside of the roadway would be made on a section-by-section basis, and the development of these operationally independent sections would be closely coordinated with the Richmond Area MPO, Hampton Roads TPO and other state and federal resource and regulatory agencies.

The number of lanes that are proposed to be added to the I-64 mainline under Alternative 1, along with typical sections, is the same as proposed under Alternative 1A and Alternative 1B. Like Alternatives 1A and 1B, Alternative 1 is designed to keep the proposed improvements within the existing right of way to the

greatest extent practicable. As discussed for Alternatives 1A and 1B, confining future improvements to the existing right of way would not always be possible. For the purpose of the impact analysis in this *Final EIS*, Alternative 1 is assumed to have the same footprint as Alternative 1A. Since Alternative 1A widens to the outside of the existing roadway, this assumption provides the most conservative assessment of environmental impacts.

Basis for Selection of Alternative 1 as the Preferred Alternative

The following section describes the basis for identifying Alternative 1 as the Preferred Alternative.

Project Needs - As stated in **Chapter I – Purpose and Need** of this *Final EIS*, the purpose of the study is to alleviate existing congestion, accommodate future capacity, and improve roadway deficiencies and safety in the corridor between the Cities of Richmond and Hampton. Analysis in the *Draft EIS* confirmed that both Alternatives 1A and 1B meet the purpose and need of the study. Alternative 1 would fully satisfy the project purpose and all of the identified needs for the study.

Resource Impacts - As discussed previously in this section, Alternative 1 is assumed to have the same footprint as Alternative 1A. However, by allowing for outside or inside widening to be determined on a section-by-section basis, this Alternative provides opportunities to avoid and minimize impacts described in **Chapter III – Environmental Resources, Impacts and Mitigation** and summarized in **Chapter V – Comparison of Alternatives** of this *Final EIS*.

II. ALTERNATIVES CONSIDERED

Public Comments - Project data were presented to the public at Citizen Information Meetings held on March 23 and 24, 2011, April 25 and 26, 2012, and at three Location Public Hearings held on December 11, 12, and 13, 2012. The comment period for the **Draft EIS** was from November 2, 2012 through January 7, 2013. Further descriptions of these events are included in **Chapter IV - Public Comments and Agency Coordination** of this **Final EIS**. Comments received at the Location Public Hearings and during the public review of the **Draft EIS** are included in **Appendix H - Comments on the Draft EIS** of this **Final EIS**. Of the comments received, Alternatives 1A and 1B received the highest support with 68 of the 108 comments that noted a preference for an Alternative.

Resolutions Passed - Based on finding set forth in the **Draft EIS**, along with comments received from the public, localities, and review agencies, the April 17, 2013, the CTB resolution resolved that the Preferred Alternative for this project be endorsed as Alternative 1. A copy of the CTB resolution is included in **Appendix J - Resolutions** of this **Final EIS**.

The CTB action was informed by a resolution passed on April 4, 2013, by the Richmond Area MPO identifying Alternative 1B in the **Draft EIS** as its locally preferred alternative, subject to conditions relating to right of way acquisition and design. In addition, at its March 6, 2013 meeting, the Hampton Roads TPO Transportation Technical Advisory Committee recommended Alternative 1A as the locally preferred alternative, with the caveat that Context Sensitive Design be applied, as well as a phased approach (built in fundable segments) for construction of the project. On June 19, 2013, the CTB approved the 2014-2019 SYIP that includes \$100 million in funding for Capacity Improvements to I-64 from the City of Newport News to the City of Williamsburg. The Hampton Roads TPO approved and adopted a resolution on June 20, 2013, endorsing the expansion of the operationally independent section of I-64 from Exit 255 (Jefferson Avenue) to Exit 242 (Humelsine Parkway) to six lanes on the condition that this preference would not preclude the I-64 Peninsula expansion to eight lanes or future associated funding. Copies of the resolutions from the Richmond MPO and from the Hampton Roads TPO are contained in **Appendix J - Resolutions** of this **Final EIS**.

Future Decision-Making Process - The Metropolitan Planning Regulations (23 CFR 450) and the Clean Air Act (CAA) Transportation Conformity Rule (40 CFR 93) require that a

project located in a metropolitan planning area and/or in a CAA nonattainment or maintenance area be contained in a conforming, fiscally-constrained LRTP. With the identification of reasonably available funding for an operationally independent section, the section can be added to the LRTP to meet the fiscal constraint requirements and can then be included in a regional transportation conformity analysis. Once the air conformity effort is complete, the TIP/STIP can be updated. At that point, FHWA can issue a **Record of Decision (ROD)** provided that the appropriate NEPA studies and documentation have been updated.

The implementation of Alternative 1 would occur via the construction of operationally independent sections as funding is identified. Operationally independent sections would be designed to contribute to the purpose and need of the *I-64 Peninsula Study* (**Chapter I - Purpose and Need**). An operationally independent section can be built and function as a viable transportation facility even if the rest of the work described in this **Final EIS** is never built, as further discussed in **Appendix L - Phased Approach for Implementation - NEPA Process**. It is possible that the full number of lanes associated with the Preferred Alternative for a particular operationally independent section may not be constructed initially. The **Final EIS** does not place any restrictions on the phasing for construction purposes for the operationally independent sections. Therefore, each future analysis update will be based on the scope of the operationally independent section to be covered by the **ROD**. Currently, the portion of I-64 identified in the Hampton Roads TPO resolution is proposed to become the first section to be advanced from this study. When an operationally independent section is advanced, the environmental analysis in this **Final EIS** would be updated as necessary and, provided that the section has met the transportation planning and air quality requirements, FHWA would issue a **ROD** for that section.

The identification of a Preferred Alternative for the entire corridor in this **Final EIS** is consistent with FHWA's objective of analyzing transportation solutions on a broad enough scale to provide meaningful analysis. The identification of an initial phase for implementation is consistent with the federal requirement to have funding identified before a **ROD** is issued.

Throughout the phased implementation process for the I-64 Peninsula Study, public involvement opportunities would be determined on a case-by-case basis and follow the most up-to-date FHWA and VDOT regulations and policies. Currently, FHWA

regulations (23 CFR 771.111(h)(3)) state that "...based on the reevaluation of project environmental documents required by CFR 771.129, the FHWA and the State highway agency will determine whether changes in the project or new information warrant additional public involvement."

Further coordination would also continue with the cooperating and participating agencies, resource and regulatory agencies, local planning agencies and consulting parties, as necessary. Details of this coordination and outreach is outlined in **Appendix L - Phased Approach for Implementation - NEPA Process**.

It is important to note that projects to maintain and improve the facility such as, but not limited to, the repair or replacement of pavement sections, bridges, guard rails, fencing, barriers, or other structures and implementation of additional intelligent transportation systems, could be implemented independently of the operationally independent sections.



INTERSTATE 64 PENINSULA STUDY

III. ENVIRONMENTAL RESOURCES, IMPACTS and MITIGATION



III. ENVIRONMENTAL RESOURCES, IMPACTS AND MITIGATION

Introduction

The purpose of this chapter is to present the results of the investigations on the resources identified for the *Interstate 64 (I-64) Peninsula Study*. In addition to the identification of resources, these analyses included identifying the anticipated impacts and mitigation for those impacts in relation to the No-Build and Build Alternatives described in **Chapter II - Alternatives Considered**. The following sections provide a summary of the information obtained and developed during the individual studies for each resource. Additional detail, data and information can be found in the following studies and documentation completed for this project:

- *Air Quality Technical Memorandum.*
- *Alternatives Development Technical Memorandum.*
- *Historic Properties Documentation.*
- *Indirect and Cumulative Effects Technical Memorandum.*
- *Natural Resources Technical Memorandum.*
- *Noise Technical Memorandum.*
- *Purpose and Need Technical Memorandum.*
- *Right of Way Technical Memorandum.*
- *Socioeconomic and Land Use Technical Memorandum.*
- *Traffic and Transportation Technical Memorandum.*

As described in **Chapter II – Alternatives Considered, Section C** of this **Final Environmental Impact Statement (EIS)**, the Alternatives evaluated in this **Final EIS** include the No-Build Alternative and the Build Alternative 1A (General Purpose Lane Widening to the outside), the Build Alternative 1B (General Purpose Lane Widening to the median) and the Build Alternative 3 (Managed Lanes). As described in **Chapter II – Alternatives Considered, Section D** of this **Final EIS**, Alternative 1 has been identified as the Preferred Alternative. Alternative 1 is within the range of options provided by Alternatives 1A and 1B. Alternative 1 allows the option to widen to the outside of the existing road corridor or within the median of the existing road corridor. The decision on whether to widen to the outside or the inside of the roadway would be made on a section-by-section basis, and the development of these operationally independent sections would be closely coordinated with the Richmond Area Metropolitan Planning Organization, the Hampton Roads Transportation Planning Organization, and other state and federal resource and regulatory agencies.

The number of lanes that are proposed to be added to the I-64 mainline under Alternative 1 (Preferred Alternative), along with typical sections, is the same as proposed under Alternative 1A and Alternative 1B. Like Alternatives 1A and 1B, Alternative 1 (Preferred Alternative) is designed to keep the proposed improvements within the existing right of way to the greatest extent practicable. As discussed for Alternatives 1A and 1B, confining future improvements to the existing right of way would not always be possible.

For the purpose of the impact analysis in this chapter, Alternative 1 (Preferred Alternative) is assumed to have the same footprint as Alternative 1A. Since Alternative 1A widens to the outside of the existing roadway, this assumption provides the most conservative assessment of environmental impacts in this **Final EIS**. However, by allowing for outside or median widening to be determined on a section-by-section basis, this Alternative provides opportunities to avoid and minimize impacts.

The studies completed for this 75 mile interstate corridor were conducted at a level appropriate for this stage of project development. The engineering designs for the Alternatives, along with the impact analyses, were completed at a level of detail to allow for comparison between Alternatives and to inform the public, decision-makers, and other stakeholders reviewing the **Draft EIS** and this **Final EIS**.

As described in **Chapter 2 - Alternatives Considered** of this **Final EIS**, the implementation of Alternative 1 would occur via the construction of operationally independent sections, as funding is identified. A detailed description of the phased approach can be found in **Appendix L – Phased Approach for Implementation - NEPA Process** of this **Final EIS**.

This chapter includes summaries of the analyses completed for the following resources and impact areas:

- A. Socioeconomics and Land Use
 - 1. Neighborhoods and Community Facilities
 - 2. Environmental Justice
 - 3. Displacements and Relocations
 - 4. Economic Activity
 - 5. Land Use
 - 6. Parks, Recreation Areas and Open Space
- B. Energy

- C. Air Quality
- D. Noise
- E. Natural Resources
 - 1. Waters of the United States, including Wetlands
 - 2. Water Quality
 - 3. Surface and Groundwater Supply
 - 4. Floodplains
 - 5. Threatened and Endangered Species
 - 6. Wildlife and Habitat
- F. Visual Quality
- G. Historic Properties
- H. Section 4(f) Resources
- I. Contaminated Sites
- J. Indirect and Cumulative Effects
- K. Construction Impacts
- L. Short-term Impacts/Long-term Benefits
- M. Irreversible and Irrecoverable Resources

The following information is included for each of these resources, as applicable:

- **Methodology:** A summary of how resources were identified and the regulations and formal methodologies used in the analysis.
- **Existing Conditions:** A summary of the resources within the study area corridor.
- **Potential Impacts:** A summary of the analysis results, by resource, for each of the Alternatives.
- **Mitigation Measures:** A discussion of potential mitigation measures for those impacts that are unavoidable.

III. ENVIRONMENTAL RESOURCES, IMPACTS AND MITIGATION

A. Socioeconomics and Land Use

1. Neighborhoods and Community Facilities

Methodology

General information regarding neighborhoods and community facilities was gathered from public involvement, local comprehensive plans and reports and mapping sources (Geographic Information Systems (GIS) data gathered from localities, the Virginia Department of Transportation (VDOT) and aerial photography).

Existing Conditions

Neighborhoods and housing communities found in the vicinity of the *Interstate 64 (I-64) Peninsula Study*, specifically in the urban areas of the City of Richmond, Henrico County, the City of Newport News and the City of Hampton, are typically older, built out and in varying stages of revitalization efforts. According to census data, these areas often include lower income populations. Neighborhoods found within close proximity to interstates tend to be located within urban settings and not rural areas; therefore, these types of neighborhoods are not discussed for all areas.

The City of Richmond area neighborhoods and housing communities include Shockoe, Jackson Ward, Church Hill, Ginger Park, Bellevue, Highland Park and Fulton. Neighborhoods and housing communities in the City of Newport News area that are easily accessible to I-64 include The Forest, Snidow, Hanover Heights, Courthouse Green, Turnberry, Warwick Lawns, Campbell, Kiln Creek, Village Green, Deerfield, Bayberry, Morrison, Swansea Manor and Robinson Terrace. The City of Hampton neighborhoods and housing communities within proximity to I-64 include Northampton, Magruder, Aberdeen and Mercury Central.

Housing

In 2010, the study area contained about 57,678 households with a 52% owner-occupancy rate. The three Cities (Richmond, Newport News and Hampton) had owner occupancy rates lower than that of the overall study area while the county rates were higher. The Commonwealth of Virginia owner-occupancy rate is 61%. The study area census block groups and Virginia had comparable percentages of renter and vacant housing units. The study area had 9% of vacant housing while the state had 11%. The study area had 37% vacant housing while the state had 30%. The urban areas had higher numbers of renters than that of the rural areas.

Community Facilities

Table III.A.1 outlines the community housing and community facilities located within a 500 foot buffer from existing right of way on either side of I-64.

Potential Impacts

As described in **Chapter II – Alternatives Considered, Section D** of this **Final EIS**, Alternative 1 has been identified as the Preferred Alternative. Alternative 1 allows the option to widen to the outside of the existing road corridor or within the median of the existing

road corridor. The decision on whether to widen to the outside or the inside of the roadway would be made on a section-by-section basis, and the development of these operationally independent sections would be closely coordinated with the Richmond Area MPO, the Hampton Roads TPO and other state and federal resource and regulatory agencies. By allowing for outside or inside widening to be determined on a section-by-section basis, this Alternative provides opportunities to avoid and minimize impacts. For the purpose of the impact analysis in this **Final EIS**,

Table III.A.1: Community Facilities and Services

Facility	Address	Locality
Schools		
Armstrong High School	2300 Cool Lane	City of Richmond
Fairfield Court Elementary School	2510 Phaup Street	City of Richmond
Joseph H. Saunders Elementary School	853 Harpersville Road	City of Newport News
Thomas Nelson Community College	99 Thomas Nelson Drive	City of Newport News
Hampton Roads Academy	739 Academy Lane	City of Newport News
Calvary Community Private School	2311 Tower Place	City of Hampton
Community Housing		
Whitcomb Court Public Housing Development*	2302 Carmine Street	City of Richmond
Fairfield Public Housing Development*	2506 Phaup Street	City of Richmond
Creighton Court Public Housing Development*	2101 Creighton Road	City of Richmond
Religious Institutions/Cemeteries		
Fairfield Jerusalem Baptist Church	2609 Selden Street	City of Richmond
Shockoe Hill Cemetery	2nd Street and 4th Hospital Street	City of Richmond
Oakwood Cemetery	3101 Nine Mile Road	City of Richmond
Antioch Baptist Church	3868 Antioch Church Road	Henrico County
Lakeside Church of God	853 Cloverleaf Lane	City of Newport News
Full Gospel First Church of Virginia	145 Richneck Road	City of Newport News
Calvary Community Church	2311 Tower Place	City of Hampton
General Services		
Fairfield Court Community Center	2311 North 25th Street	City of Richmond
Creighton Community Center	2101 Creighton Road	City of Richmond
Gill Community Center	2501 Phaup Street	City of Richmond
Preschool Development Center	2124 North 29th Street	City of Richmond

*Richmond Redevelopment and Housing Authority, Housing Communities and Redevelopment and Conservation Areas, <http://www.rrha.org/html/public/09/Map08.jpg>
Source: ESRI World Streetmap Data

III. ENVIRONMENTAL RESOURCES, IMPACTS AND MITIGATION

Table III.A.2: Community Facility Impacts by Alternative

Alternative	Neighborhood/Community Facility Impacted	Type of Impact
1* 1A/2A 1B/2B 3	Fairfield Court Community Center, City of Richmond	Partial Acquisition
	Fairfield Court Elementary School, City of Richmond	Partial Acquisition
	Creighton Court Public Housing Development, City of Richmond	Partial Acquisition
	Oakwood Cemetery, City of Richmond	Partial Acquisition
	Hampton Roads Academy, City of Newport News	Partial Acquisition
	Lakeside Church of God, City of Newport News	Full Acquisition
	Joseph H. Saunders Elementary School, City of Newport News	Partial Acquisition

*The Preferred Alternative has been identified as Alternative 1. To provide for the most conservative assessment of impacts, Alternative 1 is assumed to have the same footprint as Alternative 1A.

is assumed to have the same footprint as Alternative 1A. Since Alternative 1A widens to the outside of the existing roadway, this Alternative is assumed to provide the most conservative assessment of environmental impacts.

As described in the following section, potential impacts are reported for the No-Build Alternative and for each of the Build Alternatives. A summary table providing resource impacts associated with each of the Alternatives is included in **Chapter V – Comparison of Alternatives** of this **Final EIS**.

No-Build Alternative:

The No-Build Alternative would not involve any project-related construction and therefore no impacts would result. However, projects already programmed and funded in VDOT’s Fiscal Year 2013-2018 Six-Year Improvement Program (SYIP) would be implemented under the No-Build Alternative and could impact neighborhoods and community facilities.

Build Alternatives:

Table III.A.2 lists the community facilities that would be impacted by the Build Alternatives. The Build Alternatives under consideration would impact the facilities to the same degree (partial acquisition versus full acquisition). Additional information on right of way required is provided in the **Right of Way Technical Memorandum** and the **Displacements and Relocations** section of this chapter.

Preferred Alternative:

For the purpose of the impact analysis in this **Final EIS**, Alternative 1 is assumed to have the same footprint as Alternative 1A. As identified in **Table III.A.2**, the Preferred Alternative has the same potential impacts to community facilities as the other

Build Alternatives. This is due to the locations of the identified community facilities in relation to the Build Alternatives.

Mitigation Measures

The property owners would be compensated for the fair market value of the land and any structures acquired by the proposed project. Additionally, any individual, family, business, farm or non-profit organization displaced as a result of the acquisition of real property is eligible to receive reimbursement for the fair market value of property acquired, as well as moving costs. This process is known as relocation assistance. In accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (as amended, 1987), displaced property owners would be provided relocation assistance advisory services together with the assurance of the availability of decent, safe and sanitary housing. Relocation resources would be made available to all displacees without discrimination.

2. Environmental Justice

Methodology

There are several differences between the 2010 Census and previous censuses. The census “long form,” which was used to collect data for the 2000 Census as well as previous Decennial Censuses provided a 1-in-6 population sample of demographic and socioeconomic characteristics such as educational attainment, commuting, income, housing costs and poverty. This form is no longer collected as part of the Decennial Census, and instead it has been replaced by the American Community Survey (ACS). The ACS is a nationwide, continuous survey designed to provide demographic, housing, social and economic data every year,

however it is subject to larger margins of error and is only provided for larger geographies such as counties and large cities and therefore is not available at the census block group level. The 2010 Census data was used wherever possible, however 2000 Census data was used and noted when 2010 data was not available.

Incorporating environmental justice (EJ) principles throughout the transportation planning and decision-making process implements National Environmental Policy Act (NEPA) principles set forth in Title VI of the Civil Rights Act; the Uniform Relocation Assistance and Real Property Acquisition Policies Act as amended; and other U.S. Department of Transportation (USDOT) statutes, regulations and guidance that affect social, economic, environmental, public health and public involvement.

The EJ analysis was conducted in accordance with the Federal Highway Administration guidance. The study area was defined, and the demographic analysis was initiated to identify EJ populations. Census data was used at the block group level. Minorities and low income populations were identified to determine the area of potential impact, and the demographic information was examined to determine how potential impacts and benefits to the total population would affect the EJ populations. Finally, a determination was made whether or not the project would have disproportionately high and adverse impacts on the EJ populations in the study area.

A disproportionately high and adverse effect on minority and low income populations means an adverse effect that:

- Is predominately borne by a minority and/or low income population; or
- Would be suffered by the minority or low income community at a level that is more severe or greater in magnitude than the adverse impact that could be suffered by the non-minority or non-low income community.

The USDOT Order 5610.2(a) defines “minority” as a person who is:

- Black: a person having origins in any of the black racial groups of Africa;
- Hispanic or Latino: a person of Mexican, Puerto Rican, Cuban, Central or South America, or other Spanish culture or origin regardless of race;
- Asian American: a person having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent;

III. ENVIRONMENTAL RESOURCES, IMPACTS AND MITIGATION

Table III.A.3: Environmental Justice Minority Population Findings

Census Block Group	Locality	Percent Minority	
209	1	City of Richmond	93%
204	3	City of Richmond	98%
202	1	City of Richmond	99%
201	1	City of Richmond	100%
109	4	City of Richmond	94%
302	2	City of Richmond	58%
302	1	City of Richmond	51%
402	1	City of Richmond	65%
301	1	City of Richmond	98%
2012.02	3	Henrico County	64%
2014.01	2	Henrico County	95%
2014.01	1	Henrico County	68%
2011.02	2	Henrico County	72%
2011.01	4	Henrico County	64%
2011.01	1	Henrico County	97%
2010.03	3	Henrico County	99%
7003	2	New Kent County	29%
7003	1	New Kent County	30%
7002	2	New Kent County	33%
804.02	2	James City County	30%
801.02	1	James City County	50%
509	2	York County	53%
324	1	City of Newport News	43%
322.12	3	City of Newport News	79%
322.12	1	City of Newport News	84%
321.30	3	City of Newport News	32%
321.28	1	City of Newport News	50%
321.29	2	City of Newport News	60%
321.26	1	City of Newport News	50%
322.25	2	City of Newport News	61%
321.32	4	City of Newport News	50%
321.24	1	City of Newport News	67%
321.23	1	City of Newport News	70%
321.29	1	City of Newport News	47%

Table III.A.3: Environmental Justice Minority Population Findings (continued)

Census Block Group	Locality	Percent Minority	
321.17	3	City of Newport News	32%
321.17	2	City of Newport News	41%
321.17	1	City of Newport News	38%
321.14	1	City of Newport News	32%
321.13	1	City of Newport News	48%
320.06	1	City of Newport News	73%
316.01	1	City of Newport News	38%
105.02	2	City of Hampton	67%
105.02	1	City of Hampton	90%
105.01	1	City of Hampton	77%
103.13	2	City of Hampton	77%
103.13	1	City of Hampton	63%
103.11	1	City of Hampton	64%
103.11	2	City of Hampton	59%
103.07	2	City of Hampton	57%
103.04	1	City of Hampton	63%

Source: U.S. Census Bureau (2010 Data) (American FactFinder Web site: <http://factfinder.census.gov>), accessed February 20, 2012.

Table III.A.4: Environmental Justice Low Income Population Findings

Census Block Group	Locality	Median Household Income	
204	3	City of Richmond	\$10,870
202	1	City of Richmond	\$14,665
201	1	City of Richmond	\$11,484
109	4	City of Richmond	\$11,467
301	1	City of Richmond	\$7,220
302	2	City of Richmond	\$21,250
321.23	1	City of Newport News	\$22, 226

Source: U.S. Census Bureau (2000 Data) (American FactFinder Web site: <http://factfinder.census.gov>), accessed February 20, 2012.

- American Indian and Alaskan Native: a person having origins in any of the original people of North America, South America (including Central America) and who maintains cultural identification through tribal affiliation or community recognition; or
- Native Hawaiian and Other Pacific Islander: people having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands.

It also defines “low income” as a person (of any race) whose household income (or in the case of a community or group, whose median household income) is at or below the U.S. Department of Health and Human Services (USDHHS) poverty guidelines.

The first step in the study methodology involved determining whether or not census block groups within the study area had a low income and/or minority population. Using 2010 Census data, the total number of minority persons within each census block group was divided by each census block group’s total population. Populations were identified as minority if the minority population of the census block group was 29% or greater, which is the total minority population of the Commonwealth of Virginia based on 2012 Census data. These findings are outlined in **Table III.A.3**.

Using 2000 Census data, census block groups were identified as having low income populations when the median household income for the census block group was below the 2013 USDHHS poverty threshold, which is \$23,550 for a family of four. These findings are outlined in **Table III.A.4**

Existing Conditions

In 2010, the total population of the I-64 corridor was 128,964. While many ethnicities are represented within the corridor, the majority of the population in 2010 was Caucasian, comprising 52%. This percentage is lower in comparison to the state at 69%. The cities/urban areas all fall lower than the 52% corridor total while the counties/rural areas are much higher. The largest minority population found within the socioeconomic study area was African American, comprising 40% of the population. This percentage is higher than that of the Commonwealth at 19%. The City of Richmond’s African-American population is highest at 51% with the Cities of Hampton and Newport News at 50% and 41%, respectively.

As of 2010, the gender distribution within the Commonwealth of Virginia was 51% female and 49% male. All study area block group gender distribution percentages were within 12% or less of

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50%. The census block groups for persons 65 years of age or older ranged from 0-30%, while the state and the total study area were both 12%. The majority of the census block groups' population was between the ages of 18 and 64, with the entire study area being 64% and the state 65%.

Based on 2010 Census data, 50 of the 72 block groups have minority populations of 29% or greater. Based on the 2000 Census data, seven of the 72 block groups within the study area had a median household income below \$23,550. Block group 301 1 in the City of Richmond had the lowest median household income of \$7,220. **Figure III.A.1** shows all census block groups and highlights EJ census block groups for both minority and low income populations.

Potential Impacts

As described in **Chapter II – Alternatives Considered, Section D** of this **Final EIS**, Alternative 1 has been identified as the Preferred Alternative. Alternative 1 allows the option to widen to the outside of the existing road corridor or within the median of the existing road corridor. The decision on whether to widen to the outside or the inside of the roadway would be made on a section-by-section basis, and the development of these operationally independent sections would be closely coordinated with the Richmond Area MPO, the Hampton Roads TPO and other state and federal resource and regulatory agencies. By allowing for outside or inside widening to be determined on a section-by-section basis, this Alternative provides opportunities to avoid and minimize impacts. For the purpose of the impact analysis in this **Final EIS**, Alternative 1 is assumed to have the same footprint as Alternative 1A. Since Alternative 1A widens to the outside of the existing roadway, this Alternative is assumed to provide the most conservative assessment of environmental impacts.

As described in the following section, potential impacts are reported for the No-Build Alternative and for each of the Build Alternatives. A summary table providing resource impacts associated with each of the Alternatives is included in **Chapter V – Comparison of Alternatives** of this **Final EIS**.

The purpose of the EJ analysis is to identify any disproportionately high and adverse effects on EJ populations, and to ensure that EJ populations have been included in the study's public involvement efforts. All Alternatives and options were considered, and all of the potential impacts that would directly affect the study area were gathered. The location and severity of anticipated impacts associated with the various options were used to determine if EJ populations would be disproportionately impacted.

No-Build Alternative:

The No-Build Alternative would not involve any project related construction. Therefore, it is anticipated that the No-Build Alternative would result in no property acquisition; and therefore, would not impact low income or minority populations. However, projects already programmed and funded in VDOT's SYIP would be implemented under the No-Build Alternative and could result in impacts to low income and minority populations.

Build Alternatives:

The construction and operation of the I-64 improvements associated with the Build Alternatives would have the potential to create a variety of impacts to EJ populations. **Table III.A.5** notes the number of minority and low income block group populations that could be impacted by each of the Build Alternatives. The same EJ populations would potentially be affected by all Build Alternatives. Although each Alternative has the potential to impact property, neighborhood cohesion and isolation, access and mobility, EJ populations would not be impacted disproportionately as compared to non-EJ groups.

Preferred Alternative:

For the purpose of the impact analysis in this **Final EIS**, Alternative 1 is assumed to have the same footprint as Alternative 1A. As identified in **Table III.A.5**, the Preferred Alternative has the same potential impacts to EJ populations as the other Build Alternatives. This is due to the locations of the identified EJ populations in relation to the Build Alternatives.

Mitigation Measures

Because the No-Build Alternative and Build Alternatives would not result in disproportionately high and adverse effect on minority and low income populations, no EJ mitigation measures are required.

3. Displacements and Relocations

Methodology

GIS based analysis was conducted on parcels adjacent to the study corridor that may be impacted by the study's proposed Alternatives. Calculations were made of the acreage right of way that would be needed, the number of complete property acquisitions (also called "relocations") that would occur, and the general types or classifications of those properties being relocated for each Alternative. The estimated acreage of additional right of way to be required was obtained by overlaying each Alternative footprint onto VDOT GIS right of way boundary and parcel data provided by each locality along the corridor. As described in the **Right of Way Technical Memorandum**, each parcel was categorized into four parcel types: Rural, Residential/Suburban Low Density, Outlying Business/Suburban High Density and Central Business District. These parcel types were used in order to develop the right of way and utilities cost estimate for each Alternative.

Table III.A.5: Environmental Justice Populations by Build Alternative

Environmental Justice Populations	Alternative 1* General Purpose Widening	Alternative 1A General Purpose Lanes Outside Widening	Alternative 1B General Purpose Lanes Median Widening	Alternative 2A Full Toll Lanes Outside Widening	Alternative 2B Full Toll Lanes Median Widening	Alternative 3 Managed Lanes with General Purpose Lanes
Number of Minority Block Group Populations	50	50	50	50	50	50
Disproportionate Impacts to Minority Block Group Populations	No	No	No	No	No	No
Number of Low Income Block Group Populations	7	7	7	7	7	7
Disproportionate Impacts to Low Income Block Group Populations	No	No	No	No	No	No

*The Preferred Alternative has been identified as Alternative 1. To provide for the most conservative assessment of impacts, Alternative 1 is assumed to have the same footprint as Alternative 1A.

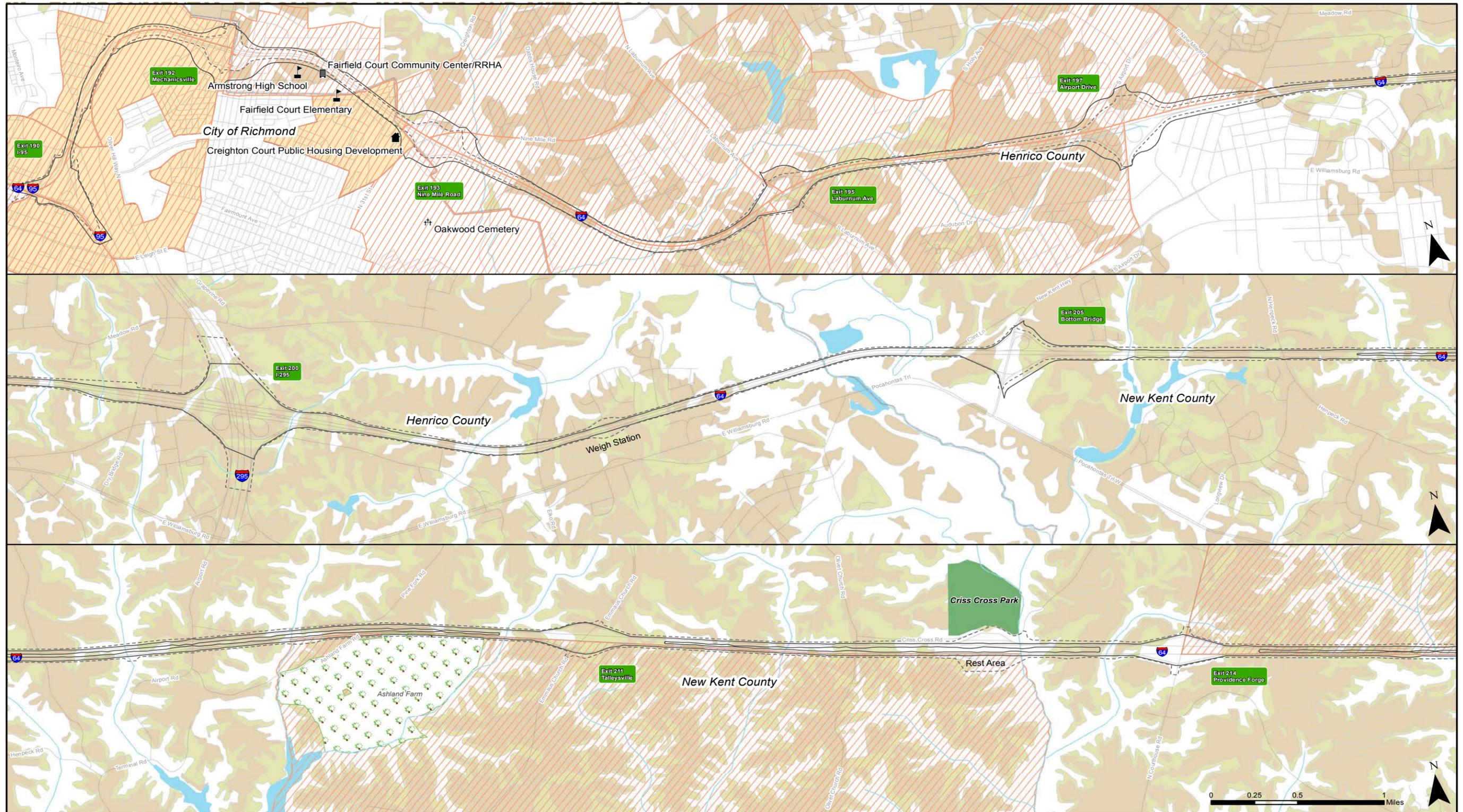


Figure III.A.1 Census Areas, Community Facilities, Agricultural/Forestal Districts, & Farmlands
Map 1 of 3



-  Community Centers
-  Churches
-  Schools
-  Cemeteries
-  Public Housing
-  Existing Right of Way
-  Limits of Widest Alternative Footprint
-  Minority Census Blocks
-  Low Income Census Blocks
-  USGS Topoquadrangle Surface Water (Non-Assessed)
-  Waterbodies (Non-Assessed)
-  NRCS Prime Farmland Soils
-  NRCS Farmland of Statewide Importance
-  Locality Jurisdiction
-  Parks
-  Agricultural/Forestal Districts



Figure III.A.1 Census Areas, Community Facilities, Agricultural/Forestral Districts, & Farmlands
Map 2 of 3



- | | | | |
|--|---|--|--|
| <ul style="list-style-type: none"> Community Centers Churches Schools Cemeteries Public Housing | <ul style="list-style-type: none"> Existing Right of Way Limits of Widest Alternative Footprint Minority Census Blocks Low Income Census Blocks | <ul style="list-style-type: none"> USGS Topoquadrangle Surface Water (Non-Assessed) Waterbodies (Non-Assessed) NRCS Prime Farmland Soils NRCS Farmland of Statewide Importance | <ul style="list-style-type: none"> Locality Jurisdiction Parks Agricultural/Forestral Districts |
|--|---|--|--|



Figure III.A.1 Census Areas, Community Facilities, Agricultural/Forestral Districts, & Farmlands
Map 3 of 3



- Community Centers
- Churches
- Schools
- Cemeteries
- Public Housing
- Existing Right of Way
- Limits of Widest Alternative Footprint
- Minority Census Blocks
- Low Income Census Blocks
- USGS Topographic Surface Water (Non-Assessed)
- Waterbodies (Non-Assessed)
- NRCS Prime Farmland Soils
- NRCS Farmland of Statewide Importance
- Locality Jurisdiction
- Parks
- Agricultural/Forestral Districts

III. ENVIRONMENTAL RESOURCES, IMPACTS AND MITIGATION

Existing Conditions

There were 1,211 parcels evaluated within the study area, which includes the construction footprints for all of the proposed Alternatives, and 1,112 total parcels that are immediately adjacent to the existing I-64 corridor right of way.

Construction of any of the proposed Build Alternatives would require the acquisition of additional right of way and the potential relocation of families, businesses and community facilities. The majority of the impacts are specifically associated with the reconstruction of the interchanges common to all the Build Alternatives.

Potential Impacts

As described in **Chapter II – Alternatives Considered, Section D** of this **Final EIS**, Alternative 1 has been identified as the Preferred Alternative. Alternative 1 allows the option to widen to the outside of the existing road corridor or within the median of the existing road corridor. The decision on whether to widen to the outside or the inside of the roadway would be made on a section-by-section basis, and the development of these operationally independent sections would be closely coordinated with the Richmond Area MPO, the Hampton Roads TPO and other state and federal resource and regulatory agencies. By allowing for outside or inside widening to be determined on a section-by-section basis, this Alternative provides opportunities to avoid and minimize impacts. For the purpose of the impact analysis in this **Final EIS**, Alternative 1 is assumed to have the same footprint as Alternative 1A. Since Alternative 1A widens to the outside of the existing roadway, this Alternative is assumed to provide the most conservative assessment of environmental impacts.

As described in the following section, potential impacts are reported for the No-Build Alternative and for each of the Build Alternatives. A summary table providing resource impacts associated with each of the Alternatives is included in **Chapter V – Comparison of Alternatives** of this **Final EIS**.

No-Build Alternative:

The No-Build Alternative would not require the acquisition of any new right of way; therefore, no displacements or relocations are anticipated. However, projects already programmed and funded in VDOT’s SYIP would be implemented under the No-Build Alternative and could require new right of way.

Build Alternatives:

Along the mainline I-64 corridor, the acreage between the existing right of way and the proposed right of way was determined for each Build Alternative, resulting in small fractions of parcels to be acquired, which totaled up to an overall total acreage of mainline right of way to be acquired for each parcel type. The interchange design and right of way footprints for Alternatives 1A and 2A and for Alternatives 1B and 2B are the same, and therefore the impacts are also the same. These are conservative estimates and the actual calculation of relocations is expected to decrease as the project design is advanced and more detailed roadway right of way requirements are determined. **Table III.A.6** depicts the numbers of mainline and interchange acquisitions for the mainline and interchanges for each Build Alternative.

Preferred Alternative:

For the purpose of the impact analysis in this **Final EIS**, Alternative 1 is assumed to have the same footprint as Alternative 1A. As identified in **Table III.A.6**, the Preferred Alternative potential impacts to property acquisitions are higher than

Alternatives 1B and 3. This is due to the locations of the identified acquisitions in relation to the Build Alternatives.

Mitigation Measures

Affected property owners would receive assistance in accordance with the applicable federal and/or state requirements.

The acquisition of property and the relocation of residents, businesses, farms and non-profit organizations, if needed, would be conducted in accordance with all applicable federal laws, regulations and requirements, including but not limited to, 23 CFR Part 710, the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended and its implementing regulations found in 49 CFR Part 24. All persons displaced on federally-assisted projects would be treated fairly, consistently and equitably so that they do not suffer disproportionate injuries as a result of projects that are designed for the benefit of the public as a whole. Relocation resources would be available to all residential and business relocatees without discrimination. A displaced small business owner may be eligible for reestablishment expenses.

4. Economic/Employment

Methodology

As previously stated, there are several differences between the 2010 Census and previous censuses. The census “long form,” which was used to collect data for the 2000 Census as well as previous Decennial Censuses provided a 1-in-6 population sample of demographic and socioeconomic characteristics such as educational attainment, commuting, income, housing costs and

Table III.A.6: Build Alternative Acquisitions

Acquisitions	Alternative 1* General Purpose Widening		Alternative 1A General Purpose Lanes Outside Widening		Alternative 1B General Purpose Lanes Median Widening		Alternative 2A Full Toll Lanes Outside Widening		Alternative 2B Full Toll Lanes Median Widening		Alternative 3 Managed Lanes with General Purpose Lanes	
	Parcel Count	Acreage	Parcel Count	Acreage	Parcel Count	Acreage	Parcel Count	Acreage	Parcel Count	Acreage	Parcel Count	Acreage
Mainline Acquisition	107	20.9	107	20.9	61	16.3	107	20.9	61	16.3	97	18.4
Interchanges Acquisition	682	600.3	682	600.3	682	600.3	682	600.3	682	600.3	682	546.3

*The Preferred Alternative has been identified as Alternative 1. To provide for the most conservative assessment of impacts, Alternative 1 is assumed to have the same footprint as Alternative 1A.

III. ENVIRONMENTAL RESOURCES, IMPACTS AND MITIGATION

poverty. This form is no longer collected as part of the Decennial Census, and instead has been replaced by the ACS. The ACS is a nationwide, continuous survey designed to provide demographic, housing, social and economic data every year, however it is subject to larger margins of error and is only provided for larger geographies such as counties and large cities and therefore is not available at the census block group level.

The project corridor is located in both developed urban areas and rural areas and spans seven localities. Using available census data, comprehensive plans and data from the Virginia Employment Commission (VEC), the economic characteristics of these areas were analyzed.

Existing Conditions

Table III.A.7 provides an employment overview of the localities within the study area. The urban areas are discussed in greater detail.

The City of Richmond area is a magnet for labor, drawing workers from more than 40 localities. The diverse employment include 11 Fortune 1000 company headquarters, Fifth District Federal Reserve, Fourth Circuit U.S. Court of Appeals, state capital, financial and information technology services and higher education. There are 15 four-year and 11 two-year colleges and universities in the area. The City of Richmond is located at the mid-point of the East Coast, and 55% of the nation’s consumers are within two days delivery from trucking line services. The convergence of I-64, Interstate 95 (I-95), Interstate 85 (I-85) and Interstate 295 (I-295), as well as the cargo handled at both the Richmond International Airport and the Port of Richmond make the area an ideal location for industry. The CSX Transportation (CSXT) and the Norfolk Southern provide rail service in the area, while Fed Ex and UPS both have district hubs located in the City of Richmond. The City of Richmond also offers a state-of-the-art telecommunication infrastructure with extensive fiber optic network and digital switching capability. Building costs in the City of Richmond area are 15% below the national average.

The Hampton Roads area, much like the City of Richmond, also offers a very diverse economy. The area is home to two national laboratories, a network of academic programs and research centers and a technology-focused business sector. The City of Newport News economy is anchored by Northrop Grumman Newport News and provides a healthy mix of manufacturing, defense, research, technology and office based industries. The Oyster Point Business Park is the central business district for the entire Virginia Peninsula

Table III.A.7: Employment Overview by Locality

Locality	Commuting Patterns	Largest Out-Commuter Destinations	Largest Classified Industry	Largest Employers
City of Richmond	Live and work in area - 51,534 In-commuters - 105,469 Out-commuters - 37,364	Henrico County; Chesterfield County	Administrative and Support and Waste Management	Virginia Commonwealth University; Medical College of Virginia; City of Richmond Richmond City Public Schools; Veterans Affairs; Phillip Morris U.S.A., Inc.
Henrico County	Live and work in area - 75,376 In-commuters - 75,380 Out-commuters - 61,448	City of Richmond; Chesterfield County; Hanover County	Administrative and Support and Waste Management	Henrico County School Board; Capital One Bank; County of Henrico; Bon Secours Richmond Health System; Anthem
New Kent County	Live and work in area - 1,320 In-commuters - 1,232 Out-commuters - 5,508	City of Richmond; Henrico County	Construction	New Kent County School Board; County of New Kent; AHS Cumberland Hospital
James City County	Live and work in area - 9,337 In-commuters - 10,815 Out-commuters - 12,534	City of Williamsburg, City of Newport News, York County	Accommodation and Food Services	Busch Entertainment Corporation; Williamsburg James City County Public School Board; County of James City; Eastern State Hospital
York County	Live and work in area - 6,697 In-commuters - 13,702 Out-commuters - 21,794	City of Newport News; City of Hampton	Accommodation and Food Services	York County School Board; County of York; Walmart; U.S. Department of Defense
City of Newport News	Live and work in area - 48,421 In-commuters - 46,369 Out-commuters - 37,555	City of Hampton; York County	Administrative and Support and Waste Management	Northrop Grumman Shipbuilding, Inc.; Riverside Regional Medical Center; Newport News Public Schools; U.S. Department of Defense; Canon; Ferguson Enterprises Inc.; U.S. Department of Army and Air Force
City of Hampton	Live and work in area - 34,274 In-commuters - 35,329 Out-commuters - 31,637	City of Newport News; City of Norfolk	Administrative and Support and Waste Management	U.S. Department of Defense; City of Hampton; Hampton City School Board; National Aeronautics and Space Administration; Veterans Affairs

Source: Virginia Employment Commission, Community Profiles, <http://www.vec.virginia.gov>

III. ENVIRONMENTAL RESOURCES, IMPACTS AND MITIGATION

region. Based on comprehensive plans and VEC data, the defense sector has been the major driving force behind the Hampton Roads area economy; however, in the last several decades the economy has become more diversified. According to the City of Newport News Chamber of Commerce, the defense sector, which includes military bases and related support industries accounts for about 25% of the employment in the Cities of Norfolk-Virginia Beach-Newport News area. The eastern terminus of the nation’s largest rail system, CSXT, is located in the City of Newport News. CSXT’s service area includes the industrial Midwest, the South and parts of Canada. The Port of Virginia at Hampton Roads is the third largest container port on the U.S. East Coast, with service from more than 75 international shipping lines and more than 3,000 sailings annually to 100 countries. It has become the Mid-Atlantic load center, and has the deepest channel on the East Coast. The unified ports, operated by Virginia International Terminals, Inc. are shipping more than 14 million tons of general cargo annually and growing. Hampton Roads is a world leader in coal export shipments. Other bulk cargo includes grains and petroleum. More than 50 million tons of bulk cargo is shipped through Hampton Roads annually. Three airports also service Hampton Roads: Newport News International Airport, Norfolk International Airport and Richmond International Airport. I-64 and Interstate 664 (I-664) are the vital interstates for transporting product.

Income

Based on availability, census data from the 2000 Census was used at the block group level for median household income. Current (2010) locality median household income can be found in **Table III.A.8**, while block group level household median income from the 2000 Census can be found in **Table III.A.9**. For consistency purposes, census tract and block group boundaries were used from the 2010 Census data, however boundaries in several areas have changed from the 2000 income data.

As of 2010, the median household income in three of the seven localities in the project was higher than that of Virginia: New Kent County, James City County and York County. The household income in the three counties was less than that of the Commonwealth. Henrico County was only slightly lower at \$60,114. A calculation for the entire study area is not available based on census block boundary changes from 2000 to 2010 data.

Potential Impacts

As described in **Chapter II – Alternatives Considered, Section D** of this **Final EIS**, Alternative 1 has been identified as the

Table III.A.8: Income Demographics for Localities

Locality	Median Household Income Average
Commonwealth of Virginia	\$61,406
City of Richmond	\$38,266
Henrico County	\$60,114
New Kent County	\$70,590
James City County	\$73,903
York County	\$81,055
City of Newport News	\$49,562
City of Hampton	\$49,815

Source: U.S. Census Bureau (2010 Data) (American FactFinder Web site: <http://factfinder.census.gov>), accessed February 20, 2012.

Preferred Alternative. Alternative 1 allows the option to widen to the outside of the existing road corridor or within the median of the existing road corridor. The decision on whether to widen to the outside or the inside of the roadway would be made on a section-by-section basis, and the development of these operationally independent sections would be closely coordinated with the Richmond Area MPO, the Hampton Roads TPO and other state and federal resource and regulatory agencies. By allowing for outside or inside widening to be determined on a section-by-section basis, this Alternative provides opportunities to avoid and minimize impacts. For the purpose of the impact analysis in this **Final EIS**, Alternative 1 is assumed to have the same footprint as Alternative 1A. Since Alternative 1A widens to the outside of the existing roadway, this Alternative is assumed to provide the most conservative assessment of environmental impacts.

As described in the following section, potential impacts are reported for the No-Build Alternative and for each of the Build Alternatives. A summary table providing resource impacts associated with each of the Alternatives is included in **Chapter V – Comparison of Alternatives** of this **Final EIS**.

No-Build Alternative:

The No-Build Alternative would not displace any businesses. No loss of local property tax revenues would occur as a result of the No-Build Alternative. However, projects already programmed and funded in VDOT’s SYIP would be implemented under the No-Build Alternative and could impact businesses and revenue.

Build Alternatives:

The proposed Build Alternatives would not have a major impact on the distribution of industries and businesses located within the corridor. The Build Alternatives are expected to have a negligible effect on property tax revenues on both the state and local level. In the **Construction Activities** section later in this chapter, temporary impacts during construction are described. These activities would affect business operations near the alignment of the respective Alternative options.

Regionally, the potential for temporary jobs would also be created for the Build Alternatives for several years during construction. This would vary by Alternative but would mostly be proportional to the construction cost of the respective Alternative.

Preferred Alternative:

For the purpose of the impact analysis in this **Final EIS**, Alternative 1 is assumed to have the same footprint as Alternative 1A. The Preferred Alternative would not have a major impact on the distribution of industries and businesses located within the corridor and would have negligible effects on property tax revenues.

Mitigation Measures

Impacts to the economic structure of the study corridor would continue to be minimized through careful planning and design. No major adverse impacts to the economic structure of the corridor are anticipated with any of the Alternatives. Throughout the planning, design and construction phases, coordination would continue with businesses in the corridor and especially those adjacent to the Preferred Alternative to prevent or minimize short term or long-term disruptions.

5. Land Use

Methodology

Land use was reviewed within a 500 foot buffer from existing right of way on either side of I-64.

Establishing locality land use characteristics involved identifying existing and anticipated future land uses in the corridor. After establishing the baseline land use characteristics that currently exist, the proposed Alternatives were evaluated to assess the potential each would have for causing direct or indirect changes in existing land use. General land uses for the study area are found in the **Socioeconomic and Land Use Technical Memorandum**.

III. ENVIRONMENTAL RESOURCES, IMPACTS AND MITIGATION

Table III.A.9: Income Demographics for Census Block Groups

Area or Census Block Group		Median Household Income
Commonwealth of Virginia		\$46,677
City of Richmond		\$31,121
Henrico County		\$49,185
New Kent County		\$53,595
James City County		\$55,594
York County		\$57,956
City of Hampton		\$39,532
City of Newport News		\$36,597
Study Area		\$39,205
City of Richmond		
209	1	\$25,686
204	3	\$10,870
202	1	\$14,665
201	1	\$11,484
109	4	\$11,467
302	2	\$21,250
302	1	\$23,611
402	1	\$27,212
301	1	\$7,220
Henrico County		
2014.03	3	\$35,493
2014.04	2	\$66,198
2014.04	1	\$43,324
2017.01	1	Not Available*
2012.02	3	\$40,670
2014.01	2	\$40,139
2014.01	1	\$48,125
2011.02	2	\$36,034
2011.01	4	Not Available*
2011.01	1	\$34,821
2010.03	3	\$29,344

Table III.A.9 (continued)

Area or Census Block Group		Median Household Income
New Kent County		
7003	1	\$48,333
7002	3	\$49,250
7002	2	\$47,750
7002	1	\$60,625
7001	3	\$72,361
7001	2	\$57,188
7001	1	\$57,143
James City County		
801.02	1	\$24,875
801.01	1	\$33,957
804.02	2	\$54,514
804.02	1	\$48,625
804.01	2	\$69,844
804.01	1	\$47,380
York County		
509	2	Not Available*
509	1	Not Available*
511	3	Not Available*
511	2	Not Available*
511	1	Not Available*
510	3	Not Available*
510	2	Not Available*
510	1	Not Available*
City of Hampton		
105.02	2	\$32,560
105.02	1	\$31,094
105.01	1	\$41,875
103.13	2	Not Available*
103.13	1	Not Available*
103.11	1	Not Available*
103.11	2	Not Available*
103.07	2	Not Available*
103.04	1	\$51,808

Table III.A.9 (continued)

Area or Census Block Group		Median Household Income
City of Newport News		
316.02	4	\$40,735
316.01	1	\$52,308
321.30	3	Not Available*
320.06	1	Not Available*
322.12	3	\$26,474
322.12	1	\$28,603
321.17	3	\$39,728
321.17	2	\$30,313
321.17	1	\$32,399
321.28	1	Not Available*
321.29	2	Not Available*
321.29	1	Not Available*
321.14	1	\$59,440
321.26	1	Not Available*
321.13	1	\$35,268
322.25	2	Not Available*
321.32	4	Not Available*
321.24	1	\$33,644
321.23	1	\$22,226
324	1	\$42,315

*Note: Census Block Groups were established using 2010 Census data boundaries; therefore data is not available for those areas with boundary changes between the two data sets.

Source: U.S. Census Bureau (2000 Data) (American FactFinder Website: <http://factfinder.census.gov>), accessed February 20, 2012.

III. ENVIRONMENTAL RESOURCES, IMPACTS AND MITIGATION

Existing Conditions

City of Richmond

According to the *Richmond Master Plan* (2000-2010) there are limited opportunities for new development. There are a few vacant parcels, located primarily in the southwest part of the City or within redevelopment projects. Commercial service centers are located throughout the City and along key transportation corridors, providing convenient goods and services to adjacent neighborhoods and areas, while industrial uses are concentrated within four primary areas. Residential uses occupy more land area in the City than any other type of use. The City benefits from a well-developed radial highway system that provides easy access to Downtown and surrounding local and regional destinations. There are substantial public open spaces throughout the City in the form of parks, public school grounds and cemeteries, in addition to large public spaces along the James River.

Henrico County

Henrico County's *Vision 2026* states that land use for the county is divided into the following categories: Rural, Residential, Mixed-Use, Office/Service/Industrial, Retail/Commercial and Civic. The Rural land use group is characterized by agricultural uses, land maintained in a natural state and large tract residential development. Prime Farmlands and Farmlands of Statewide Importance are located within the County along the corridor. Rural areas are primarily located around the perimeter of the eastern end of the county with a few locations along the western portion of the county. These areas would likely be pressured for growth in the future but are not primary growth areas. Residential is the most dominant land use in Henrico County. Mixed-Use groups are a new land concept in Henrico County and incorporate open space, conveniences and living within a small area. The Office/Service/Industrial areas in Henrico County are strong factors in the local and regional economy and offer a wide range of employment opportunities to residents. The County is encouraging expansion of economically productive business areas in coordination with anticipated residential growth. Existing Retail/Commercial areas in the county are concentrated around substantial corridors. A goal for Henrico County is to prevent vacant retail structures and encourage redevelopment. Civic uses include locations for new and existing community amenities such as government facilities, schools, churches and hospitals.

New Kent County

Land use in New Kent County is clustered, with commercial centers, government and institutional uses all centered around

residential areas. Prime Farmlands and Farmlands of Statewide Importance are located within the County along the project corridor. According to the New Kent County Comprehensive Plan, *Vision 2020*, residents of New Kent would prefer to preserve the rural nature of the County. Future land use mapping shows several economic opportunity areas around the I-64 corridor, however approximately 70% of the County would still remain in rural lands, agriculture and forested areas, including land in Agricultural/Forestral Districts (AFDs) and environmental buffer.

James City County

According to the James City County *2009 Comprehensive Plan*, growth management is the most important component of land use for this locality. The *2007 Virginia Tech Citizen Survey* indicated that 83% of respondents agreed that development of the land in James City County is happening too quickly. James City County has undergone continuous rapid growth since 1970, transforming the predominantly rural character of James City County into a more urban and suburban environment. Most development has occurred in and around the City of Williamsburg, though development has also spread both to the north and west areas of the County. The 1990s and the 2000s marked a period of substantial diversification in business and industry, with large expansions to shopping, business developments and public service dwellings. Numerous opportunities for future industrial growth still exist in the County. The amount of acreage in James City County farms, around 5,831 acres, is about 6% of the County's total land area. Prime Farmlands and Farmlands of Statewide Importance are located within the County along the project corridor. James City County has instated a pattern of land use and development that reinforces and improves the quality of life for citizens and assists in achieving the goals of the *Comprehensive Plan* for all future land use.

York County

Based on the York County *Comprehensive Plan, Charting the Course to 2025*, of the 108 square miles contained within the County's jurisdictional limits (a figure that includes the bodies of water within the jurisdictional limits), approximately 37% of the total land area is owned by the federal government. These federal landholdings include the various military installations (the U.S. Coast Guard Training Center, U.S. Naval Weapons Station, Cheatham Annex and Camp Peary), which total approximately 20,400 acres, and the 3,900 acre Colonial National Historical Park. In addition to these large federal landholdings, the Cities

of Newport News and Williamsburg each own reservoirs and watershed property in the County encompassing a total of 6,600 acres. The combination of federal and watershed property accounts for 30,900 acres, representing almost half (47.5%) of the land area in York County. While presenting a number of constraints for the County, these landholdings do ensure that a relatively large amount of open space would be perpetuated, thus contributing positively to the County's quality of life and the perception of a rural atmosphere. The County land use percentages are as follows: residential development, 18%; commercial development, 2.3%; industrial development, 2.5%; open space (conservation/recreation, agriculture and vacant), 43.2%; and total military, 33.7%. York County also has over 200 miles of shoreline and associated tidal areas, providing vast green areas. Prime Farmlands and Farmlands of Statewide Importance are located within the County along the project corridor. Maintaining a rural character while balancing the desire for high quality of life is the County's main challenge for land use planning.

City of Newport News

The City of Newport News Comprehensive Plan, *Framework for the Future 2030*, breaks down existing land use by type. Thirty-one percent of the City's land is developed for residential uses, and 19% is owned by the military or federally owned. Only 9.1% of City land remains vacant and undeveloped. The remaining 48.9% is broken out between commercial and office, transportation facilities, public right of way use, community facilities and parks/open space. Prime Farmlands and Farmlands of Statewide Importance are located within the City along the project corridor. Since much of the land is developed, the City has set goals to protect residential neighborhoods from incompatible infill development and commercial or industrial intrusions and instead plans to support neighborhoods with adequate public facilities. Long range land use goals include: creating safe and quality neighborhoods which enhance the natural and historic diversity of Newport News; planning for efficient growth; developing balanced and sustainable mixes of land use; developing efficient land use patterns; and revitalizing historic Downtown Newport News.

City of Hampton

The *Hampton Community Plan* (2010) discusses existing and future land use for the City. The City has experienced a substantial amount of population growth and land development since the consolidation of the City of Hampton, Elizabeth City County and the Town of Phoebus in 1952. The City is nearly fully developed.

III. ENVIRONMENTAL RESOURCES, IMPACTS AND MITIGATION

Infill development, redevelopment and revitalization of existing developed areas would be the main source of growth and change within the City of Hampton. The City of Hampton has evolved into a city with a number of unique activity centers with distinct and often complementary functions as opposed to one single center of activity. Examples of activity centers include Downtown, Hampton Roads Center and Coliseum Central. These centers serve both local and regional functions. Residential land is the dominant land use in the City. The City is made up of many neighborhoods providing a variety of residential settings and housing options. Residential land makes up about 40% of the City's land area. Fourteen percent of the City's land is occupied by two military bases: Langley Air Force Base and Fort Monroe. The City of Hampton has worked closely with Langley Air Force Base (LAFB) to implement the Air Installation Compatible Use Zone program in areas close to the Base to ensure LAFB's continued existence in the City. The City of Hampton's low inventory of vacant, developable land would continue to have important implications for revenue growth, service requirements and future community development strategies. The City of Hampton's plan for future land use would protect residential neighborhoods, encourage commercial investment in established centers and districts, promote revitalization in strategic areas of the City and protect environmentally sensitive areas.

Potential Impacts

As described in **Chapter II – Alternatives Considered, Section D** of this **Final EIS**, Alternative 1 has been identified as the Preferred Alternative. Alternative 1 allows the option to widen to the outside of the existing road corridor or within the median of the existing road corridor. The decision on whether to widen to the outside or the inside of the roadway would be made on a section-by-section basis, and the development of these operationally independent sections would be closely coordinated with the Richmond Area MPO, the Hampton Roads TPO and other state and federal resource and regulatory agencies. By allowing for outside or inside widening to be determined on a section-by-section basis, this Alternative provides opportunities to avoid and minimize impacts. For the purpose of the impact analysis in this **Final EIS**, Alternative 1 is assumed to have the same footprint as Alternative 1A. Since Alternative 1A widens to the outside of the existing roadway, this Alternative is assumed to provide the most conservative assessment of environmental impacts.

As described in the following section, potential impacts are reported for the No-Build Alternative and for each of the Build Alternatives. A summary table providing resource impacts associated with each of the Alternatives is included in **Chapter V – Comparison of Alternatives** of this **Final EIS**.

No-Build Alternative:

Changes in existing and planned land use would not be expected with the No-Build Alternative. It is assumed that approved projects and land uses would develop as planned. There would be no impacts to Prime Farmlands, Farmlands of Statewide Importance or AFDs. However, the increasing travel-time delays associated with the No-Build Alternative would not benefit the planned development along the I-64 corridor.

Build Alternatives:

The proposed Build Alternatives could potentially affect existing and future land use in several ways. These include directly converting land from its existing use to transportation use; limiting or precluding planned future developments from occurring; and indirectly inducing unplanned development as well as supporting and enhancing planned development. However, because the Build Alternatives would involve acquiring right of way along an existing interstate corridor, none of the Build Alternatives are expected to make more than minor changes in land use, population density, or growth rate. There are Prime Farmlands and/or Farmlands of Statewide Importance located in the Counties of Henrico, New Kent, James City and York that would be impacted by the Build Alternatives. Based on coordination with the Natural Resource Conservation Service, there are Prime Farmlands and Farmlands of Statewide Importance identified in the corridor, however, impacts are not substantial to these resources since they are currently alongside the existing corridor (**Tables III.A.10 and III.A.11**). Some areas are located in Census-designated Urbanized Areas (UAs) and are not protected under the Farmland Protection Policy Act. UAs are areas designated to have over 50,000 people within a census designated boundary. There would be impacts to two AFDs, both in New Kent County, shown on **Figure III.A.1**. See **Table III.A.12** for impact amounts by Build Alternative.

Preferred Alternative:

For the purpose of the impact analysis in this **Final EIS**, Alternative 1 is assumed to have the same footprint as Alternative 1A. As identified in **Tables III.A.10 - III.A.12**, the Preferred Alternative has the same or similar potential impacts to Prime

Farmlands, Farmlands of Statewide Importance and AFDs the other Build Alternatives. This is due to the locations of the resources in relation to the Build Alternatives.

Mitigation Measures

Close coordination with appropriate localities, agencies and affected property owners would be required to ensure that land use conversions are consistent with local land use policies and plans. Impacts to AFDs would be coordinated with appropriate localities prior to project commencement.

III. ENVIRONMENTAL RESOURCES, IMPACTS AND MITIGATION

Table III.A.10: Impacts to Prime Farmlands (in Acres)

Locality	Alternative 1* General Purpose Widening	Alternative 1A General Purpose Lanes Outside Widening	Alternative 1B General Purpose Lanes Median Widening	Alternative 2A Full Toll Lanes Outside Widening	Alternative 2B Full Toll Lanes Median Widening	Alternative 3 Managed Lanes with General Purpose Lanes
New Kent County	5.14	5.14	5.15	5.14	5.15	5.14
James City County	23.65	23.65	23.63	23.65	23.63	23.63
York County	36.63	36.63	36.40	36.63	36.40	36.40

*The Preferred Alternative has been identified as Alternative 1. To provide for the most conservative assessment of impacts, Alternative 1 is assumed to have the same footprint as Alternative 1A.

Table III.A.11: Impacts to Farmlands of Statewide Importance (in Acres)

Locality	Alternative 1* General Purpose Widening	Alternative 1A General Purpose Lanes Outside Widening	Alternative 1B General Purpose Lanes Median Widening	Alternative 2A Full Toll Lanes Outside Widening	Alternative 2B Full Toll Lanes Median Widening	Alternative 3 Managed Lanes with General Purpose Lanes
Henrico County	0.00	0.00	0.01	0.00	0.01	0.00
New Kent County	4.13	4.13	4.13	4.13	4.13	4.13
James City County	10.01	10.01	10.05	10.01	10.05	10.05
York County	22.93	22.93	22.86	22.93	22.86	22.86

*The Preferred Alternative has been identified as Alternative 1. To provide for the most conservative assessment of impacts, Alternative 1 is assumed to have the same footprint as Alternative 1A.

Table III.A.12: Impacts to Agricultural/Forestral Districts

Locality	Alternative 1* General Purpose Widening	Alternative 1A General Purpose Lanes Outside Widening	Alternative 1B General Purpose Lanes Median Widening	Alternative 2A Full Toll Lanes Outside Widening	Alternative 2B Full Toll Lanes Median Widening	Alternative 3 Managed Lanes with General Purpose Lanes
Ashland Farm, New Kent County	1.28	1.28	0.48	1.28	0.48	1.22
Springfield Natts, New Kent County	0.12	0.12	0	0.12	0	0.02

*The Preferred Alternative has been identified as Alternative 1. To provide for the most conservative assessment of impacts, Alternative 1 is assumed to have the same footprint as Alternative 1A.

6. Parks, Recreation Areas and Open Space

Methodology

Parks and recreation areas were identified within a 500 foot buffer from existing right of way on either side of I-64.

Section 4(f) of the USDOT Act of 1966 (23 USC. 138 and 49 USC. 303), requires that the proposed use of land from a publicly-owned public park, recreation area, wildlife and/or waterfowl refuge, or

any significant historic or archaeological site, as part of a federally funded or approved transportation project, is permissible only if; 1) there is no feasible and prudent alternative to the use and (2) the project includes all planning to minimize harm; or (3) if the use is a *de minimis* impact. Refer to **Section H - Section 4(f) Resources** of this chapter for the 4(f) discussion for this study. Section 6(f) of the Land and Water Conservation Fund Act (16 USC 460) requires that the Secretary of the U.S. Department of the Interior approve

any conversion of lands purchased or developed with assistance under this Act to a use other than public, outdoor recreation use.

Existing Conditions

Within the study area, there are several notable parks, including the Colonial National Historical Park and Newport News Park, the largest municipal park east of the Mississippi. **Table III.A.13** is a listing of the parks and recreational facilities located in the study area and they can be viewed on **Figure III.A.1**.

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Potential Impacts

As described in Chapter II – Alternatives Considered, Section D of this Final EIS, Alternative 1 has been identified as the Preferred Alternative. Alternative 1 allows the option to widen to the outside of the existing road corridor or within the median of the existing road corridor. The decision on whether to widen to the outside or the inside of the roadway would be made on a section-by-section basis, and the development of these operationally independent sections would be closely coordinated with the Richmond Area MPO, the Hampton Roads TPO and other state and federal resource and regulatory agencies. By allowing for outside or inside widening to be determined on a section-by-section basis, this Alternative provides opportunities to avoid and minimize impacts. For the purpose of the impact analysis in this Final EIS, Alternative 1 is assumed to have the same footprint as Alternative 1A. Since Alternative 1A widens to the outside of the existing roadway, this Alternative is assumed to provide the most conservative assessment of environmental impacts.

As described in the following section, potential impacts are reported for the No-Build Alternative and for each of the Build Alternatives. A summary table providing resource impacts associated with each of the Alternatives is included in Chapter V – Comparison of Alternatives of this Final EIS.

No-Build Alternative:

The No-Build Alternative would not involve any project-related construction and therefore no impacts would result. However, projects already programmed and funded in VDOT’s SYIP would be implemented under the No-Build Alternative and could impact parks, recreational land or open space lands.

Build Alternatives:

Parks and recreation areas were identified within a 500 foot buffer from existing right of way on either side of I-64. Of the five parks and recreational areas identified, two as summarized in Table III.A.14 would be impacted by the proposed Build Alternatives.

Preferred Alternative:

For the purpose of the impact analysis in this Final EIS, Alternative 1 is assumed to have the same footprint as Alternative 1A. As identified in Table III.A.14, the Preferred Alternative has similar potential impacts to parks and recreational facilities as the other Build Alternatives. This is due to the locations of these identified parks and recreational facilities in relation to the Build Alternatives.

Mitigation Measures

Whenever possible, parks, recreation land and open space have been avoided by the proposed Alternatives. Mitigation measures for impacts to parks, recreational lands and open spaces could include:

- Replacement lands of equal or greater natural resource and economic value.
- Erosion and sediment control measures would be provided and strictly enforced to minimize impacts.
- Additional appropriate mitigation measures, such as landscaping (where applicable with respect to the resource), would be developed through coordination with the appropriate parties.
- Additional discussions are anticipated to occur regarding the project’s potential impacts to parks, recreation areas and open space and mitigation measures that could lessen potential impacts.
- Mitigation measures are outlined in Section H- Section 4(f) Resources of this chapter for impacts to those parks and recreation areas that qualify under Section 4(f).

Table III.A.13: Parks and Recreational Facilities

Facility	Amenities/Activities
Waller Mill Park, York County and James City County	2700 acre park with 360 acre reservoir owned by the City of Williamsburg. Activities include fishing, boating, hiking, pedal boating, canoeing and kayaking. Amenities include shelters, picnic tables, and playground equipment.
Colonial National Historical Park, York County	Historic Park, American Revolutionary War, includes Colonial Parkway.
Newport News Park, City of Newport News	8000 acres, largest municipal park east of Mississippi, hiking, biking, picnic sites, disc golf, 30 acre flying field, discovery center, gardens
Sandy Bottom Nature Park, City of Hampton	Campsites, nature center, yurts, amphitheater.
Bluebird Gap Farm, City of Hampton	60 acre urban farm park, 150 domestic animals, shelter, picnic areas.

Table III.A.14: Impacts to Parks and Recreational Facilities

Facility	Alternative 1* General Purpose Widening	Alternative 1A General Purpose Lanes Outside Widening	Alternative 1B General Purpose Lanes Median Widening	Alternative 2A Full Toll Lanes Outside Widening	Alternative 2B Full Toll Lanes Median Widening	Alternative 3 Managed Lanes with General Purpose Lanes
Newport News Park, City of Newport News	27.05	27.05	27.06	27.05	27.06	27.05
Bluebird Gap Farm, City of Hampton	7.42	7.42	7.42	7.42	7.42	7.42

*The Preferred Alternative has been identified as Alternative 1. To provide for the most conservative assessment of impacts, Alternative 1 is assumed to have the same footprint as Alternative 1A.

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B. Energy

Methodology

For transportation projects, energy use is predominantly influenced by the amount of fuel used, both during the construction activities as well as the road usage following construction. Transportation energy is generally discussed in terms of direct and indirect energy. Direct energy involves all energy consumed by vehicle propulsion. This energy is a function of traffic characteristics such as volume, speed, distance traveled, vehicle type mix and the thermal value of the fuel being used. Indirect energy consumption involves the non-recoverable, one-time energy consumption involved in the construction of the physical infrastructure associated with the project.

A qualitative review of the energy impacts were developed involving a comparative evaluation of the energy consumption of the No-Build Alternative to the Build Alternatives. This evaluation was based on the existing and projected vehicle miles traveled (direct), as determined and described in the *Traffic and Transportation Technical Memorandum*, and the construction cost estimates for each Build Alternative (indirect).

Existing Conditions

Although petroleum is also used in a variety of common materials such as plastics and other chemicals and powers various industry processes, oil consumption in the United States in the form of transportation fuels is prevalent. The U.S. Department of Energy tracks national energy consumption in four sectors including industrial, transportation, residential and commercial. The industrial sector has long been the country's largest energy user, currently representing about 33% of the total. Transportation is the second largest source of energy consumption in the United States, followed by the residential and commercial sectors. According to

the Virginia Energy Overview, approximately 40% of the energy used within Virginia is for transportation, primarily in the form of petroleum (gasoline in cars, diesel in trucks).

Congestion is currently an issue in different sections of the corridor with traffic volumes highest at the western and eastern ends of the study area between Exits 190 (Interstate 95) and 192 (Mechanicsville) in the City of Richmond and between Exits 250 (Fort Eustis Boulevard) and 264 (Interstate 664) in the Cities of Newport News and Hampton. Within these areas, fuel consumption can be high due to congestion-related slower speeds and idling times. Congestion also has temporal association, both within the daily cycle and a seasonal component (including significant increases in traffic volumes and worsening congestion during summer weekend peak conditions).

Potential Impacts

As described in **Chapter II – Alternatives Considered, Section D** of this **Final EIS**, Alternative 1 has been identified as the Preferred Alternative. Alternative 1 allows the option to widen to the outside of the existing road corridor or within the median of the existing road corridor. The decision on whether to widen to the outside or the inside of the roadway would be made on a section-by-section basis, and the development of these operationally independent sections would be closely coordinated with the Richmond Area MPO, the Hampton Roads TPO and other state and federal resource and regulatory agencies. By allowing for outside or inside widening to be determined on a section-by-section basis, this Alternative provides opportunities to avoid and minimize impacts. For the purpose of the impact analysis in this **Final EIS**, Alternative 1 is assumed to have the same footprint as Alternative 1A. Since Alternative 1A widens to the outside of the existing roadway, this Alternative is assumed to provide the most conservative assessment of environmental impacts.

As described in the following section, potential impacts are reported for the No-Build Alternative and for each of the Build Alternatives. A summary table providing resource impacts associated with each of the Alternatives is included

Direct Energy Consumption

Table III.B.1 lists a qualitative (Low, Medium, or High) ranking of each Alternative in terms of the increase in direct energy consumption as compared to 2011 Base Conditions. This ranking is based on the detailed traffic forecasts and Alternatives analysis outlined in the *Traffic and Transportation Technical Memorandum*.

For all Alternatives, the projected direct energy consumption is expected to be substantially mitigated by anticipated improvements to the region's vehicle fleet. Over time, older and less fuel-efficient vehicles are expected to gradually be replaced with more fuel-efficient vehicles. In addition, emerging technologies such as hybrid and electric vehicles will continue to mature, leading to an increased percentage of these vehicles on Interstate 64 (I-64).

No-Build Alternative:

Under design year 2040 No-Build conditions, I-64 is expected to see substantial increases in traffic as compared to 2011 Base Conditions. Without improvements in capacity to I-64, there is projected to be substantial increases in congestion and delay, with over 80% of the road projected to be operating at a deficient level of service (LOS). During peak travel periods, drivers could be expected to spend substantially more time idling or at significantly reduced speeds, which would result in additional fuel burned and increased emissions during their trip.

Table III.B.1: Direct Construction Energy Consumption Comparison

Type of Energy Consumption	No-Build Alternative	Build Alternatives					
		Alternative 1* General Purpose Widening	Alternative 1A General Purpose Lanes Outside Widening	Alternative 1B General Purpose Lanes Median Widening	Alternative 2A Full Toll Lanes Outside Widening	Alternative 2B Full Toll Lanes Median Widening	Alternative 3 Managed Lanes with General Purpose Lanes
Direct Construction Energy Consumption	High	Medium	Medium	Medium	Medium	Medium	Medium

*The Preferred Alternative has been identified as Alternative 1. To provide for the most conservative assessment of impacts, Alternative 1 is assumed to have the same footprint as Alternative 1A.

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Preferred Alternative:

For the purpose of the impact analysis in this **Final EIS**, Alternative 1 is assumed to have the same footprint as Alternative 1A. As identified in **Table III.B.1**, the Preferred Alternative has the same potential impacts to direct construction energy consumption as the other Build Alternatives.

Alternatives 1A/1B:

Alternatives 1A/1B (which are identical to each other in terms of traffic volumes and capacity) are projected to result in increased traffic (ranging from 27% in the rural areas to 6-11% in Hampton) on I-64. However, much of that is expected to be traffic that would still exist under the No-Build Alternative because traffic would use other roads to avoid a severely congested I-64. The total amount of vehicles, and vehicle-miles traveled, in the region would not significantly change. In addition, the capacity of I-64 would be improved under Alternatives 1A/1B to a LOS C or better. Therefore, there would be substantially less idling and/or reduced speeds for drivers on I-64, which in turn would result in less fuel being burned during their trip as compared to the No-Build Alternative.

Alternatives 2A/2B:

Alternatives 2A/2B (which are identical to each other in terms of traffic volumes and capacity) are projected to have less traffic on I-64 as compared to Alternatives 1A/1B, due to traffic diverting off of I-64 in order to avoid the tolls. That traffic would use alternate routes such as US 60, which is a slower-speed road that has occasional traffic signals. Therefore, when considering both I-64 and its parallel roads, this Alternative could be expected to result in more fuel burned as compared to Alternatives 1A/1B due to drivers choosing less fuel-efficient alternative routes in order to avoid a tolled I-64.

Alternative 3:

Overall, the energy consumption of Alternative 3 is anticipated to be about the same as the energy consumption of Alternatives 1A/1B. The general purpose lanes in Alternative 3 may have a LOS below C, however the managed lanes would be designed to operate at a LOS B and be completely congestion-free. Managed lanes could accommodate an express bus service, and some of them would promote multiple-occupancy vehicles, which would result in the same number of persons occupying fewer vehicles and resulting in less fuel consumed.

Indirect Energy Consumption

The indirect energy consumption is the energy needed to construct the study Alternatives. Accurate indirect energy costs are extremely difficult to estimate given the uncertainty of field variables at this point in the study. The indirect energy values calculated should be considered as an indicator between Alternatives rather than absolute values. Construction energy factors estimate the amount of energy necessary to extract raw materials, manufacture and fabricate construction materials, transport materials to the work site, and complete construction activities. The indirect energy consumption was assessed using the construction cost estimates. **Table III.B.2** lists a qualitative ranking of each Alternative in terms of indirect energy consumption.

No-Build Alternative:

Maintenance activities would be required for the corridor under the No-Build Alternative, which would involve construction energy consumption activities. In comparison to the various Build Alternatives, this long-term maintenance of the existing corridor would be considered Low.

Alternatives 1A/2A:

Outside widening activities for Alternative 1A/2A would require more energy than Alternatives 1B/2B because widening would occur to the outside of the existing roadway and would require separate work zones. Also, there would be substantially more earthwork anticipated for the outside widening Alternative due to the existing conditions along the corridor.

Alternatives 1B/2B:

Inside widening activities for this Alternative would require a substantial level of energy consumption; however, it anticipated to be less than Alternatives 1A/2A due to the elimination of work zones in some areas (where the median is relatively narrow, one work zone may be established to construct both sides of the roadway). Also, there would be less earthwork required for these Alternatives due to the existing conditions along the corridor.

Alternative 3:

This Alternative would have similar energy consumption impacts as Alternatives 1B and 2B. The reason for this is that managed lane systems are usually on the left-most lanes of a roadway, so the managed lane concepts are, by default, “inside widening” scenarios. However, it should be noted that there is the potential for numerous “off-ramp bridges” that would be required to move traffic from the inner most managed lanes to the interchange ramps without traffic disruption along the general purpose lanes. For that reason, it is anticipated that Alternative 3 would have a high degree of energy consumption for construction.

Preferred Alternative:

For the purpose of the impact analysis in this **Final EIS**, Alternative 1 is assumed to have the same footprint as Alternative 1A. As identified in **Table III.B.2**, the Preferred Alternative has the same potential impacts to indirect construction energy consumption as the other Build Alternatives.

Table III.B.2: Indirect Construction Energy Consumption Comparison

Type of Energy Consumption	No-Build Alternative	Build Alternatives					
		Alternative 1* General Purpose Widening	Alternative 1A General Purpose Lanes Outside Widening	Alternative 1B General Purpose Lanes Median Widening	Alternative 2A Full Toll Lanes Outside Widening	Alternative 2B Full Toll Lanes Median Widening	Alternative 3 Managed Lanes with General Purpose Lanes
Indirect Construction Energy Consumption	Low	High	High	High	Medium	Medium	High

*The Preferred Alternative has been identified as Alternative 1. To provide for the most conservative assessment of impacts, Alternative 1 is assumed to have the same footprint as Alternative 1A.

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Mitigation Measures

An improved corridor is anticipated to increase the overall energy consumption along the corridor due to the increased capacity, although the anticipated improvements to vehicular fuel economy is expected to substantially reduce the anticipated impacts.

Conservation of energy could be achieved in the facility planning, construction, operation and maintenance. Conservation could also be applied to recycling pavements, hardware items such as guardrails, tires, right of way, signals, etc., and using indigenous plants for landscaping.

Other measures that could be applied include using energy-efficient electronics, such as light-emitting diode light fixtures and traffic signals, high pressure sodium vapor roadway lights and solar-powered devices. Measures to mitigate the indirect energy usage during construction may include limiting the idling of machinery and optimizing construction methods to lower overall fuel use.

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C. Air Quality

Methodology

Air quality became a national concern in the mid-1960s, leading to the passage of the Air Quality Act in 1967. Following the passage of the federal Clean Air Act Amendments (CAAA) of 1990, states were mandated to implement additional steps to reduce airborne pollutants and improve local and regional conditions. Automobile emissions have been identified as a critical element in attaining the federal National Ambient Air Quality Standards (NAAQS) for carbon monoxide (CO), ozone (O₃) and fine particulate matter (PM_{2.5}).

Generally, local air quality is assessed on a micro-scale by evaluating CO concentrations at the project level. High concentrations of CO tend to occur in areas of high traffic volumes or areas adjacent to a stationary source of the pollutant. The CO emissions are associated with the incomplete combustion of fossil fuels in motor vehicles and are considered to be a good indicator of vehicle-induced air pollution.

Criteria Pollutants - Under the National Environmental Policy Act (NEPA), federal agencies must consider environmental factors in the decision making process. Changes in air quality, and the effects of such changes on human health and welfare, are among the factors to be considered.

Under provisions of the Clean Air Act (CAA), the U.S. Environmental Protection Agency (USEPA) is required to set NAAQS for pollutants considered harmful to public health and welfare. As shown in **Table III.C.1**, the USEPA has established Primary Standards, the attainment and maintenance of which, in the judgment of USEPA, and allowing an adequate margin of safety, are requisite to protect the public health. The USEPA also established Secondary Standards to protect the public welfare (e.g., to protect against damage to crops, vegetation, buildings and animals). The pollutants (CO, lead, nitrogen dioxide, PM, fine particulate matter, O₃ and sulfur dioxide) for which NAAQS have been established are called “criteria pollutants.” Federal actions must not cause or contribute to any new violation of the NAAQS, increase the frequency or severity of any existing violation, or delay timely attainment of any standard or required interim milestone.

Mobile Source Air Toxics (MSAT) - In addition to the criteria air pollutants for which there are NAAQS, the USEPA also regulates air toxics. Most air toxics originate from human-made sources,

Table III.C.1: National Ambient Air Quality Standards

Pollutant	Primary Standards		Secondary Standards	
	Level	Averaging Time	Level	Averaging Time
Carbon Monoxide	9 ppm* (10 mg/m ³)**	8-hour ⁽¹⁾	None	
	35 ppm (40 mg/m ³)	1-hour ⁽¹⁾		
Lead	0.15 µg/m ³ ⁽²⁾	Rolling 3-Month Average	Same as Primary	
	1.5 µg/m ³	Quarterly Average		
Nitrogen Dioxide	0.053 ppm (100 µg/m ³)	Annual (Arithmetic Mean)	Same as Primary	
Particulate Matter (PM ₁₀)	150 µg/m ³	24-hour ⁽³⁾	Same as Primary	
Particulate Matter (PM _{2.5})	15.0 µg/m ³	Annual ⁽⁴⁾ (Arithmetic Mean)	Same as Primary	
	35 µg/m ³	24-hour ⁽⁵⁾		
Ozone	0.075 ppm (2008 std)	8-hour ⁽⁶⁾	Same as Primary	
	0.08 ppm (1997 std)	8-hour ⁽⁷⁾		
	0.12 ppm	1-hour ⁽⁸⁾		
Sulfur Dioxide	0.03 ppm	Annual (Arithmetic Mean)	0.5 ppm (1300 µg/m ³)	3-hour ⁽¹⁾
	0.14 ppm	24-hour ⁽¹⁾		

Source: Table and footnotes are excerpted from USEPA Website: <http://www.epa.gov/air/criteria.htm>.

*ppm - parts per million; **mg/m³ - milligrams per cubic meter

- (1) Not to be exceeded more than once per year.
- (2) Final rule signed October 15, 2008.
- (3) Not to be exceeded more than once per year on average over three years.
- (4) To attain this standard, the 3-year average of the weighted annual mean PM_{2.5} concentrations from single or multiple community-oriented monitors must not exceed 15.0 micrograms per cubic meter (µg/m³).
- (5) To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m³ (effective December 17, 2006).
- (6) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm (effective May 27, 2008).
- (7) (a) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm.
(b) The 1997 standard — and the implementation rules for that standard — will remain in place for implementation purposes as USEPA undertakes rulemaking to address the transition from the 1997 ozone standard to the 2008 ozone standard.
- (8) (a) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is < 1.
(b) As of June 15, 2005, USEPA has revoked the 1-hour ozone standard in all areas except the fourteen 8-hour ozone nonattainment Early Action Compact (EAC) Areas. For one of the 14 EAC areas (Denver, CO), the 1-hour standard was revoked on November 20, 2008. For the other 13 EAC areas, the 1-hour standard was revoked on April 15, 2009.

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including on-road mobile sources, non-road mobile sources and stationary sources (e.g., factories or refineries). MSAT are a subset of the 188 air toxics defined by the CAA, of which the USEPA identified seven compounds with significant contributions from mobile sources. These seven criteria pollutants are acrolein, benzene, 1,3-butadiene, diesel PM plus diesel exhaust organic gases (diesel PM), formaldehyde, naphthalene and polycyclic organic matter.

Existing Conditions

Attainment Status/Regional Air Quality Conformity - The study area encompasses the Richmond Area Metropolitan Planning Organization (MPO), Tri-Cities MPO and the Hampton Roads Transportation Planning Organization (TPO) which are responsible for regional conformity analyses. The portions of the project located in Henrico, James City and York Counties and the Cities of Richmond, Newport News and Hampton lie in an area that is currently designated as being in “maintenance” with the 8-hour ozone standard. As such, the proposed project is subject to regional transportation conformity requirements for ozone. In addition, the project is located in an area designated as attainment for both PM₁₀ and PM_{2.5}.

The *Interstate 64 (I-64) Peninsula Study* is included in the Hampton Roads TPO *FY 2012-2015 Transportation Improvement Program (TIP)* and *2034 Long-Range Transportation Plan (LRTP)* for Preliminary Engineering (PE) only. Similarly, the project is included in both the Richmond Planning District Commission and the Tri-Cities Area MPO *FY 2012-2015 TIP* and *2035 LRTP* for PE only. Therefore, the project was not included in the regional conformity determination. Once funding is identified through the Construction Phase, the preferred Alternative can be added to the LRTP to meet the fiscal constraint requirements and can then be included in a regional transportation conformity analysis, if required.

Potential Impacts

As described in **Chapter II – Alternatives Considered, Section D** of this **Final EIS**, Alternative 1 has been identified as the Preferred Alternative. Alternative 1 allows the option to widen to the outside of the existing road corridor or within the median of the existing road corridor. The decision on whether to widen to the outside or the inside of the roadway would be made on a section-by-section basis, and the development of these operationally independent sections would be closely coordinated with the Richmond Area MPO, the Hampton Roads TPO and other state

and federal resource and regulatory agencies. By allowing for outside or inside widening to be determined on a section-by-section basis, this Alternative provides opportunities to avoid and minimize impacts. For the purpose of the impact analysis in this **Final EIS**, Alternative 1 is assumed to have the same footprint as Alternative 1A. Since Alternative 1A widens to the outside of the existing roadway, this Alternative is assumed to provide the most conservative assessment of environmental impacts.

As described in the following section, potential impacts are reported for the No-Build Alternative and for each of the Build Alternatives. A summary table providing resource impacts associated with each of the Alternatives is included

The purpose of this analysis was to evaluate potential air quality impacts as a result of each of the Alternatives retained for detailed study. As such, the air study investigated the potential impacts from the five highway Build Alternatives related to CO concentrations, PM and MSAT emissions and compared those results to the No-Build Alternative. In addition, potential air quality construction related impacts were also qualitatively considered.

No-Build Alternative:

The No-Build Alternative is evaluated solely for the purpose of providing comparison for the Build Alternatives results.

Build Alternatives:

CO Methodology and Assessment Procedures - The CO assessment has been conducted in accordance with procedures identified in the Virginia Department of Transportation’s (VDOT) *Consultant Guide – Air Quality Project-Level Analysis*, May 2009 (Revision 18), *USEPA’s Guideline for Modeling Carbon Monoxide from Roadway Intersections* and Federal Highway Administration (FHWA) general guidance. Emissions and ambient CO concentrations were modeled using USEPA’s MOBILE6.2 emission factor model using FHWA’s Easy Mobile Inventory Tool (EMIT) interface software. CO emission rates were calculated for existing (2011), opening year (2020) and Design Year (2040) Conditions. Once calculated, CAL3QHC Version 2.0 was used for modeling the dispersion of peak CO concentrations adjacent to the four worst-case interchange areas as well as the two worst-case signalized intersections along the project corridor.

For the purposes of the quantitative CO hot-spot analysis, the four worst-case interchange areas were selected for analysis based on worst-case annual average daily traffic volumes under Design Year

(2040) Build Alternatives 1A/1B. The CO hot-spot assessment included two of the top three interchanges based on total PM peak hour traffic volumes under Design Year (2040) Alternatives 1A/1B, when compared to all other interchanges along the project corridor. The four interchange areas selected for further analysis in the study were:

- I-64 Exit 190 – I-64 and I-95 Interchange (west), Ranked #1.
- I-64 Exit 243 – Busch Gardens Interchange (central).
- I-64 Exit 261 – I-64 and Hampton Roads Center Parkway Interchange (east).
- I-64 Exit 263 – I-64 and US 258 (Mercury Boulevard) Interchange (east), Ranked #3.

As part of this process, the air study included the assessment of the worst-case peak CO concentrations at 41 modeling receptors adjacent to the four interchanges identified above for Existing (2011); Opening Year (2020) No-Build and Build; and Design Year (2040) No-Build and Build Conditions for Alternatives 1A/1B and Alternative 3. In order to streamline the air quality assessment, Alternatives 2A/2B are discussed qualitatively in the air study since electronic tolling is expected to have no negative effects on air quality on I-64 and queuing traffic conditions is not expected at the toll gantries. In addition, traffic projections for Alternatives 2A/2B are projected to be less than Alternatives 1A/1B in all cases along the project corridor. As such, any projected peak CO concentrations for Alternatives 2A/2B at the interchange locations would be less than any projected peak CO concentrations for Alternatives 1A/1B. Therefore, Alternatives 1A/1B were assumed to represent worst-case conditions.

In addition, each of the project Alternatives could indirectly affect signalized intersections adjacent to the corridor. In order to capture the potential effects of the project on adjacent signalized intersections in the analysis, the top 15 worst-case signalized intersections in the project corridor were reviewed and analyzed based on PM peak hour traffic volumes. Each of these signalized intersections was evaluated based on total traffic volume, level of service (LOS), delay, percent change in traffic volumes from No-Build to Build Conditions and potential increases in traffic volumes as a result of diversions associated with Alternatives 2A/2B.

It was determined that for the Design Year (2040) No-Build and Build Alternatives 1A/1B, the signalized intersection identified below would not only contain the highest PM peak hour traffic

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volumes, but would also experience a “F” LOS. As such, for the purposes of the CO hot-spot analysis, the intersection identified below was considered to experience worst-case conditions and was therefore chosen for further analysis:

- I-64 Exit 255 – Route 143 and Brick Kiln Boulevard WalMart Way intersection.

In addition, a second signalized intersection was selected based on detailed traffic studies for Alternatives 2A/2B. The intersection identified below is located in a part of the corridor that is expected to experience the highest potential traffic volume diversion as a result of tolling. As such, the intersection identified below was also chosen to be included in the CO hot-spot analysis:

- I-64 Exit 238 – Rochambeau Drive/Route 143 and I-64 eastbound off-ramp.

Once the two signalized intersections were identified, the worst-case peak CO concentrations were projected at 49 additional modeling receptors for Existing (2011); Opening Year (2020) No-Build and Build; and Design Year (2040) No-Build and Build Conditions for all Alternatives considered. As stipulated by USEPA guidance, worst-case locations were selected for analysis based on assessments of where human activity is likely to coincide with the highest CO concentrations. If the worst-case interchanges/intersections selected for the analysis do not show

an exceedance of the CO NAAQS, then it is assumed that all other locations within the project corridor will also remain below the CO NAAQS.

Interchange Summary - Maximum CO concentrations for the selected interchanges are summarized in **Table III.C.2**. For each analysis year, the peak 1-hour and 8-hour CO concentrations are projected to be below the CO NAAQS (as shown in **Table III.C.1**) of 35 ppm and 9 ppm, respectively. Additionally, as modeled under each analysis condition, the peak 1-hour CO concentrations are below the 8-hour standard.

The air quality receptors studied at each interchange location are shown on **Figure III.C.1**. The peak CO concentrations for all the receptors included in the air study can be referenced in the *Air Quality Technical Memorandum*.

Signalized Intersection Summary (I-64 Exit 255 - Route 143 and Brick Kiln Boulevard/Walmart Way) - Maximum CO concentrations for the Route 143 and Brick Kiln Boulevard/WalMart Way signalized intersection are summarized in **Table III.C.3**. For each analysis year and consistent with the interchange summary, the highest 1-hour and 8-hour peak CO concentrations are projected to be below the CO NAAQS of 35 ppm and 9 ppm, respectively. The 28 air quality receptors studied at the Route 143 and Brick Kiln Boulevard/WalMart Way intersection are shown on

Figure III.C.1. The peak CO concentrations for all 28 receptors included in the air study can be referenced in the *Air Quality Technical Memorandum*.

PM₁₀ and PM_{2.5} - The project is located in an area designated as attainment for PM₁₀ and PM_{2.5}. As such, based on the attainment designation for PM_{2.5}, no hot-spot analysis is required for transportation conformity purposes since the area has not been identified as nonattainment or maintenance and is in compliance with the PM NAAQS. Additionally, the project is not considered to be a project of air quality concern with respect to PM based on the March 2006 final rule and satisfies 40 CFR 93.123(b)(1). Furthermore, the project will not cause or contribute to a new violation of the PM NAAQS, increase the frequency or severity of a violation, or delay timely attainment of the PM NAAQS. A detailed discussion on PM₁₀ and PM_{2.5} is included in the *Air Quality Technical Memorandum*.

MSAT - The results of the quantitative MSAT analysis are summarized in **Table III.C.4**. In general, the results show that MSAT emissions are expected to decline significantly from Existing Year (2011) Conditions to both the project Opening Year (2020) and Design Year (2040) Build Conditions for each of the Alternatives considered (1A/1B, 2A/2B and 3). More specifically, the results show that MSATs will decline about 19% to 76%

Table III.C.2: Interchange Summary Data - Highest CO Concentrations

Year	Alternative	Highest 1-Hour CO Concentration (ppm)	Highest 8-Hour CO Concentration (ppm)	Receptor Location	Exit Location
Opening Year 2020	No-Build Alternative	7.4	5.2	4-1	263
	Alternative 1*	8.2	5.7	4-1	263
	Alternative 1A	8.2	5.7	4-1	263
	Alternative 1B	8.2	5.7	4-1	263
	Alternative 3	7.3	5.1	4-1	263
Design Year 2040	No-Build Alternative	7.5	5.3	4-1	263
	Alternative 1*	8.2	5.7	4-1	263
	Alternative 1A	8.4	5.9	4-1	263
	Alternative 1B	8.4	5.9	4-1	263
	Alternative 3	7.6	5.3	4-1	263

*The Preferred Alternative has been identified as Alternative 1. To provide for the most conservative assessment of impacts, Alternative 1 is assumed to have the same footprint as Alternative 1A. Note: Alternatives 2A/2B were not included in the CO hot-spot analysis since projected traffic volumes are less than Alternatives 1A/1B.



Figure III.C.1 Air Quality

Map 1 of 3



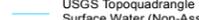
- Air Quality Modeling Receiver Site (Interchange Analysis)
- Air Quality Modeling Receiver Site (Signalized Intersection Analysis)
- Existing I-64 Right of Way
- Limits of Widest Alternative Footprint
- USGS Topoquadrangle Surface Water (Non-Assessed)
- Non-Assessed Water Bodies
- Locality Jurisdiction



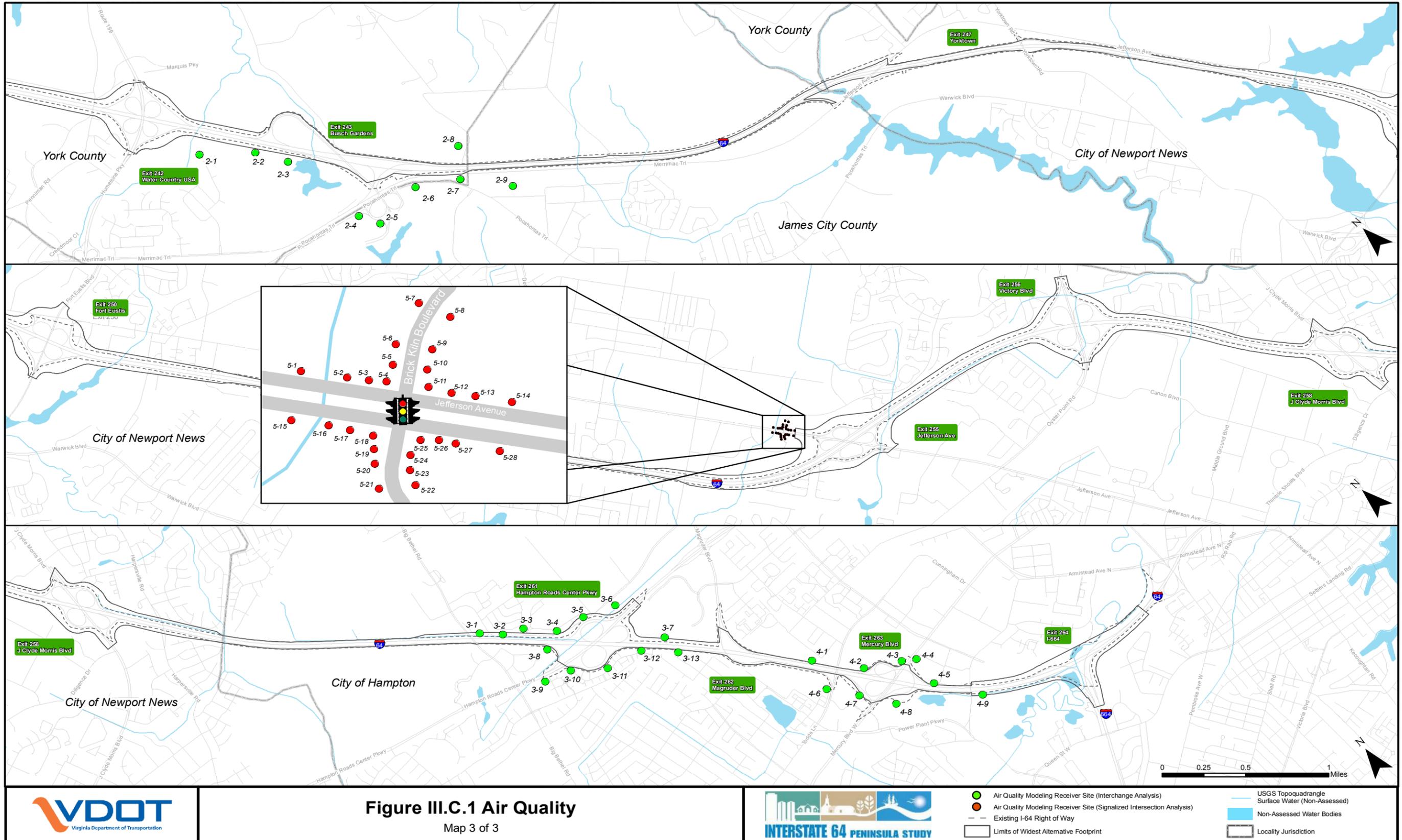
Figure III.C.1 Air Quality

Map 2 of 3



- Air Quality Modeling Receiver Site (Interchange Analysis)
- Air Quality Modeling Receiver Site (Signalized Intersection Analysis)
- Existing I-64 Right of Way
- Limits of Widest Alternative Footprint
-  USGS Topoquadrangle Surface Water (Non-Assessed)
-  Non-Assessed Water Bodies
-  Locality Jurisdiction





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between 2011 and 2020 for each of the Alternatives considered. In addition, MSATs will decline about 6% to 86% between 2011 and 2040 for each of the Alternatives considered. These reductions in MSATs are projected to occur even though the vehicle miles traveled (VMT) are projected to increase 10% to 15% for each of the Alternatives considered between 2011 and 2020, and from about 41% to 46% for each of the Alternatives considered between 2011 and 2040. The largest reductions between 2011 and 2040 are expected to occur in Diesel PM where emissions are expected to decrease over 86% for each of the Alternatives considered.

The results also indicate that the emissions of each of the MSATs are expected to decline about 3% to 4% when comparing the

Opening Year (2020) Condition for Alternatives 2A/2B and Alternative 3 to the No-Build (2020) Condition. Similarly, the emissions of each of the MSATs are expected to decline 2% to 3% when comparing the Design Year (2040) Condition for Alternatives 2A/2B and Alternative 3 to the No-Build (2040) Condition. The results do indicate that emissions from the Opening Year (2020) Alternatives 1A/1B are projected to increase from 0.3% to 0.4% when compared to the No-Build (2020) Condition for each respective MSAT, although this increase is not considered to be significant, especially when compared to regional emission levels and considering the projected decline in MSATs between 2011 and 2020. A similar increase in MSAT emissions of 0.1% to 0.2% is

projected to occur in the Design Year (2040) Alternative 1A/1B Condition when compared to the No-Build (2040) Condition, although again this increase is considered to be insignificant.

The results of the analysis are consistent with the national MSAT emission trends as predicted by MOBILE6.2 from 1999-2050. The results of the analysis indicate that no meaningful increases in MSAT have been identified and are not expected to cause an adverse effect on the human environment as a result of any of the Alternatives considered. Additional details including methodology, identification of the affected network, input parameters used and detailed discussion of the results of the quantitative analysis can be referenced in the *Air Quality Technical Memorandum*.

Table III.C.3: Intersection Summary Data - Highest CO Concentrations

Year	Alternative	Highest 1-Hour CO Concentration (ppm)	Highest 8-Hour CO Concentration (ppm)	Receptor Location
Opening Year 2020	No-Build Alternative	7.9	5.5	5-16
	Alternative 1*	8.2	5.7	5-7, 5-13, 5-26
	Alternative 1A	8.2	5.7	5-7, 5-13, 5-26
	Alternative 1B	8.2	5.7	5-7, 5-13, 5-26
	Alternative 2A	9.8	6.9	5-7
	Alternative 2B	9.8	6.9	5-7
	Alternative 3	8.4	5.9	5-14, 5-16
Design Year 2040	No-Build Alternative	9.4	6.6	5-7
	Alternative 1*	9.4	6.6	5-7
	Alternative 1A	9.4	6.6	5-7
	Alternative 1B	9.4	6.6	5-7
	Alternative 2A	9.6	6.7	5-7
	Alternative 2B	9.6	6.7	5-7
	Alternative 3	9.6	6.7	5-7

*The Preferred Alternative has been identified as Alternative 1. To provide for the most conservative assessment of impacts, Alternative 1 is assumed to have the same footprint as Alternative 1A.

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Table III.C.4: MSAT Pollutants on “Affected Network”*

Year	Alternative	Million Vehicle Miles Traveled	Acrolein	Benzene	1,3-Butadiene	Diesel PM	Formaldehyde	Naphthalene	Polycyclic Organic Matter
Existing Year 2011	Existing	35.28	8.14	503.48	64.53	57.47	154.10	12.20	13.08
Opening Year 2020	No-Build Alternative	40.57	5.79	346.55	45.13	13.92	113.18	9.67	10.55
	Alternative 1**	40.72	5.81	347.87	45.30	13.97	113.62	9.70	10.59
	Alternative 1 (1A/1B)	40.72	5.81	347.87	45.30	13.97	113.62	9.70	10.59
	Alternative 2 (2A/2B)	39.39	5.61	336.09	43.77	13.52	109.76	9.38	10.24
	Alternative 3	38.78	5.62	335.53	43.68	13.31	109.75	9.30	10.16
	Alternative 1 vs. No-Build	0.4%	0.3%	0.4%	0.4%	0.4%	0.4%	0.3%	0.4%
	Alternative 2 vs. No-Build	-2.9%	-3.1%	-3.0%	-3.0%	-2.9%	-3.0%	-3.0%	-2.9%
	Alternative 3 vs. No-Build	-4.4%	-2.9%	-3.2%	-3.2%	-4.4%	-3.0%	-3.8%	-3.7%
	Alternative 1 vs. Existing	15.4%	-28.6%	-30.9%	-29.8%	-75.7%	-26.3%	-20.5%	-19.0%
	Alternative 2 vs. Existing	11.6%	-31.1%	-33.2%	-32.2%	-76.5%	-28.8%	-23.1%	-21.7%
Alternative 3 vs. Existing	9.9%	-31.0%	-33.4%	-32.3%	-76.8%	-28.8%	-23.8%	-22.3%	
Design Year 2040	No-Build Alternative	51.59	6.39	378.24	49.42	7.85	126.22	11.46	12.55
	Alternative 1**	51.59	6.40	378.60	49.46	7.85	126.34	11.47	12.56
	Alternative 1A	51.59	6.40	378.60	49.46	7.85	126.34	11.47	12.56
	Alternative 1B	50.52	6.25	369.60	48.30	7.68	123.32	11.21	12.28
	Alternative 3	49.90	6.28	370.89	48.43	7.59	123.89	11.17	12.23
	Alternative 1 vs. No-Build	0.0%	0.2%	0.1%	0.1%	0.0%	0.1%	0.1%	0.1%
	Alternative 2 vs. No-Build	-2.1%	-2.2%	-2.3%	-2.3%	-2.2%	-2.3%	-2.2%	-2.2%
	Alternative 3 vs. No-Build	-3.3%	-1.7%	-1.9%	-2.0%	-3.3%	-1.8%	-2.5%	-2.5%
	Alternative 1 vs. Existing	46.2%	-21.4%	-24.8%	-23.4%	-86.3%	-18.0%	-6.0%	-4.0%
	Alternative 2 vs. Existing	43.2%	-23.2%	-26.6%	-25.2%	-86.6%	-20.0%	-8.1%	-6.1%
Alternative 3 vs. Existing	41.4%	-22.9%	-26.3%	-24.9%	-86.8%	-19.6%	-8.4%	-6.5%	

Note: All values represent tons per year.

*Annual vehicle miles traveled within the “affected network.”

**The Preferred Alternative has been identified as Alternative 1. To provide for the most conservative assessment of impacts, Alternative 1 is assumed to have the same footprint as Alternative 1A.

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D. Noise

Methodology

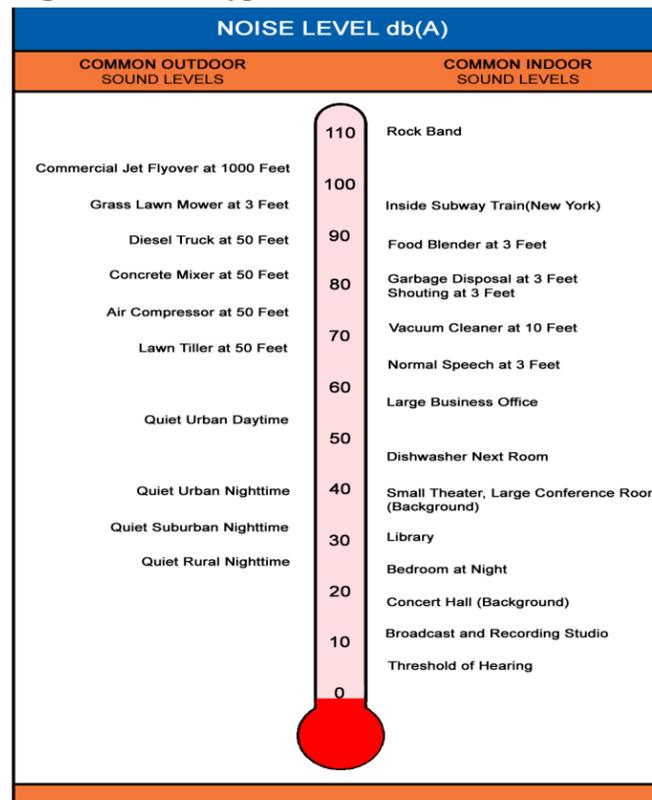
Noise is measured in decibels (dB). To account for human sensitivity to noise, decibels are measured on the A-weighted scale (dB(A)). The A-weighted scale is the preferred measurement for traffic noise because it is comprised of the sound level frequencies that are most easily distinguished by the human ear, out of the entire sound level spectrum. Highway noise is categorized as a linear noise source, where varying noise levels occur at a fixed point during a single vehicle pass by. These fluctuating noise levels can be characterized by a single number known as the equivalent noise level (L_{eq}). The L_{eq} is the value of a steady state sound level that would represent the same sound energy as the actual time varying sound evaluated over the same time period. The highway traffic noise analysis focuses on the hourly, A-weighted L_{eq} . For example, a diesel truck 50 feet away would have a L_{eq} of approximately 90 dB(A). **Figure III.D.1** shows typical indoor and outdoor noise levels.

To determine the degree of highway noise impact, Federal Highway Administration (FHWA) developed Noise Abatement Criteria (NAC) for a number of different land use categories. The goal of the NAC is to minimize the adverse noise impacts on the community and to provide feasible and reasonable noise abatement measures where necessary and appropriate. **Table III.D.1** documents the NAC for the associated activity land use category shown in the adjacent column.

As described in the *Noise Technical Memorandum*, computer modeling was conducted to predict Existing and Design Year noise levels associated with traffic-induced noise using FHWA Traffic Noise Model (TNM) 2.5 computer-modeling program. The modeling effort compiled highway design files (existing and proposed conceptual design), traffic data, roadway cross-sections, survey of terrain, aerial photography, and existing noise levels determined during the noise monitoring efforts. Noise monitoring was performed at 59 locations in an effort to validate existing levels shown in the noise model.

Common Noise Environments (CNEs) were established for the project by grouping noise modeling and monitoring sites together in order to evaluate traffic noise impacts and potential noise mitigation options to residential developments or communities

Figure III.D.1 Typical Noise Levels



as a whole, as well as for consideration of feasibility and reasonableness of possible noise abatement measures for specific communities.

The methodologies applied to the noise analysis for this project are in accordance with the Virginia Department of Transportation’s (VDOT) *State Noise Abatement Policy*, effective July 13, 2011, and updated September 2011. VDOT guidelines are based on 23 of CFR 772 and FHWA’s *Procedures for Abatement of Highway Traffic Noise and Construction Noise* (23 CFR 772).

Existing Conditions

There were 538 modeled or monitored receptor sites identified which were grouped into 66 CNEs for this project as shown in **Table III.D.2**. These 538 modeling points represent 5,529 residences, four churches, two cemeteries, five schools, five athletic fields, four golf courses, six parks, one campground, two hotels, two correctional facilities, nine pools, two tennis courts, two playgrounds, and one auditorium. Using the modeling and

monitoring data, existing noise levels were determined for each site as depicted in **Table III.D.2**. There are 85 sites that have existing noise levels over the NAC of 66 dB(A) which represent 947 residences, one athletic field, three golf courses, three parks, and one pool.

Additionally, there are 15 existing sound barriers along the Interstate 64 (I-64) project corridor. These existing barriers are located along the eastern end of the project area east of Exit 250 (Fort Eustis Boulevard) in the City of Newport News and the Hampton Roads area.

Potential Impacts

As described in **Chapter II – Alternatives Considered, Section D** of this **Final EIS**, Alternative 1 has been identified as the Preferred Alternative. Alternative 1 allows the option to widen to the outside of the existing road corridor or within the median of the existing road corridor. The decision on whether to widen to the outside or the inside of the roadway would be made on a section-by-section basis, and the development of these operationally independent sections would be closely coordinated with the Richmond Area MPO, the Hampton Roads TPO and other state and federal resource and regulatory agencies. By allowing for outside or inside widening to be determined on a section-by-section basis, this Alternative provides opportunities to avoid and minimize impacts. For the purpose of the impact analysis in this **Final EIS**, Alternative 1 is assumed to have the same footprint as Alternative 1A. Since Alternative 1A widens to the outside of the existing roadway, this Alternative is assumed to provide the most conservative assessment of environmental impacts.

As described in the following section, potential impacts are reported for the No-Build Alternative and for each of the Build Alternatives. A summary table providing resource impacts associated with each of the Alternatives is included

As part of this study, noise analysis was performed to determine if future noise levels at the sensitive receptors would approach or exceed FHWA NAC. The noise levels associated with the existing design year (2040) modeling analysis are summarized for each Alternative and CNE in **Table III.D.2**. Projected noise impacts are noted at each modeled or monitored receptor site. A summary of the projected noise impacts is included below in **Table III.D.3**. **Figure III.D.2** depicts the CNEs that are impacted along the corridor.

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Table III.D.1: Noise Abatement Criteria (Hourly A-Weighted Sound Level Decibels (dB(A))¹)

Activity Category	Activity Leq (h) ⁴	Criteria ² L10 (h)	Evaluation Location	Description of Activity Category
A	57	60	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B ³	67	70	Exterior	Residential.
C ³	67	70	Exterior	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, public meeting rooms, public or non-profit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52	55	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or non-profit institutional structures, radio studios, recording studios, schools, and television studios.
E ³	72	75	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties of activities not included in A-D or F.
F	--	--	Exterior	Agriculture, airports, bus yards, emergency services, industrial logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing
G	--	--	--	Undeveloped lands that are not permitted.

1. Either Leq(h) or L10(h) (but not both) may be used on a project.
2. The Leq(h) and L10(h) Activity Criteria values are for impact determination only, and are not design standards for noise abatement measure.
3. Includes undeveloped lands permitted for this Activity Criteria.
4. VDOT utilizes the Leq(h) designation.

The eastern terminus of this study overlaps with the western termini of the *Hampton Road Bridge-Tunnel Study Environmental Impact Statement (EIS)* at Exit 264 (I-64/Interstate 664 (I-664)) interchange. The *Hampton Roads Bridge-Tunnel Study* is adjacent to the eastern termini of this project. Both projects are being studied by VDOT and FHWA as independent utility projects. Due to the overlap, coordination between the studies occurred to ensure that the CNEs are the same in terms of dimension and location. Additional details are included in the *Noise Technical Memorandum*.

Preferred Alternative:

For the purpose of the impact analysis in this **Final EIS**, Alternative 1 is assumed to have the same footprint as Alternative 1A. As identified in **Table III.D.2**, the minimum and the maximum dB(A)s for the Preferred Alternative for a given CNE are similar for the other Build Alternatives. This is due to the locations of the identified CNEs in relation to the Build Alternatives.

Mitigation Measures

Federal regulations (23 CFR Part 772) state that if a noise level at any given receptor approaches or exceeds the appropriate abatement criterion, or if predicted traffic noise levels substantially exceed the existing noise levels (by 10 dB(A)), abatement considerations are evaluated in an attempt to reduce future noise to acceptable levels. This is Phase 1 of VDOT’s three-phase approach.

Phase 2 determines the feasibility of the noise barrier considered for abatement. In order for a barrier to be considered feasible it must achieve at least a 5 dB(A) noise reduction at fifty percent of the impacted receptors. In addition, the barrier must be able to be physically constructed. This takes into account safety, topography, drainage, utilities, and other factors that may affect the possibility of constructing a barrier.

While noise barriers and/or earth berms are generally the most effective form of noise abatement, other abatement measures exist that have the potential to provide considerable noise reductions, under certain circumstances. Additionally, the Code of Virginia (§33.1-223.2:21) states “*Whenever the Commonwealth Transportation Board or the Department plan for or undertake any highway construction or improvement project and such project includes or may include the requirement for the mitigation of traffic noise impacts, first consideration should be given to the use of noise reducing design and low noise pavement materials and techniques in lieu of construction of noise walls or sound barriers. Vegetative screening, such as the planting of appropriate conifers, in such a design would be utilized to act as a visual screen if visual screening is required.*”

Phase 3 determines the reasonableness of the proposed barrier. At the preliminary stage, some parameters can not yet be quantified (such as the desire of the impacted community). All reasonable factors must be achieved in order for a noise abatement measurement to be considered reasonable. These factors include: viewpoints of the benefited receptors (50% of benefited receptors must be in favor of the abatement measure); cost effectiveness (maximum square footage of abatement per benefited receptor (MaxSF/BR) must not exceed 1,600 square feet); and noise reduction design goals (reduction of future highway traffic noise by 7dB(A) at one or more impacted receptor).

Noise abatement was evaluated where noise impacts are predicted to occur. There were a number of barriers that were considered, however not all of them were found to be feasible and reasonable.

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Table III.D.2: Noise Analysis Summary

CNE	Site Representation	Existing Conditions Year 2011			No-Build Alternative Design Year 2040			Alternative 1* Design Year 2040			Alternatives 1A/2A Design Year 2040			Alternatives 1B/2B Design Year 2040			Alternative 3 Design Year 2040		
		Min dB(A)	Max dB(A)	Number of Impacts	Min dB(A)	Max dB(A)	Number of Impacts	Min dB(A)	Max dB(A)	Number of Impacts	Min dB(A)	Max dB(A)	Number of Impacts	Min dB(A)	Max dB(A)	Number of Impacts	Min dB(A)	Max dB(A)	Number of Impacts
1	3 residences, 2 cemeteries and 1 church	59	65	none	63	67	1 residence and 1 cemetery	61	68	1 cemetery	61	68	1 cemetery	61	67	1 cemetery	60	66	1 cemetery
2	24 residences and 1 church	56	68	1 residence	60	70	1 residence	57	68	1 residence	57	68	1 residence	57	68	1 residence	57	68	1 residence
3	116 residences	57	72	61 residences	59	73	78 residences	61	77	78 residences	61	77	78 residences	61	77	72 residences	58	73	53 residences
4	45 residences	63	65	none	65	67	10 residences	65	66	30 residences	65	66	30 residences	65	67	30 residences	63	65	none
5	278 residences	56	72	105 residences	57	73	162 residences	59	73	225 residences	59	73	225 residences	60	73	149 residences	58	72	189 residences
6	50 residences, 2 schools and 2 athletic fields	56	69	9 residences and 1 athletic field	58	70	20 residences and 2 athletic fields	60	73	25 residences and 1 athletic field	60	73	25 residences and 1 athletic field	60	73	25 residences and 1 athletic field	57	71	25 residences and 1 athletic field
7	15 residences	59		none	60		none	64		none	64		none	64		none	63		none
8	5 residences	60		none	61		none	63		none	63		none	63		none	63		none
9	146 residences	54	69	13 residences	56	70	13 residences	54	72	53 residences	54	72	53 residences	55	72	38 residences	55	70	38 residences
10	166 residences	53	68	9 residences	55	70	13 residences	56	71	13 residences	56	71	13 residences	56	71	13 residences	57	71	13 residences
11	59 residences	52	61	none	54	64	none	55	65	none	55	65	none	55	65	none	55	65	none
12	3 residences	63		none	63		none	64		none	64		none	63		none	64		none
13	11 residences	51	53	none	51	52	none	52	55	none	52	55	none	53	55	none	52	54	none
14	1 residence	60		none	59		none	59		none	59		none	59		none	59		none
15	15 residences	48	60	none	49	62	none	51	64	none	51	64	none	50	63	none	50	63	none
16	56 residences	55	69	22 residences	57	71	22 residences	59	72	22 residences	59	72	22 residences	59	72	22 residences	58	70	20 residences
17	25 residences	55	63	none	57	65	none	59	67	4 residences	59	67	4 residences	59	67	4 residences	58	65	none
18	14 residences	60	65	none	61	67	12 residences	61	67	12 residences	61	67	12 residences	62	69	12 residences	61	67	12 residences
19	44 residences and 1 golf course	48	68	4 residences and 1 golf course	49	69	5 residences and 1 golf course	53	71	15 residences and 1 golf course	53	71	15 residences and 1 golf course	53	70	15 residences and 1 golf course	53	69	15 residences and 1 golf course
20	29 residences	53	62	none	54	65	none	55	65	none	55	65	none	55	65	none	49	65	none
21	6 residences	60		none	62		none	64		none	64		none	63		none	62		none
22	1 park	57		none	58		none	60		none	60		none	60		none	57		none
23	5 residences	48	65	none	50	66	2 residences	51	68	2 residences	51	68	2 residences	51	67	2 residences	50	66	2 residences
24	2 residences	53	67	1 residence	55	68	1 residence	56	71	1 residence	56	71	1 residence	56	71	1 residence	54	68	1 residence
25	10 residences	54	61	none	56	63	none	57	65	none	57	65	none	57	65	none	57	63	none
26	1 residence	56		none	58		none	59		none	59		none	59		none	58		none
27	18 residences	57	61	none	59	63	none	60	64	none	60	64	none	60	64	none	59	62	none

*The Preferred Alternative has been identified as Alternative 1. To provide for the most conservative assessment of impacts, Alternative 1 is assumed to have the same footprint as Alternative 1A.

**Refer to the *Noise Technical Memorandum, Appendix D* for specific NAC applied to each modeled or monitored receptor.

III. ENVIRONMENTAL RESOURCES, IMPACTS AND MITIGATION

Table III.D.2: Noise Analysis Summary (continued)

CNE	Site Representation	Existing Conditions Year 2011			No-Build Alternative Design Year 2040			Alternative 1* Design Year 2040			Alternatives 1A/2A Design Year 2040			Alternatives 1B/2B Design Year 2040			Alternative 3 Design Year 2040		
		Min dB(A)	Max dB(A)	Number of Impacts	Min dB(A)	Max dB(A)	Number of Impacts	Min dB(A)	Max dB(A)	Number of Impacts	Min dB(A)	Max dB(A)	Number of Impacts	Min dB(A)	Max dB(A)	Number of Impacts	Min dB(A)	Max dB(A)	Number of Impacts
28	3 residences	60		none	61		none	62		none	62		none	62		none	60		none
29	1 golf course	48	68	1 golf course	50	70	1 golf course	51	73	1 golf course	51	73	1 golf course	51	73	1 golf course	50	71	1 golf course
30	14 residences	59	60	none	61	63	none	62	63	none	62	63	none	61	63	none	61	62	none
31	4 residences and 1 campground	56	63	none	58	65	none	58	65	none	58	65	none	58	65	none	58	64	none
32	7 residences	55	67	3 residences	57	69	3 residences	58	72	3 residences	58	72	3 residences	58	72	3 residences	57	70	3 residences
33	24 residences	53	70	17 residences	55	72	17 residences	55	75	18 residences	55	75	18 residences	55	74	18 residences	55	71	17 residences
34	32 residences	49	68	7 residences	51	71	13 residences	51	71	7 residences	51	71	7 residences	51	71	7 residences	50	69	7 residences
35	1 residence	60		none	61		none	61		none	61		none	61		none	60		none
36	29 residences, 1 hotel* and 1 park	52	68	9 residences	54	70	16 residences	55	74	16 residences	55	74	16 residences	55	72	16 residences	54	70	16 residences
37	10 residences	58	71	2 residences	60	73	2 residences	61	72	2 residences	61	72	2 residences	61	74	2 residences	61	72	2 residences
38	1 school	51		none	53		none	54		none	54		none	54		none	53		none
39	57 residences and 1 athletic field	56	71	6 residences	58	73	17 residences	58	74	6 residences and 1 athletic field	58	74	6 residences and 1 athletic field	58	74	6 residence and 1 athletic field	57	71	6 residences
40	49 residences	58	67	11 residences	60	69	16 residences	58	70	11 residences	58	70	11 residences	57	70	11 residences	57	69	11 residences
41	76 residences	58	70	21 residences	60	72	28 residences	62	72	35 residences	62	72	35 residences	61	71	35 residences	60	69	21 residences
42	22 residences	54	64	none	57	66	3 residences	58	65	none	58	65	none	58	65	none	56	64	none
43	1 golf course	66		1 golf course	67		1 golf course	69		1 golf course	69		1 golf course	68		1 golf course	67		1 golf course
44	11 residences	56	65	none	61	71	8 residences	58	70	8 residences	58	70	8 residences	59	70	8 residences	58	68	4 residences
45	13 residences	56	62	none	58	65	none	60	67	2 residences	60	67	2 residences	60	67	2 residences	59	66	2 residences
46	2 correctional facilities**	66	67	none	68	70	none	69	71	none	69	71	none	69	70	none	67	69	none
47	1 park and 1 residence	55	68	1 park	58	72	1 park	59	71	1 park	59	71	1 park	61	71	1 park	60	70	1 park
48	574 residences and 1 playground	56	75	211 residences	58	77	281 residences	60	76	160 residences	60	76	160 residences	60	75	185 residences	60	74	265 residences and 1 playground
49	398 residences, 1 tennis court and 1 pool	57	77	224 residences and 1 pool	60	79	256 residences, 1 pool and 1 tennis court	60	78	282 residences and 1 pool	60	78	282 residences and 1 pool	60	78	282 residences and 1 pool	60	79	240 residences and 1 pool
50	63 residences	53	60	none	56	63	none	55	64	none	55	64	none	56	64	none	55	63	none
51	180 residences	58	62	none	60	64	none	59	63	none	59	63	none	59	63	none	59	63	none
52	447 residences	56	59	none	58	61	none	57	60	none	57	60	none	57	60	none	58	60	none

*The Preferred Alternative has been identified as Alternative 1. To provide for the most conservative assessment of impacts, Alternative 1 is assumed to have the same footprint as Alternative 1A.

**Refer to the *Noise Technical Memorandum, Appendix D* for specific NAC applied to each modeled or monitored receptor.

III. ENVIRONMENTAL RESOURCES, IMPACTS AND MITIGATION

Table III.D.2: Noise Analysis Summary (continued)

CNE	Site Representation	Existing Conditions Year 2011			No-Build Alternative Design Year 2040			Alternative 1* Design Year 2040			Alternatives 1A/2A Design Year 2040			Alternatives 1B/2B Design Year 2040			Alternative 3 Design Year 2040		
		Min dB(A)	Max dB(A)	Number of Impacts	Min dB(A)	Max dB(A)	Number of Impacts	Min dB(A)	Max dB(A)	Number of Impacts	Min dB(A)	Max dB(A)	Number of Impacts	Min dB(A)	Max dB(A)	Number of Impacts	Min dB(A)	Max dB(A)	Number of Impacts
53	100 residences, 1 play ground and 1 pool	59	65	none	60	67	7 residences	58	65	none	58	65	none	58	65	none	59	63	none
54	285 residences and 1 golf course	56	64	none	58	65	none	58	64	none	58	64	none	58	64	none	58	65	none
55	124 residences, 1 school and 1 athletic field	56	67	23 residences	60	68	37 residences	61	65	none	61	65	none	61	65	none	61	65	none
56	394 residences, 4 pools, 1 hotel* and 1 church	58	68	none	59	69	25 residences	60	70	none	60	70	none	60	70	none	59	67	none
57	210 residences, 1 pool, 1 church and 1 park	54	61	none	55	62	none	56	63	none	56	63	none	56	63	none	56	64	none
58	126 residences and 1 pool	57	62	none	58	63	none	59	63	none	59	63	none	59	63	none	59	65	none
59	1 park	63	73	1 park	64	74	1 park	65	75	1 park	65	75	1 park	65	75	1 park	65	76	1 park
60	48 residences, 1 school and 1 athletic field	56	62	none	57	63	none	58	65	none	58	65	none	58	65	none	58	64	none
61	460 residences, 1 tennis court and 1 pool	52	60	none	54	64	none	54	65	none	54	65	none	54	65	none	55	65	none
62	526 residences	55	72	182 residences	55	73	182 residences	55	73	182 residences	55	73	182 residences	55	73	182 residences	56	74	182 residences
63	1 park	71		1 park	72		1 park	74		1 park	74		1 park	74		1 park	74		1 park
63A	3 residences	62		none	63		none	64		none	64		none	64		none	64		none
64	1 auditorium and 70 residences	60	66	5 residences	61	67	10 residences	64	68	48 residences	64	68	48 residences	64	68	48 residences	62	66	10 residences
65	20 residences	61	63	none	62	64	none	61	65	none	61	65	none	61	65	none	60	63	none

*The Preferred Alternative has been identified as Alternative 1. To provide for the most conservative assessment of impacts, Alternative 1 is assumed to have the same footprint as Alternative 1A.

**Refer to the *Noise Technical Memorandum, Appendix D* for specific NAC applied to each modeled or monitored receptor.

III. ENVIRONMENTAL RESOURCES, IMPACTS AND MITIGATION

Table III.D.4 presents a summary of the proposed barriers for each Alternative. There are 13 barriers that would be considered feasible and reasonable for Alternatives 1 (Preferred Alternative), 1A/2A and 1B/2B and 12 barriers that are considered feasible and reasonable for Alternative 3 at this time in the study. In addition, there are four existing barriers that are impacted due to the project. For the analysis, these barriers were replaced ‘in-kind’ meaning that although the barrier had to be moved, the receptors maintained the same level of noise protection.

The noise evaluation is preliminary and a more detailed review would be completed during the final design of each operationally independent section. As such, noise barriers that are found to be feasible and reasonable during the preliminary noise analysis may not be found to be feasible and reasonable during the final design noise analysis. Conversely, noise barriers that were not considered feasible and reasonable may meet the established criteria and be recommended for construction. The *Noise Technical Memorandum* contains detailed information regarding the evaluation of potential abatement for the Build Alternatives.

Table III.D.3: Projected Noise Impacts Summary

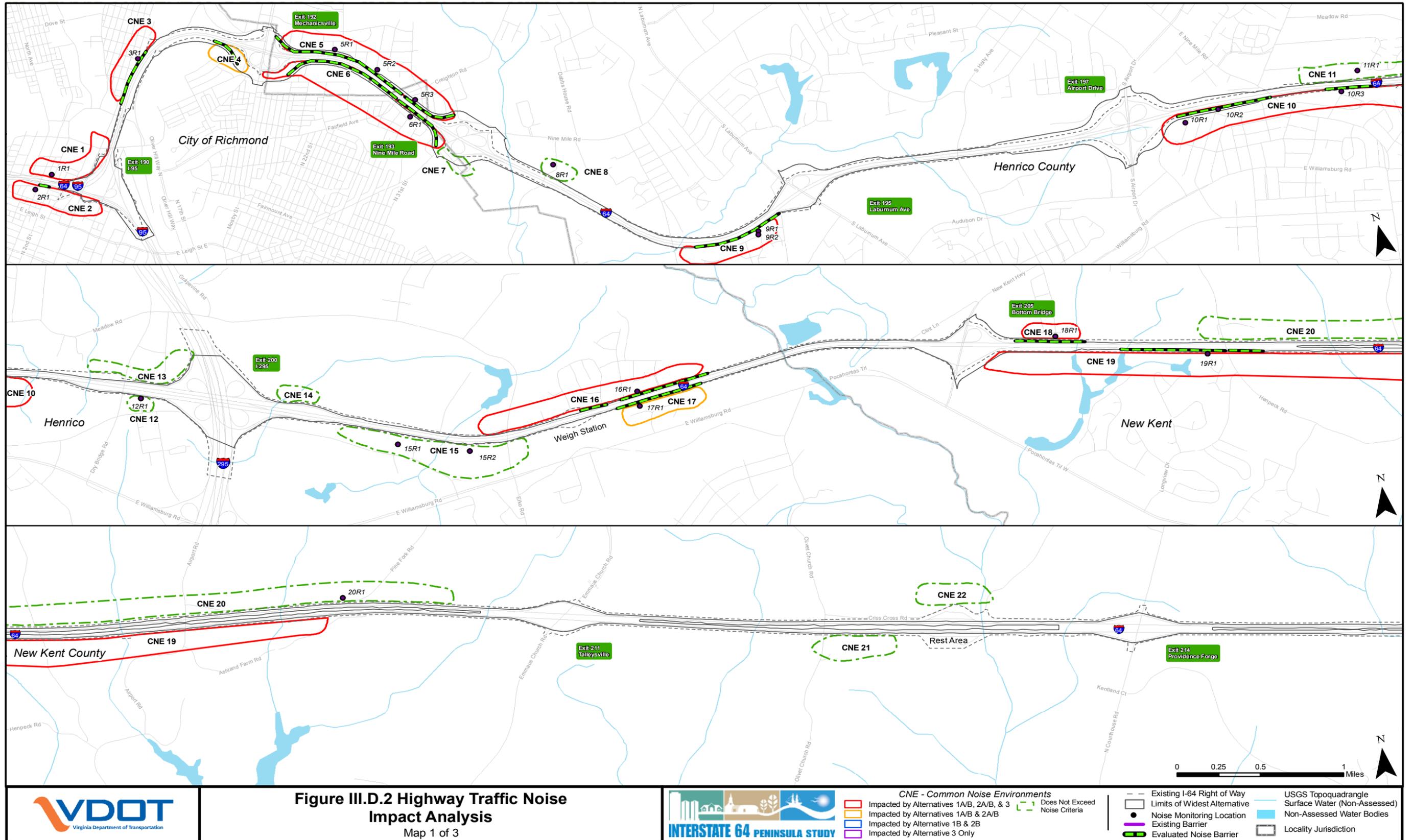
CNE Number/ Receptor Type	Total Present within Study Corridor	Existing Conditions	No-Build Alternative	Build Alternatives					
				Alternative 1* General Purpose Widening	Alternative 1A General Purpose Lanes Outside Widening	Alternative 1B General Purpose Lanes Median Widening	Alternative 2A Full Toll Lanes Outside Widening	Alternative 2B Full Toll Lanes Median Widening	Alternative 3 Managed Lanes with General Purpose Lanes
CNEs	66	27	35	33	33	33	33	33	31
Residences	5,529	947	1,262	1,262	1,262	1,190	1,262	1,190	1,156
Cemeteries	2	0	1	1	1	1	1	1	1
Athletic Fields	4	1	2	2	2	2	2	2	1
Golf Courses	4	3	3	3	3	3	3	3	3
Parks	6	3	3	3	3	3	3	3	3
Pools	9	1	1	1	1	1	1	1	1
Playgrounds	2	0	0	0	0	0	0	0	1

*The Preferred Alternative has been identified as Alternative 1. To provide for the most conservative assessment of impacts, Alternative 1 is assumed to have the same footprint as Alternative 1A.

Table III.D.4: Preliminary Noise Barrier Determination

Barrier Summary	Alternative 1* General Purpose Widening	Alternative 1A General Purpose Lanes Outside Widening	Alternative 1B General Purpose Lanes Median Widening	Alternative 2A Full Toll Lanes Outside Widening	Alternative 2B Full Toll Lanes Median Widening	Alternative 3 Managed Lanes with General Purpose Lanes
Total Benefited Sites	1,511	1,511	1,470	1,511	1,470	1,642
Number of Barriers Recommended	13	13	13	13	13	12
Total Length of Proposed Barriers (Linear Feet)	39,376	39,376	39,376	39,376	39,376	37,321

*The Preferred Alternative has been identified as Alternative 1. To provide for the most conservative assessment of impacts, Alternative 1 is assumed to have the same footprint as Alternative 1A.



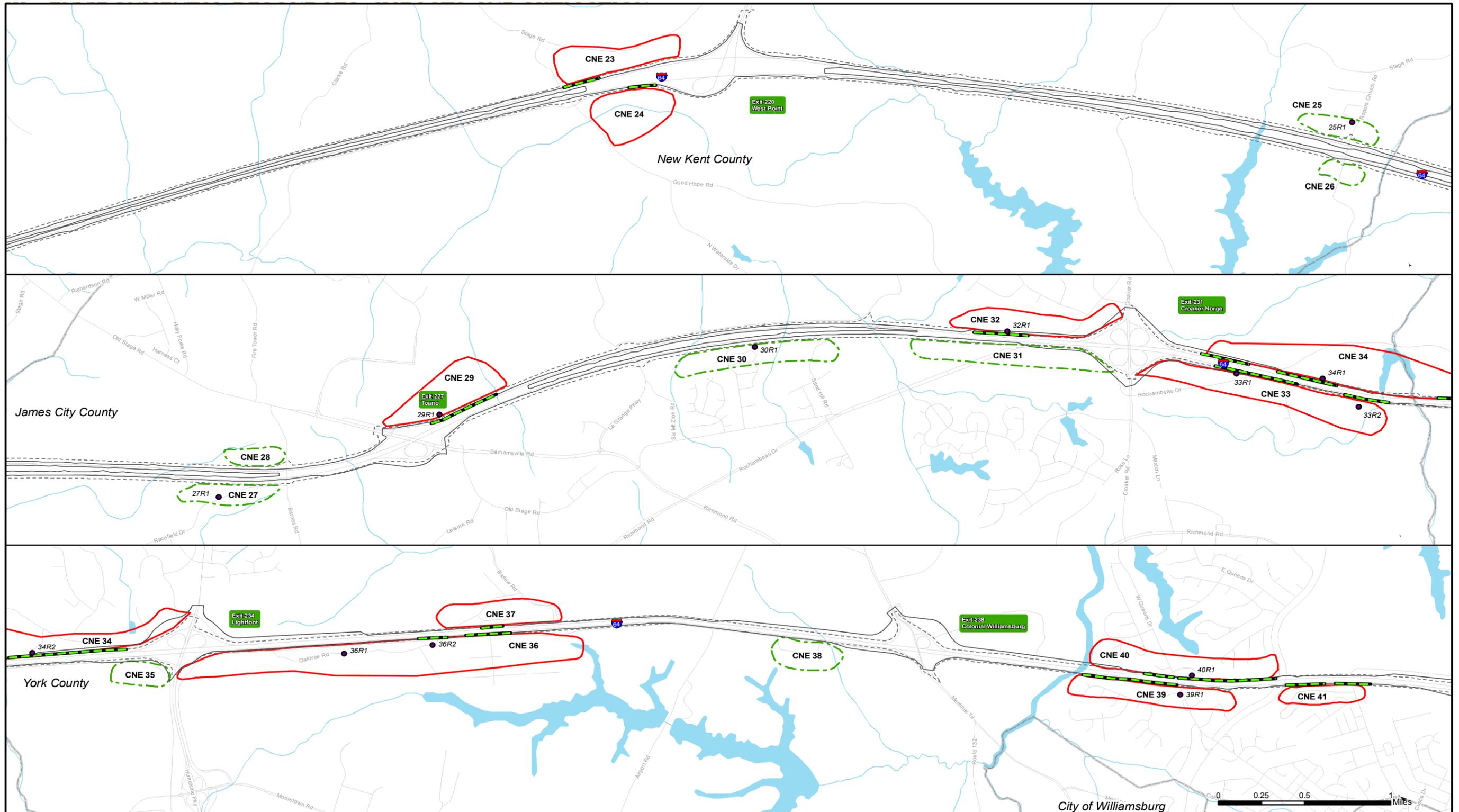


Figure III.D.2 Highway Traffic Noise Impact Analysis
Map 2 of 3



<p>CNE - Common Noise Environments</p> <ul style="list-style-type: none"> Impacted by Alternatives 1A/B, 2A/B, & 3 Impacted by Alternatives 1A/B & 2A/B Impacted by Alternative 1B & 2B Impacted by Alternative 3 Only 		<ul style="list-style-type: none"> Does Not Exceed Noise Criteria 	<ul style="list-style-type: none"> Existing I-64 Right of Way Limits of Widest Alternative Noise Monitoring Location Existing Barrier Evaluated Noise Barrier 	<ul style="list-style-type: none"> USGS Topoquadrangle Surface Water (Non-Assessed) Non-Assessed Water Bodies Locality Jurisdiction
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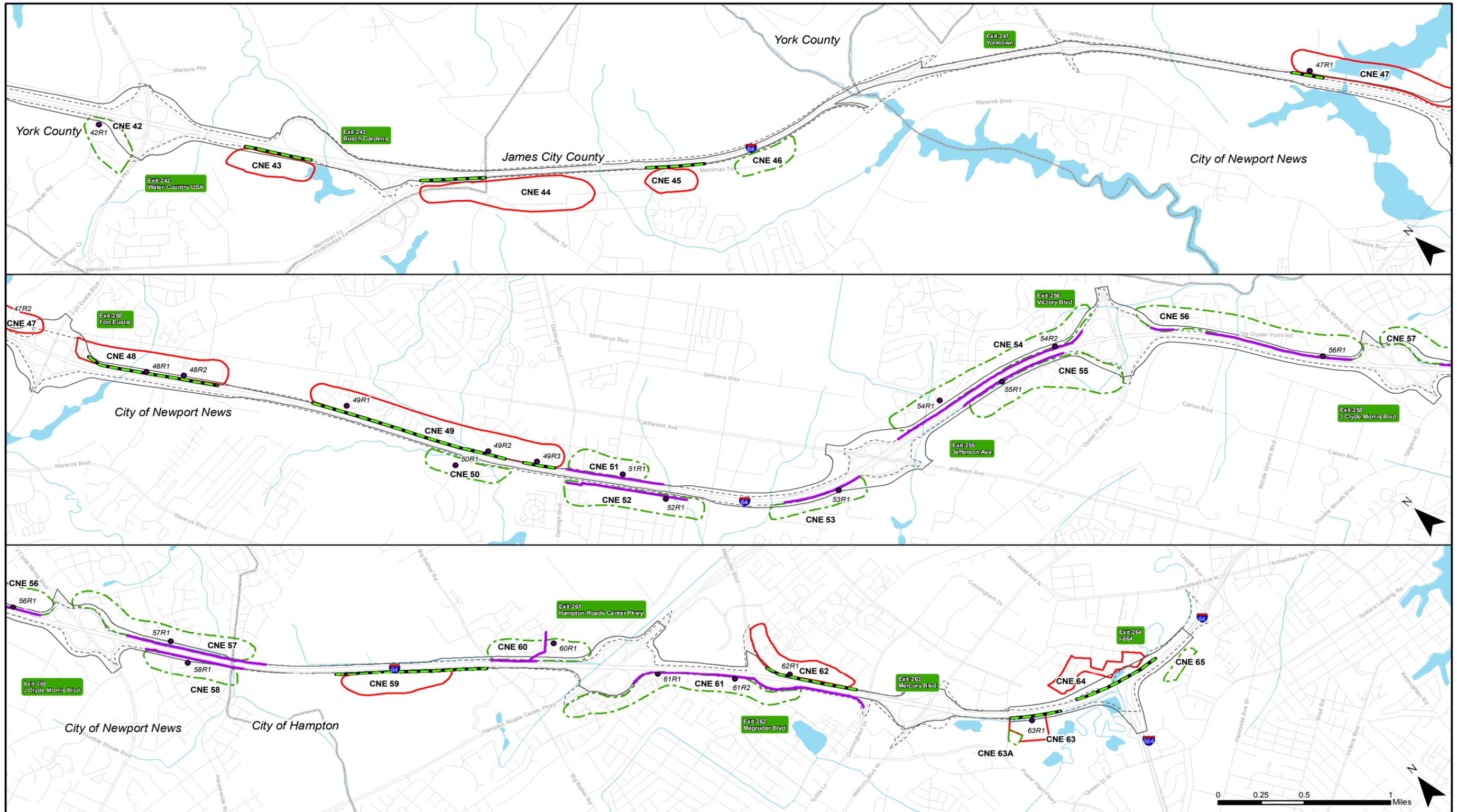


Figure III.D.2 Highway Traffic Noise Impact Analysis
Map 3 of 3



- CNE - Common Noise Environments**
- Impacted by Alternatives 1A/B, 2A/B, & 3
 - Impacted by Alternatives 1A/B & 2A/B
 - Impacted by Alternative 1B & 2B
 - Impacted by Alternative 3 Only
 - Does Not Exceed Noise Criteria
- Legend:**
- Existing I-64 Right of Way
 - Limits of Widest Alternative
 - Noise Monitoring Location
 - Existing Barrier
 - Evaluated Noise Barrier
 - USGS Topoquadrangle Surface Water (Non-Assessed)
 - Non-Assessed Water Bodies
 - Locality Jurisdiction

III. ENVIRONMENTAL RESOURCES, IMPACTS AND MITIGATION

E. Natural Resources

1. Waters of the United States, including Wetlands

Methodology

In Virginia, Waters of the United States, including wetlands, are primarily regulated by the United States Army Corps of Engineers (Corps), the Virginia Department of Environmental Quality (VDEQ) and the Virginia Marine Resources Commission (VMRC). These resources are regulated under Section 401 and 404 of the Clean Water Act (CWA), the Virginia Water Protection Permit (VWPP) Program Regulation 9 VAC 25-210 and the Virginia Wetlands Act (Chapter 13, Title 28.2 of the Code of Virginia).

There are both tidal and non-tidal wetlands and stream systems located within the project corridor. Impacts to these systems resulting from the discharge of fill material into or otherwise encroachment under, over, or through these systems may require a Section 404 Corps permit, a VDEQ VWPP and a VMRC Subaqueous Bottomlands Permit.

The assessment methodology to identify the presence and location of Waters of the United States, including wetlands, within the project corridor included desktop and field review components. Surface waters were designated as either a wetland (labeled WET) or other Waters of the United States (labeled WUS), with the systems further designated as being located north of the mainline (N), south of the mainline (S), or within the median (M). The same physical stream channel or wetland system may have different designations if they are located within more than one area. Wetlands were identified in the field in accordance with the *Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987) and supplemental guidance papers issued by the Corps, the Natural Resources Conservation Service (NRCS) and the United States Fish and Wildlife Service (USFWS) and were classified according to the Cowardin System, as described in *A Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979). As part of the scope for this project, regional supplements were not followed and Rapanos jurisdictional determination forms were not completed. The boundaries of the systems were mapped using Global Positioning System (GPS) and identified on project base mapping. Road side ditches (some jurisdictional and others non-jurisdictional) were prevalent along the corridor and were assessed following guidance provided by the Corps and the VDEQ, both in written communication and in personal communication during a pre-field work site visit held

with the Corps on June 8, 2011. The procedures for completing the wetland and stream assessment for this project, including the directive to not use the regional supplements and the approach to address stormwater management features, were discussed with and agreed to by the Corps during the June 8, 2011, meeting.

A jurisdictional determination from the Corps to determine which resources are regulated by the agencies would need to be obtained during the permitting phase of the project. Also during the permitting phase, avoidance and minimization techniques for the systems must be fully demonstrated and a compensatory mitigation plan for impacts would also be completed.

Navigable Waters are regulated by the Corps under Section 10 of the Rivers and Harbors Act of 1899. Navigable Waters of the United States are defined by the Corps as those waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. Once a determination of navigability is made by the Corps, this definition applies laterally over the entire surface of the waterbody, and is not extinguished by later actions or events which impede or destroy navigable capacity. Navigable Waters, by definition, include all tidal waterbodies including streams/rivers and wetlands.

For more information regarding the Waters of the United States, including wetlands, along the project corridor, refer to the *Natural Resources Technical Memorandum*.

Existing Conditions

The project corridor falls within three of the twelve major river basins in Virginia, specifically the James River (Lower James River sub-basin), the York River and the Chesapeake Bay/Atlantic Ocean and Small Coastal Basins, with all drainage ultimately entering the Chesapeake Bay.

The study identified numerous Waters of the United States, including wetlands, within the project corridor. **Figure III.E.1** shows the location of these systems along the corridor. A total of 99.93 acres of wetlands and 148,493 linear feet of other waters were identified within the project corridor. The types of resources identified are summarized in **Table III.E.1**. A total of 70.40 acres of non-tidal and 29.53 acres of tidal wetlands were identified. The tidal wetlands were associated with Queen Creek and Newmarket Creek, whose current crossings are bridged. These two stream systems were the only tidal streams identified within the project area (4,467 linear feet). Considering non-tidal stream systems,

127,563 linear feet of perennial channel, 12,490 linear feet of intermittent channel and 3,800 linear feet of ephemeral channel were identified within the project boundary. In addition, 173 linear feet of lacustrine resources were identified. Navigable waters within the study area were the tidal features identified through the desktop review and field review and include the streams and any associated wetland systems of Queen Creek and Newmarket Creek.

Table III.E.1: Identified Wetlands and Other Waters of the United States within the Study Area

Resource	Wetlands (acres)	Other Waters of the United States (linear feet)
Total Identified Resources	99.93	148,493
Non-Tidal Systems	70.40	144,026
Tidal Systems	29.53	4,467

As summarized in **Table III.E.2**, the median had the least amount of both wetlands and other waters while the greatest amount of wetlands and greatest amount of other waters were identified south and north of the mainline, respectively.

Regarding tidal features specifically, the least amount of tidal resources were identified within the median (0.66 acres of wetlands and 98 linear feet of other waters), the greatest amount of tidal wetlands (21.73 acres) were identified south of the mainline and the greatest amount of tidal other waters (4,249 linear feet) were located north of the mainline.

The majority of the systems have been influenced to some degree by the roadway itself or the intense development along the corridor, particularly those systems in or near the Cities of Richmond, Newport News and Hampton.

Table III.E.2: Location of Identified Wetlands and Other Waters of the United States within the Study Area

Location	Wetlands (acres)	Other Waters of the United States (linear feet)
North of Mainline	35.80	66,370
Median	18.09	19,275
South of Mainline	46.04	62,848



Figure III.E.1 Water Resources

Map 1 of 3



- Existing Right of Way
- Limits of Widest Alternative Footprint
- USGS Topoquadrangle Surface Water (Non-Assessed)
- Locality Jurisdiction
- Assessed Streams and Waterbodies
- Assessed Wetlands
- Non Assessed Water Bodies
- New Kent Farms Public Groundwater Well
- ▨ FEMA 100 Year Floodplains
- 2010 VDEQ Impaired Waters

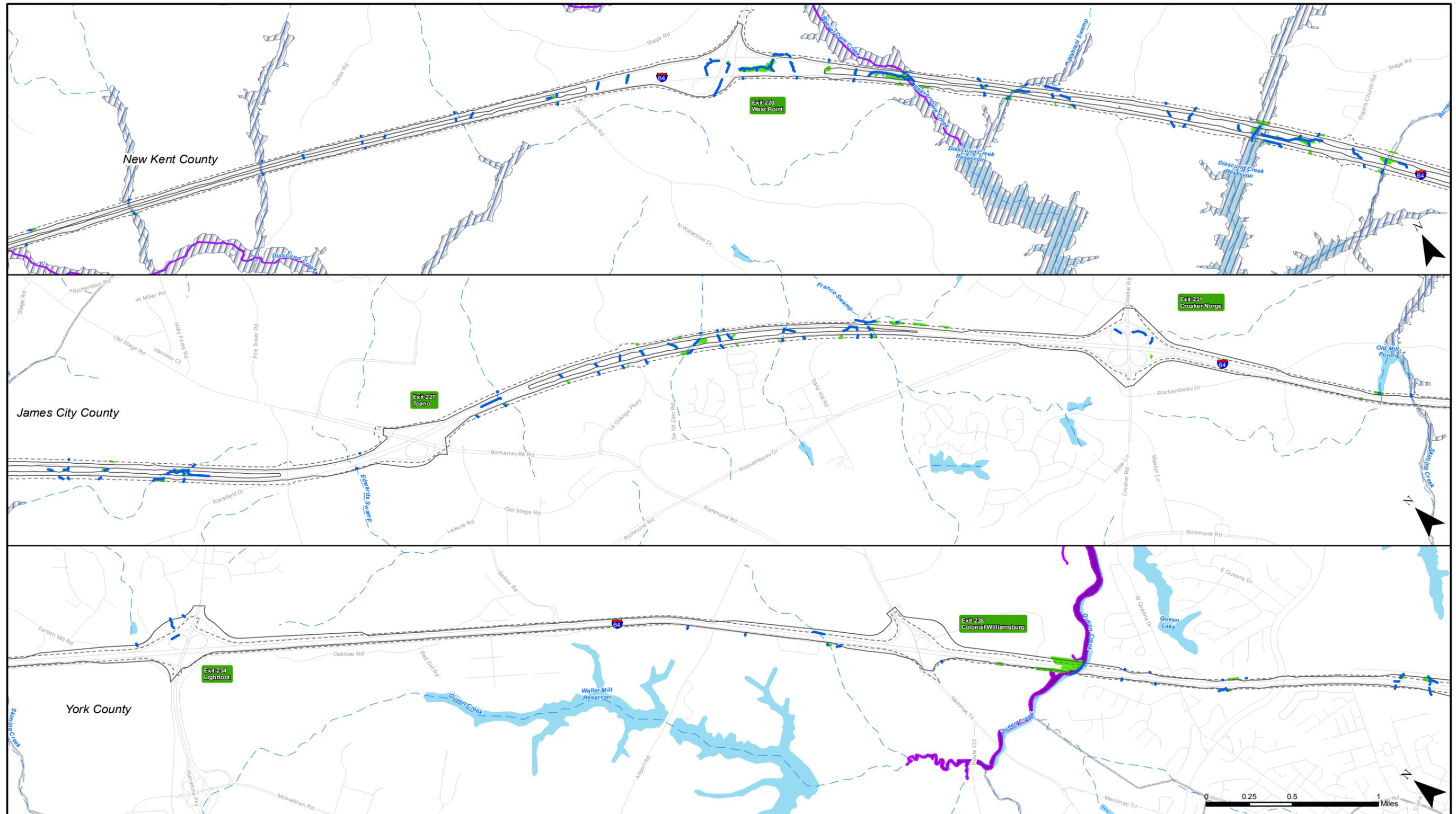


Figure III.E.1 Water Resources

Map 2 of 3



- Existing Right of Way
- Limits of Widest Alternative Footprint
- USGS Topoquadrangle Surface Water (Non-Assessed)
- Locality Jurisdiction
- Assessed Streams and Waterbodies
- Assessed Wetlands
- Non-Assessed Water Bodies
- New Kent Farms Public Groundwater Well
- FEMA 100 Year Floodplains
- 2010 VDEQ Impaired Waters

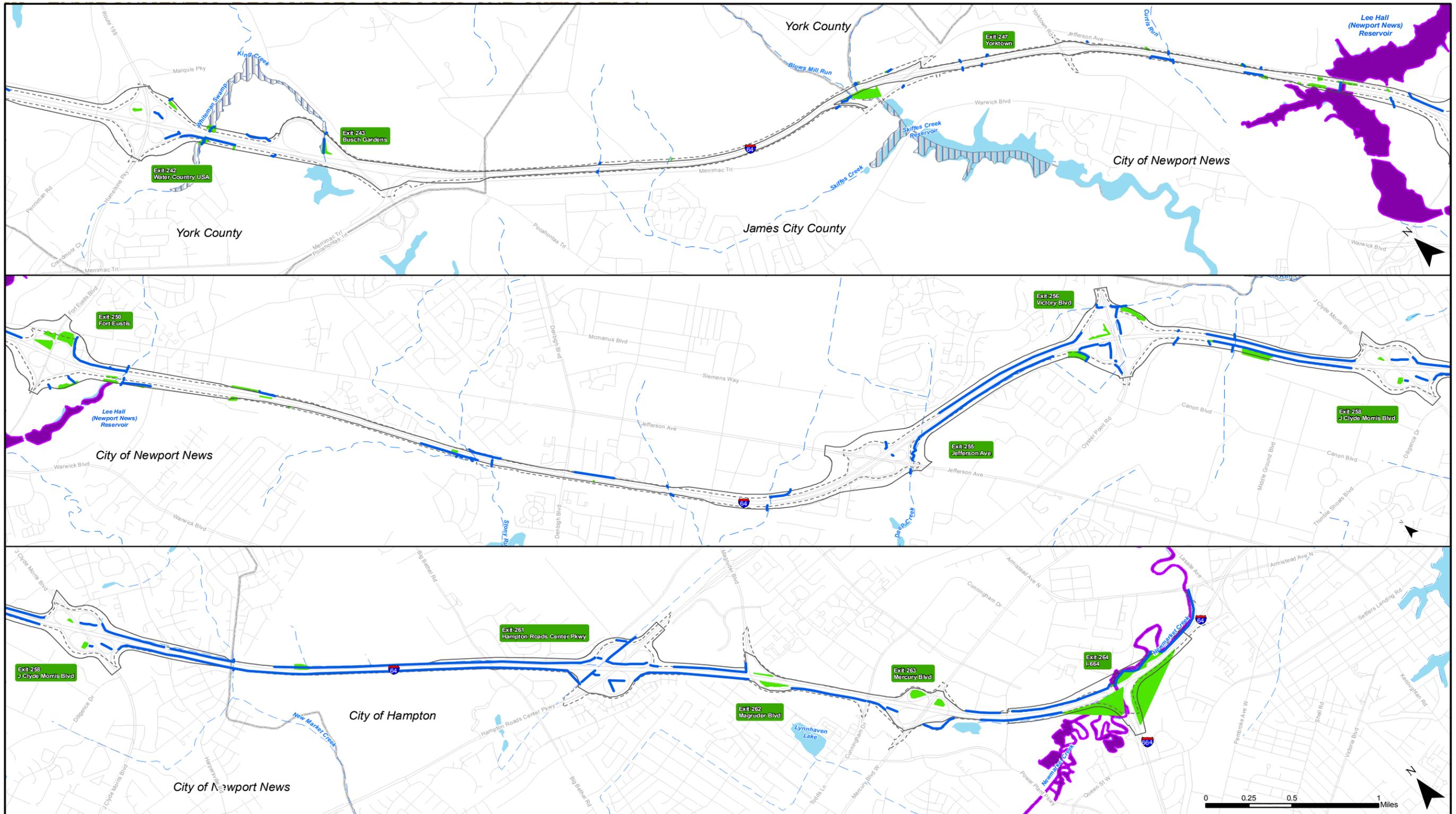


Figure III.E.1 Water Resources

Map 3 of 3



- Existing Right of Way
- Limits of Widest Alternative Footprint
- USGS Topoquadrangle Surface Water (Non-Assessed)
- Locality Jurisdiction
- Assessed Streams and Waterbodies
- Assessed Wetlands
- Non Assessed Water Bodies
- New Kent Farms Public Groundwater Well
- FEMA 100 Year Floodplains
- 2010 VDEQ Impaired Waters

III. ENVIRONMENTAL RESOURCES, IMPACTS AND MITIGATION

Many of the systems have been heavily manipulated through past ditching or filling activities associated with the road development and previous improvements. In addition, a number of the channels appear to have developed from drainage from the roadway and a number of wetland systems appear to have developed through constraints associated with and drainage to the interchanges and median. Despite the high degree of previous disturbance, these systems may still provide ecological functions such as wildlife habitat, flood control and water quality benefits such as nutrient uptake and sediment trapping.

Potential Impacts

As described in **Chapter II – Alternatives Considered, Section D** of this **Final EIS**, Alternative 1 has been identified as the Preferred Alternative. Alternative 1 allows the option to widen to the outside of the existing road corridor or within the median of the existing road corridor. The decision on whether to widen to the outside or the inside of the roadway would be made on a section-by-section basis, and the development of these operationally independent sections would be closely coordinated with the Richmond Area MPO, the Hampton Roads TPO and other state and federal resource and regulatory agencies. By allowing for outside or inside widening to be determined on a section-by-section basis, this Alternative provides opportunities to avoid and minimize impacts. For the purpose of the impact analysis in this **Final EIS**, Alternative 1 is assumed to have the same footprint as Alternative 1A. Since Alternative 1A widens to the outside of the existing roadway, this Alternative is assumed to provide the most conservative assessment of environmental impacts.

As described in the following section, potential impacts are reported for the No-Build Alternative and for each of the Build Alternatives. A summary table providing resource impacts associated with each of the Alternatives is included

No-Build Alternative:

The No-Build Alternative would not involve any project-related construction or changes to the natural environment. As a result, project-related environmental effects from the No-Build Alternative are not anticipated.

Build Alternatives:

In accordance with the federal and state regulations governing streams and wetlands, efforts have been made to reduce the potential for impacts to jurisdictional Waters of the United States, including wetlands, wherever possible. However, because this project involves the widening of an existing corridor which

currently crosses numerous stream and wetland systems, impacts are unavoidable. In addition, along the greatest areas of impacts and in areas where bridges already exist, the true footprint of the impact would be minimized due to bridging activities. Also, in many cases the impacts are the result of culvert extensions and not complete fill of the system itself. In addition since the construction area for all Build Alternatives is similar, total impacts among the Alternatives is similar.

Tables III.E.3 - III.E.5 summarize the potential impacts resulting from each Build Alternative to Waters of the United States, including wetlands, along the project corridor. The overall impacts associated with Build Alternatives are very similar. While all Build Alternatives result in very similar overall impacts, the highest amount of both wetland and stream channel tidal impacts would occur from Build Alternatives 1A/2A. Additional details regarding the systems and potential impacts can be found in the accompanying *Natural Resources Technical Memorandum*.

Both temporary and permanent effects to jurisdictional wetland and stream systems resulting from any of the Build Alternatives would require a permitting decision from the Corps, the VDEQ and the VMRC. Based on the scale of the project, the multiple individual impact area crossings and the potential for tidal impacts it is anticipated that a Section 404 Individual Permit from the Corps, a VWP Individual Permit from the VDEQ and a Subaqueous Bottomlands Permit from the VMRC would be required.

Preferred Alternative:

For the purpose of the impact analysis in this **Final EIS**, Alternative 1 is assumed to have the same footprint as Alternative 1A. As identified in **Tables III.E.3 - III.E.5**, the Preferred Alternative has similar potential impacts to tidal and non-tidal surface waters as the other Build Alternatives. This is due to the locations of the resources in relation to the Build Alternatives.

Mitigation Measures

The mitigation measures for stream and wetland impacts would be identified for any of the Build Alternatives during the final design. These measures would include avoidance and minimization efforts to the greatest extent practicable. Some measures which may be considered are: the use and appropriate placement of erosion and sediment control measures and best management practices; the use of upgraded erosion and sediment controls in environmentally sensitive areas; bridging/spanning of streams and wetlands; alignment shifts around specific systems; the use of cofferdams;

steepening of slopes and the use of retaining walls on steeper slopes; properly countersunk culverts; stream relocation to improve skew angle and shorten culverts if new culverts are necessary; and ensuring groundwater recharge/wetland hydrology maintenance through the location of outfalls and infiltration trenches. Following construction practices, any additional stormwater generated through new impervious surfaces would be treated through improved stormwater management systems.

Coordination with the Corps, the VDEQ and the VMRC would be required during the permitting phase of the project to determine the jurisdictional limits of surface waters and to make a final determination of the need for and type of permits. In addition, the compensatory mitigation requirements for both streams and wetlands would be determined for the Preferred Alternative during the permitting phase. The current compensatory mitigation to impact ratios for non-tidal forested, scrub-shrub and emergent wetlands are 2:1, 1.5:1 and 1:1, respectively. The typical compensatory mitigation to impact ratio for tidal emergent wetlands is 2:1. The approved assessment methodology to determine the required stream compensation would be completed as part of the compensatory mitigation plan. At the time of this document, the approved assessment methodology is the Unified Stream Methodology.

2. Water Quality

Methodology

State and federal law requires the VDEQ to report the condition of the Commonwealth's waters. Section 305(b) of the CWA requires each state to submit a biennial report describing the quality of its waters. This process assesses the following six primary designated uses based on the regulatory Water Quality Standards: Aquatic Life, Recreation, Fish Consumption, Shellfishing, Public Water Supply and Wildlife. These primary uses are further broken into sub-categories. Virginia's Water Quality Standards define the water quality needed to support each of these uses by establishing the numeric criteria that physical and chemical data are assessed against. If a waterbody contains more of a pollutant than is allowed by the Water Quality Standards, it would not support one or more of its designated uses, and is considered "impaired." All anthropogenically impaired waters in Virginia are placed on a federally mandated 303(d) impaired waters list. Waters that are impaired due to human activities require a plan to restore water quality and associated designated use(s). The VDEQ schedules

III. ENVIRONMENTAL RESOURCES, IMPACTS AND MITIGATION

Table III.E.3: Potential Impacts to Waters of the United States, Including Wetlands

Resource Type	Alternative 1* General Purpose Widening	Alternative 1A General Purpose Lanes Outside Widening	Alternative 1B General Purpose Lanes Median Widening	Alternative 2A Full Toll Lanes Outside Widening	Alternative 2B Full Toll Lanes Median Widening	Alternative 3 Managed Lanes with General Purpose Lanes
Wetlands (acres)	66.11	66.11	64.95	66.11	64.95	66.73
Other Waters of the United States (linear feet)	112,237	112,237	113,544	112,237	113,544	112,516

*The Preferred Alternative has been identified as Alternative 1. To provide for the most conservative assessment of impacts, Alternative 1 is assumed to have the same footprint as Alternative 1A.

Table III.E.4: Potential Impacts to Non-Tidal Waters of the United States

Non-Tidal	Alternative 1* General Purpose Widening	Alternative 1A General Purpose Lanes Outside Widening	Alternative 1B General Purpose Lanes Median Widening	Alternative 2A Full Toll Lanes Outside Widening	Alternative 2B Full Toll Lanes Median Widening	Alternative 3 Managed Lanes with General Purpose Lanes
PFO Wetlands (acres)	19.74	19.74	19.94	19.74	19.94	20.85
PSS Wetlands (acres)	3.09	3.09	2.39	3.09	2.39	2.91
PEM Wetlands (acres)	15.27	15.27	14.86	15.27	14.86	15.14
Perennial Channel (linear feet)	97,148	97,148	98,300	97,148	98,300	96,865
Intermittent Channel (linear feet)	8,764	8,764	9,064	8,764	9,064	9,405
Ephemeral Channel (linear feet)	3,139	3,139	3,075	3,139	3,075	3,138
Lacustrine System (linear feet)	173	173	173	173	173	173

*The Preferred Alternative has been identified as Alternative 1. To provide for the most conservative assessment of impacts, Alternative 1 is assumed to have the same footprint as Alternative 1A.

Table III.E.5: Potential Impacts to Tidal Waters of the United States

Tidal	Alternative 1* General Purpose Widening	Alternative 1A General Purpose Lanes Outside Widening	Alternative 1B General Purpose Lanes Median Widening	Alternative 2A Full Toll Lanes Outside Widening	Alternative 2B Full Toll Lanes Median Widening	Alternative 3 Managed Lanes with General Purpose Lanes
E2EM1P Wetlands (acres)	28.01	28.01	27.76	28.01	27.76	27.83
Other Waters of the United States (linear feet)	3,012	3,012	2,932	3,012	2,932	2,936

*The Preferred Alternative has been identified as Alternative 1. To provide for the most conservative assessment of impacts, Alternative 1 is assumed to have the same footprint as Alternative 1A.

each of these waters for development of a Total Maximum Daily Load (TMDL), which is a reduction plan that defines the limit of a pollutant(s) that a water system can receive and still meet water quality standards. The condition of the Commonwealth's waters is summarized in the *Virginia Water Quality Assessment 305(b)/303(d) Integrated Report (Integrated Report)*.

For more information regarding water quality issues along the project corridor, refer to the *Natural Resources Technical Memorandum*.

Existing Conditions

Table III.E.6 lists the nine surface water segments intersecting the project corridor that have been listed as impaired waters

(Categories 4 and/or 5) in the *VDEQ 2010 Integrated Report*.

Figure III.E.1 shows the location of these systems along the corridor. *Escherichia coli*, *Enterococcus* and Fecal Coliform, all non-highway related pollutants, are responsible, at least in part, for impairment in most of the systems.

Dissolved Oxygen is also identified for a number of the systems with the impairment source listed as Natural Conditions or Unknown for the systems located in the James River basin. A number of additional sources, including stormwater discharges, are listed for the Dissolved Oxygen impairment in the systems in the York River and Chesapeake Bay basins. All sources of fish tissue contamination and copper contamination are listed as Unknown.

The Designated Use for Aquatic Life/Shallow-Water Submerged Aquatic Vegetation (SAV) in Newmarket Creek (both the lower and upper sections) and Queen Creek was not met based on the criteria for Aquatic Plants (Macrophytes). For Newmarket Creek, the system failed the Shallow Water SAV and water clarity acreage requirements. Queen Creek was listed as impaired because the acres of SAV mapped through aerial surveys did not meet the criteria. However, there is insufficient data to assess the water clarity criteria. The listed impairment sources included, in part, Internal Nutrient Recycling, Loss of Riparian Habitat, Sediment Re-suspension (Clean Sediment) and Wet Weather Discharges. Although roadway drainage could contribute incrementally to

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Table III.E.6: Virginia Department of Environmental Quality 2010 Impaired Waters (Categories 4 and 5) Intersecting the Project Corridor

Basin	Water Name	Designated Use	Cause Name	TMDL Schedule
James	Gillies Creek	Recreation	<i>Escherichia coli</i>	2016
		Aquatic Life	pH	2016
	Stony Run	Recreation	<i>Escherichia coli</i>	2020
	Rumley Marsh	Aquatic Life	Dissolved Oxygen; pH	2014; 2022
	Diascund Creek	Recreation	<i>Escherichia coli</i> ; Dissolved Oxygen	2020
		Aquatic Life	Dissolved Oxygen	2020
	Beaverdam Creek	Aquatic Life	Dissolved Oxygen	2014
	Lee Hall (Newport News) Reservoir	Aquatic Life	Copper; Dissolved Oxygen	2016; 2018
		Wildlife	Copper	2016
		Fish Consumption	Mercury and PCB* in Fish Tissue	2022
York	Queen Creek	Fish Consumption	PCB in Fish Tissue	2018
		Recreation	<i>Enterococcus</i>	2010
		Shellfishing	Fecal Coliform	2010
		Aquatic Life; Shallow-Water SAV	Aquatic Plants (Macrophytes)	2010
		Aquatic Life; Open-Water Aquatic Life	Dissolved Oxygen	2010
Chesapeake Bay/Atlantic/Small Coastal	Newmarket Creek – Lower	Aquatic Life; Open-Water Aquatic Life	Dissolved Oxygen	2010
		Aquatic Life; Shallow-Water SAV	Aquatic Plants (Macrophytes)	2010
		Fish Consumption	PCB in Fish Tissue	2018
		Recreation	<i>Enterococcus</i>	2010
		Shellfishing	Fecal Coliform	2010
	Newmarket Creek – Upper	Aquatic Life; Open-Water Aquatic Life	Dissolved Oxygen	2010
		Aquatic Life; Shallow-Water SAV	Aquatic Plants (Macrophytes)	2010
		Fish Consumption	PCB in Fish Tissue	2018
		Recreation	<i>Enterococcus</i>	2010
		Shellfishing	Fecal Coliform	2010

*PCB - Polychlorinated Biphenyls

impairment due to siltation and dissolved solids, the VDEQ does not list roadway runoff as a specific component of any source of impairment.

Potential Impacts

As described in **Chapter II – Alternatives Considered, Section D** of this **Final EIS**, Alternative 1 has been identified as the Preferred Alternative. Alternative 1 allows the option to widen to the outside of the existing road corridor or within the median of the existing road corridor. The decision on whether to widen to the outside or the inside of the roadway would be made on a section-by-section basis, and the development of these operationally independent sections would be closely coordinated with the Richmond Area MPO, the Hampton Roads TPO and other state and federal resource and regulatory agencies. By allowing for outside or inside widening to be determined on a section-by-section basis, this Alternative provides opportunities to avoid and minimize impacts. For the purpose of the impact analysis in this **Final EIS**, Alternative 1 is assumed to have the same footprint as Alternative 1A. Since Alternative 1A widens to the outside of the existing roadway, this Alternative is assumed to provide the most conservative assessment of environmental impacts.

As described in the following section, potential impacts are reported for the No-Build Alternative and for each of the Build Alternatives. A summary table providing resource impacts associated with each of the Alternatives is included in **Chapter V – Comparison of Alternatives** of this **Final EIS**.

No-Build Alternative:

The No-Build Alternative would not involve any project-related construction or changes to the natural environment. As a result, project-related environmental effects from the No-Build Alternative are not anticipated.

Build Alternatives:

All of the Build Alternatives have the potential to increase levels of certain contaminants within the affected surface waters. These increases would be expected to be minimized with the use of approved sediment and erosion control during construction and implementation of stormwater best management practices. However the Build Alternatives could still affect water quality to some degree, exacerbating problems within sub-watersheds where contaminant levels are already elevated.

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Potential impacts during construction include physical disturbances or alterations, accidental spills and sediment releases that can affect aquatic life. During construction, wind and rain could severely erode large areas of soil exposed following the removal of vegetation, considerably increasing sediment load to receiving waters. While all of the Build Alternatives have the post-construction potential to affect existing surface waters to a degree, the relatively small amount of new impervious surfaces and related pollutants that the project would add, in addition to the improved stormwater management practices, would be expected to cause only minimal changes, if any, to the corridor water quality.

A number of the surface waters listed as “impaired” are designated, at least in part, due to *Escherichia coli*, *Enterococcus* and Fecal Coliform. These parameters, in addition to Polychlorinated Biphenyls (PCB), Mercury and Copper contamination, would not be affected by highway construction. Another major parameter of impairment in the listed streams is Dissolved Oxygen. Since Dissolved Oxygen concentrations can become adversely low following algal blooms resulting from nutrient loading, any use of nutrient-rich fertilizers or excessive stormwater discharges resulting from the road project could contribute to impairment of the systems. This could also lead to elevated levels of pH, which were causes of contamination in Gillies Creek and Rumley Marsh. The failure to meet the Designated Use for Aquatic Life/Shallow-Water SAV in Newmarket Creek (both the lower and upper sections) and Queen Creek may be increased through the roadway project due to nutrient loading or excessive stormwater discharges (as noted above) and through excessive clearing of existing vegetation.

After construction, impacts associated with the use of the roadway would be primarily based on the potential for contamination of surface waters by runoff from new impervious surfaces. These runoff constituents would likely include heavy metals, salt and associated materials, organic molecules and nutrients. However, this runoff would be treated by improved stormwater management facilities. Therefore, potential impacts are expected to be minimal, if any.

Preferred Alternative:

For the purpose of the impact analysis in this Final EIS, Alternative 1 is assumed to have the same footprint as Alternative 1A. The Preferred Alternative has the same potential impacts to water quality as the other Build Alternatives.

Mitigation Measures

As part of the construction practices, minimizing or restricting the use of nutrient-bearing (phosphorus and nitrogen) fertilizers, following the proper application of the appropriate fertilizer and/or utilizing appropriate stormwater management facilities that effectively prohibit nutrient loading of receiving waters for the Alternative crossings would be considered, as appropriate. These practices should be implemented not just in the vicinity of streams impaired due to low Dissolved Oxygen, but to all systems to prevent the systems from being listed as impaired in the future. These control measures would also assist in off-setting impairment due to changes in pH and reduced SAV. In addition, clearing practices should be limited to the greatest extent possible to reduce potential for impairment to the systems. Based on the impairments listed, any crossing in the vicinity of a waterway may include stormwater management plans designed specifically to address the particular condition. During construction, all appropriate erosion and sediment control measures would be employed and although impervious surface would increase runoff post-construction, all stormwater would be treated through improved stormwater management facilities.

3. Surface and Groundwater Supply

Methodology

The Virginia Department of Health (VDH) and the VDEQ are the primary state agencies tasked to manage surface and groundwater resources to maintain safe reliable drinking water supplies and to restore the Commonwealth’s waters. The VDH - Office of Drinking Water reviews projects for the proximity of the site to public drinking water sources. The VDEQ manages groundwater through a program regulating groundwater withdrawals in certain areas called Ground Water Management Areas (GWMA). The approximate locations of potential surface water and groundwater resources located in the vicinity of the project corridor are shown on **Figure III.E.1**.

For more information regarding surface and groundwater supply resources, refer to the *Natural Resources Technical Memorandum*.

Existing Conditions

Surface Waters

Eight reservoirs are located in the vicinity of the project corridor, with the project bisecting one (Lee Hall/Newport News Reservoir)

and intersecting with the upstream limits of Diascund Creek Reservoir. In addition to these two reservoirs, drainage from the project site flows to Skiffes Creek Reservoir, Big Bethel Reservoir and Chickhominy Lake at Walker’s Dam. Drainage along the project corridor flows away from the final three reservoirs (Waller Mill, Little Creek and Harwoods Mill). Although not located within the City of Newport News, the water itself in a number of the reservoirs along the corridor is owned by the City and serves as the major potable water source for this highly populated area.

According to the VDH, there are no public surface water intakes located within 100 feet of the existing edge of pavement along the project corridor.

Groundwater

The Coastal Plain region in Virginia is composed mostly of unconsolidated deposits, primarily alternating layers of sand, gravel, shell rock, silt and clay. These extremely permeable layers hold substantial amounts of groundwater. Therefore, the pollution potential in the uppermost unconfined aquifer within this area is very high due to the high permeability and high population density and agricultural activities in the area. However, the principal source of major groundwater withdrawals along the project corridor is a deeper system of confined aquifers. The recharge area to these aquifers occurs many miles away where the formations outcrop but infiltration from the water table and a shallower confined aquifer also recharge the deeper confined aquifers. The natural water quality in the Coastal Plain aquifers is high except in areas where saltwater, iron and hydrogen sulfide occurs.

The U.S. Environmental Protection Agency (USEPA) defines a sole source aquifer as one which supplies at least 50% of the drinking water consumed in the area overlying the aquifer. According to the USEPA Sole Source Aquifer Virtual Aquifer Map, no sole source aquifers, as defined under Section 1424(e) of the Safe Drinking Water Act, have been designated in the study corridor or the immediate vicinity. As noted above, there are a number of reservoirs in the vicinity of the project area that supply the metropolitan areas along the corridor.

The project corridor from the City of Richmond/Henrico County boundary to the project termini in the City of Hampton is located within the Eastern Virginia GWMA. While a VDEQ permit is needed for groundwater withdrawals greater than 3,000 gallons per month, this project is not anticipated to require any water withdrawals.

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According to the VDH, there is one public groundwater source located within 100 feet of the existing edge of pavement along the project corridor (see **Figure III.E.1**). This public groundwater well is owned by New Kent Farms and is located north of the westbound exit ramp at Exit 211 (Talleysville) in New Kent County.

Potential Impacts

As described in **Chapter II – Alternatives Considered, Section D** of this **Final EIS**, Alternative 1 has been identified as the Preferred Alternative. Alternative 1 allows the option to widen to the outside of the existing road corridor or within the median of the existing road corridor. The decision on whether to widen to the outside or the inside of the roadway would be made on a section-by-section basis, and the development of these operationally independent sections would be closely coordinated with the Richmond Area MPO, the Hampton Roads TPO and other state and federal resource and regulatory agencies. By allowing for outside or inside widening to be determined on a section-by-section basis, this Alternative provides opportunities to avoid and minimize impacts. For the purpose of the impact analysis in this **Final EIS**, Alternative 1 is assumed to have the same footprint as Alternative 1A. Since Alternative 1A widens to the outside of the existing roadway, this Alternative is assumed to provide the most conservative assessment of environmental impacts.

As described in the following section, potential impacts are reported for the No-Build Alternative and for each of the Build Alternatives. A summary table providing resource impacts associated with each of the Alternatives is included in **Chapter V – Comparison of Alternatives** of this **Final EIS**.

No-Build Alternative:

The No-Build Alternative would not involve any project-related construction or changes to the natural environment. As a result, project-related environmental effects from the No-Build Alternative to either the groundwater or surface water resources are not anticipated.

Build Alternatives:

Surface Waters

All of the Build Alternatives have the potential to increase levels of contaminants within the affected surface waters draining to the reservoirs. These increases would be expected to be minimized with the use of both the appropriate sediment and erosion control

during construction and the implementation of best management practices.

Potential impacts during construction include physical disturbances or alterations, accidental spills and sediment releases that can affect aquatic life and water quality. During construction, wind and rain could severely erode large areas of exposed soil, either through the removal of existing vegetation or staged stockpiles. This erosion could lead to an increased sediment load to surrounding surface waters. While all the Build Alternatives have the potential to affect existing surface waters to a degree, the relatively small amount of new impervious surfaces and related pollutants that the project would add, in addition to improved stormwater treatment facilities, would be expected to cause no or only minimal changes to the water quality of the surface waters surrounding the project corridor.

Impacts associated with the use of the roadway following construction would be primarily based on the potential for contamination of surface waters by runoff from new impervious surfaces. These runoff constituents would likely include heavy metals, salt and associated materials, organic molecules and nutrients. However, this runoff should be treated by improved stormwater management facilities. Therefore, potential impacts to the receiving waters are expected to be minimal, if any.

Groundwater

The Build Alternatives would be constructed on the surface, with no anticipated deep excavations, and are anticipated to have no or minor effects to groundwater in the aquifers along the corridor. Only small changes in the movements of the shallow groundwater table are likely to occur during grading and construction. In addition, the urbanized nature of the sections of the corridor with the greatest construction footprint make it unlikely that runoff from the post-construction interstate would reach the groundwater table. The generated runoff would be treated in accordance with the state guidelines for stormwater management and then released to surface waters.

The construction footprints of each Build Alternative would not impact the identified public groundwater supply well located north of the westbound exit ramp at Exit 211 (Talleysville) in New Kent County. It is possible that there are private drinking water wells within the vicinity of the project. No determination was made for this study for which properties utilize public water and which utilize well water. Further investigations during the right of way acquisition would be necessary to make these determinations.

However, potential impacts to any groundwater well resulting from any of the Build Alternatives are likely non-existent.

Preferred Alternative:

For the purpose of the impact analysis in this **Final EIS**, Alternative 1 is assumed to have the same footprint as Alternative 1A. The Preferred Alternative has the same minimal impacts to surface waters and groundwater supply as the other Build Alternatives.

Mitigation Measures

Surface Waters

During construction, the potential for impacts to the reservoirs would be minimized through strict adherence to the required appropriate erosion and sediment control practices, which include best management practices such as silt fence, straw bales, check dams, sediment basins and other methods to capture potential sediment from exposed soils. In addition, the amount of clearing of existing vegetation would be minimized to the greatest extent possible and areas of exposed soils would be stabilized as soon as possible to prevent additional erosion. Following construction, the generated runoff would be treated in accordance with the state guidelines for stormwater management and then released to surface waters. Any crossing draining to a reservoir may include stormwater management plans designed specifically to address any potential impact to the surface water supply.

Groundwater

As noted by the VDH, potential impacts to public water distribution systems or sanitary sewage collection systems must be verified by the local utility prior to construction practices. Further investigations to determine the presence, operational status and location of individual wells would be performed as part of property acquisition and right of way management for the construction project. Closures and/or relocation of the identified New Kent Farms public well (or any other identified well), if required, would be completed by following the Virginia Waterworks Regulation and other applicable Virginia Department of Transportation (VDOT) or locality standard. Closures and relocation of private wells, if required, would be completed by using the Virginia Private Well Regulation and other applicable VDOT standards or locality standards.

Runoff generated both during and post-construction would not likely reach the groundwater table. In addition, the generated runoff would be treated in accordance with the state guidelines for stormwater management and then released to surface waters.

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4. Floodplains

Methodology

Several federal regulations govern fill and construction in floodplains to ensure that proper consideration is given to the avoidance and mitigation of adverse floodplain effects. These regulations include Executive Order 11988, US Department of Transportation Order 5650.2, entitled the “Floodplain Management and Protection” and the National Flood Insurance Act of 1968. In Virginia, the Virginia Department and Conservation and Recreation (VDCR) is responsible for coordination of all state floodplain programs, and floodplains are also governed by local Flood Insurance Programs administered by localities and supervised by the Federal Emergency Management Agency (FEMA). The VDCR Floodplain Management Program and VDOT construction specifications for the roadway itself also address downstream floodplain and floodway effects.

The approximate locations of 100-year floodplain limits in the corridor are based on data from the FEMA. The 100-year floodplain refers to the areas along or adjacent to a stream or body of water that are capable of storing or conveying floodwaters during a 100-year storm. The approximate locations of the 100-year floodplains in the corridor are shown on **Figure III.E.1**.

For more information regarding the floodplains along the project corridor, refer to the *Natural Resources Technical Memorandum*.

Existing Conditions

Within the project boundary, the FEMA designated 100-year floodplains are located along Gillies Creek and an unnamed tributary, Boar Swamp and an unnamed tributary, the Chickahominy River and an unnamed tributary, Higgins Swamp, Crump Swamp, Allens Run, Toe Ink Swamp and an unnamed tributary, Schiminoe Creek, Rumley Marsh, Diascund Creek and two unnamed tributaries, Beaverdam Creek, Wahrani Swamp, the upper limits of Diascund Creek Reservoir, Barnes Swamp, Skimino Creek, Whiteman Swamp, King Creek and Blows Mill Run. The total acreage of mapped 100-year floodplains within the project corridor is 50.01 acres.

Potential Impacts

As described in **Chapter II – Alternatives Considered, Section D** of this **Final EIS**, Alternative 1 has been identified as the Preferred Alternative. Alternative 1 allows the option to widen to the outside of the existing road corridor or within the median of

the existing road corridor. The decision on whether to widen to the outside or the inside of the roadway would be made on a section-by-section basis, and the development of these operationally independent sections would be closely coordinated with the Richmond Area MPO, the Hampton Roads TPO and other state and federal resource and regulatory agencies. By allowing for outside or inside widening to be determined on a section-by-section basis, this Alternative provides opportunities to avoid and minimize impacts. For the purpose of the impact analysis in this **Final EIS**, Alternative 1 is assumed to have the same footprint as Alternative 1A. Since Alternative 1A widens to the outside of the existing roadway, this Alternative is assumed to provide the most conservative assessment of environmental impacts.

As described in the following section, potential impacts are reported for the No-Build Alternative and for each of the Build Alternatives. A summary table providing resource impacts associated with each of the Alternatives is included in **Chapter V – Comparison of Alternatives** of this **Final EIS**.

No-Build Alternative:

The No-Build Alternative would not involve any project-related construction or changes to the natural environment. As a result, project-related environmental effects from the No-Build Alternative are not anticipated.

Build Alternatives:

The majority of the floodplain encroachments from the proposed Alternatives would be from the perpendicular crossing of floodplains, not from longitudinal (parallel) encroachments which were avoided. These longitudinal crossings have been avoided because they would result in more floodplain fill, reducing conveyance and floodplain storage.

Individual impacts to any one floodplain are relatively small in both size and severity. Efforts to avoid and minimize impact to 100-year floodplains would continue as the project moves forward. Hydraulic and hydrologic studies would be performed to determine if any floodplain encroachments would have negative effects on storage areas for floodwaters or alter flooding characteristics. Techniques that would be investigated to further minimize or avoid impacts may include alignment shift to ensure the narrowest possible crossing and bridging of floodwaters to further reduce encroachment and allow for unrestricted passage of floodwaters. In addition, in accordance with VDOT standards, changes to the

surface water elevation are not allowed as part of the project design and construction.

Table III.E.7 summarizes the potential specific encroachments (expressed as area in acres crossed by the construction footprint) into the FEMA-designated 100-year floodplains for each Build Alternative.

All of the Build Alternatives would affect each identified 100-year non-tidal floodplain to some degree. Cumulatively, the impacts are least with Alternatives 1B/2B and greatest with Alternatives 1A/2A. Placement of a substantial amount of fill is not anticipated in any of the floodplains. It is expected that the majority of encroachments would result from minimal cut/fill activities and the construction of bridges crossing the systems.

Preferred Alternative:

For the purpose of the impact analysis in this **Final EIS**, Alternative 1 is assumed to have the same footprint as Alternative 1A. As identified in **Table III.E.7**, the Preferred Alternative has similar potential impacts to FEMA 100-year floodplains as the other Build Alternatives. This is due to the locations of the identified FEMA 100-year floodplains in relation to the Build Alternatives.

Mitigation Measures

All construction occurring within the FEMA designated 100-year floodplain must comply with VDOT floodplain construction requirements. These requirements consider structural evaluations, fill levels and grading elevations. In accordance with VDOT requirements, no change in surface water elevation would be permissible as part of the project final design and construction. Avoidance and minimization efforts, including the bridging/ spanning of these systems, would be followed to the greatest extent practicable. In addition to mitigation measures designed to reduce the amount of floodplain encroachment by an Alternative, VDOT’s highway construction specifications require implementation of stormwater management practices to address concerns such as post-development runoff associated with storm events and downstream channel capacity. These standards require that stormwater management facilities be designed to reduce stormwater flows to pre-construction conditions for up to a 10-year storm event. Also, during final design, a hydraulic study would be conducted that would ensure that no substantial increase in downstream flooding would occur.

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Table III.E.7: Potential Impacts to FEMA 100-year Floodplains

FEMA 100-year Floodplains	Alternative 1* General Purpose Widening	Alternative 1A General Purpose Lanes Outside Widening	Alternative 1B General Purpose Lanes Median Widening	Alternative 2A Full Toll Lanes Outside Widening	Alternative 2B Full Toll Lanes Median Widening	Alternative 3 Managed Lanes with General Purpose Lanes
Potential Encroachment (acres)	21.08	21.08	17.56	21.08	17.56	20.80

*The Preferred Alternative has been identified as Alternative 1. To provide for the most conservative assessment of impacts, Alternative 1 is assumed to have the same footprint as Alternative 1A.

5. Threatened and Endangered Species

Methodology

The presence of federal and state threatened or endangered species or their habitat in the vicinity of the project requires coordination with the various federal and state agencies that govern these species including the USFWS, the National Marine Fisheries Service (NMFS), the Virginia Department of Game and Inland Fisheries (VDGIF), the VDCR and the Virginia Department of Agriculture and Consumer Services (VDACS). The USFWS and the NMFS regulate and protect federally listed threatened and endangered species under the Endangered Species Act (ESA) with the primary goal of conserving and recovering listed species. The ESA, with few exceptions, prohibits activities affecting threatened and endangered species unless authorized by a permit. Listed federally endangered (FE) species are those threatened with extinction throughout all or a substantial portion of their range, and listed federally threatened (FT) species are those likely to become endangered in the foreseeable future. Neither the USFWS nor the NMFS provided specific comments on the presence of threatened and endangered species along the project corridor. The USFWS Information, Planning and Conservation (IPaC) system was reviewed to assess the federally listed species potentially present within the project corridor.

In addition to the federal oversight, threatened and endangered species are also regulated at the state level. The VDGIF has adopted the federal list as well as a state list of threatened and endangered species, with the primary focus of managing Virginia’s wildlife to maintain optimum populations of all species and conserve biodiversity. In addition, through a Memorandum of Agreement established between the VDCR and the VDACS, the VDCR represents the VDACS in comments regarding potential impacts on state listed threatened and endangered plants and

insect species. Listed state endangered (SE) and state threatened (ST) species have similar definitions as their federal counterparts.

As part of the study, comments involving state threatened and endangered species were requested from the VDGIF, the VDCR and the VDACS. The threatened and endangered species were also mapped using VDOT’s Enterprise Database. The information from this database includes the Virginia Fish and Wildlife Information Service data maintained by the VDGIF and the VDCR Natural Heritage resources. In addition, the Center for Conservation Biology (CCB) database was accessed to obtain information regarding Bald eagle (*Haliaeetus leucocephalus*) issues.

As part of this study, a reconnaissance level habitat evaluation was conducted for the federally threatened, state endangered Small whorled pogonia (*Isotria medeoloides*) within the project corridor. Potential habitat was identified using a combination of desktop review of relevant data resources, windshield reconnaissance conducted from a vehicle and pedestrian spot checks of the highest quality habitat areas.

For more information regarding the threatened and endangered species along the project corridor, refer to the *Natural Resources Technical Memorandum*.

Existing Conditions

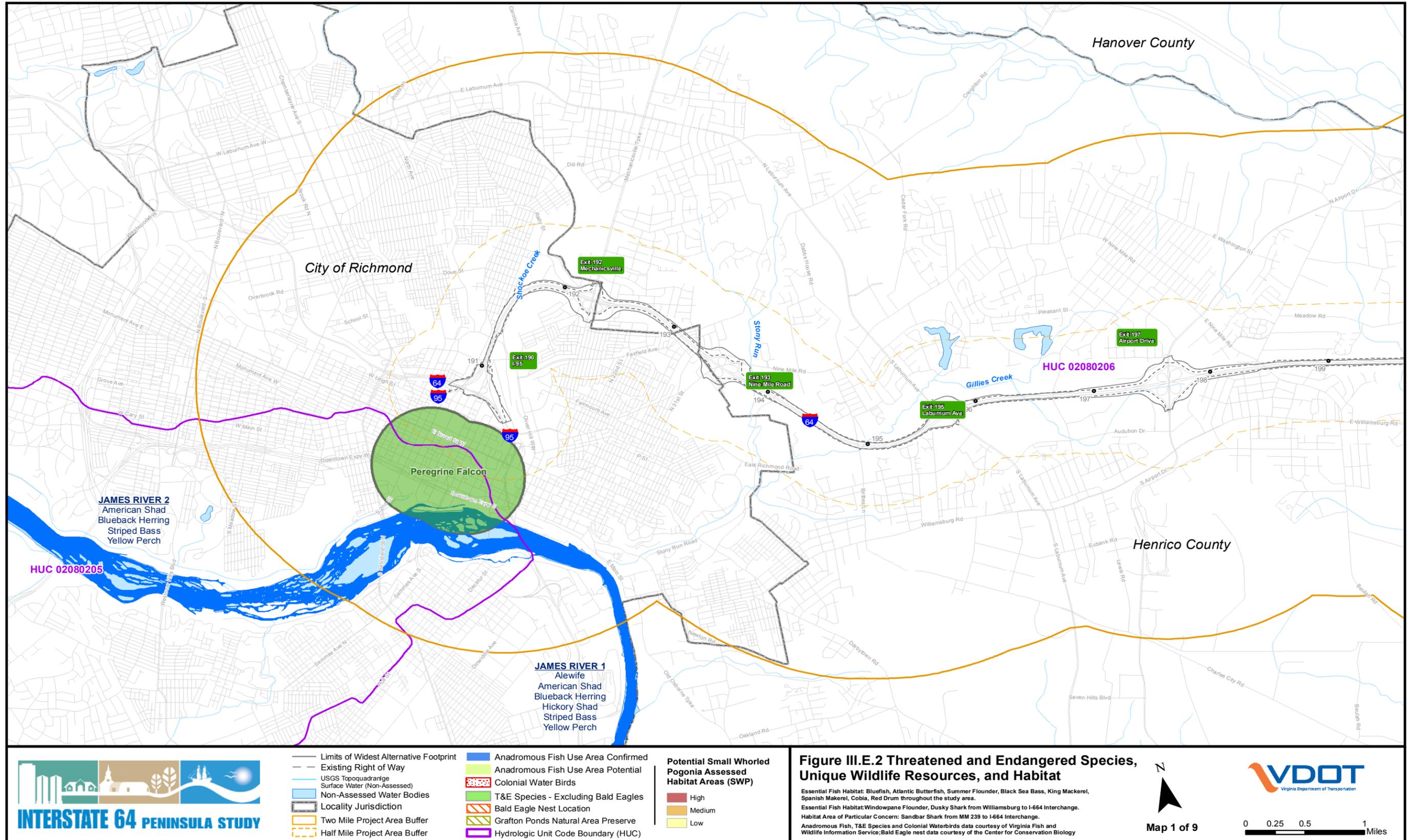
The study identified ten federal and state threatened and/or endangered species or their habitat located within a two mile radius of the project corridor. Most of these species were listed with numerous occurrences throughout the corridor. These species are listed in **Table III.E.8**, and **Figure III.E.2** shows the location of these resources along the corridor. This summary only includes species which have been documented/confirmed through the review process within the two mile radius of the center line of the project, in addition to the assessed potential habitat areas for

Small whorled pogonia conducted as part of the study. In addition to Small whorled pogonia and Swamp pink (*Helonias bullata*), the USFWS on-line database system also identified Piping plover (*Charadrius melodus*) in the City of Hampton and Sensitive joint-vetch (*Aeschynomene virgininica*) occurring in York County. The exact locations of these occurrences were not identified.

As shown on **Figure III.E.2**, the Mabee’s salamander (*Ambystoma mabeei*) and the Canebrake rattlesnake (*Crotalus horridus*) are located in the immediate vicinity of the project corridor. Through the CCB dataset, a total of 11 Bald eagle nests were identified as active/occupied within a two mile radius of the project. However, no nests were located within 660 feet of the project corridor; the closest nest is located approximately 1,450 feet from the project boundary. Nests located within the 660 foot radius, considered the nest protection zone, would elevate the review and protective measures required by the agencies. Of the 15 areas assessed, only

Table III.E.8: Threatened and Endangered Species Mapped within a Two Mile Radius of the Project Corridor

Common Name	Scientific Name	Legal Status
Rafinesque's eastern big-eared bat	<i>Corynorhinus rafinesquii macrotis</i>	SE
Peregrine falcon	<i>Falco peregrinus</i>	ST
Canebrake rattlesnake	<i>Crotalus horridus</i>	SE
Mabee's salamander	<i>Ambystoma mabeei</i>	ST
Eastern tiger salamander	<i>Ambystoma tigrinum tigrinum</i>	SE
Loggerhead sea turtle	<i>Caretta caretta</i>	FT/ST
Bald eagle	<i>Haliaeetus leucocephalus</i>	ST
Small whorled pogonia	<i>Isotria medeoloides</i>	FT/SE
Swamp pink	<i>Helonias bullata</i>	FT/SE
Harper’s fimbriatylis	<i>Fimbristylis perpusilla</i>	SE



- Limits of Widest Alternative Footprint
- - Existing Right of Way
- USGS Topoquadrangle
- Surface Water (Non-Assessed)
- Non-Assessed Water Bodies
- Locality Jurisdiction
- Two Mile Project Area Buffer
- - Half Mile Project Area Buffer
- Anadromous Fish Use Area Confirmed
- Anadromous Fish Use Area Potential
- Colonial Water Birds
- T&E Species - Excluding Bald Eagles
- Bald Eagle Nest Location
- Grafton Ponds Natural Area Preserve
- Hydrologic Unit Code Boundary (HUC)
- Potential Small Whorled Pogonia Assessed Habitat Areas (SWP)**
- High
- Medium
- Low

Figure III.E.2 Threatened and Endangered Species, Unique Wildlife Resources, and Habitat

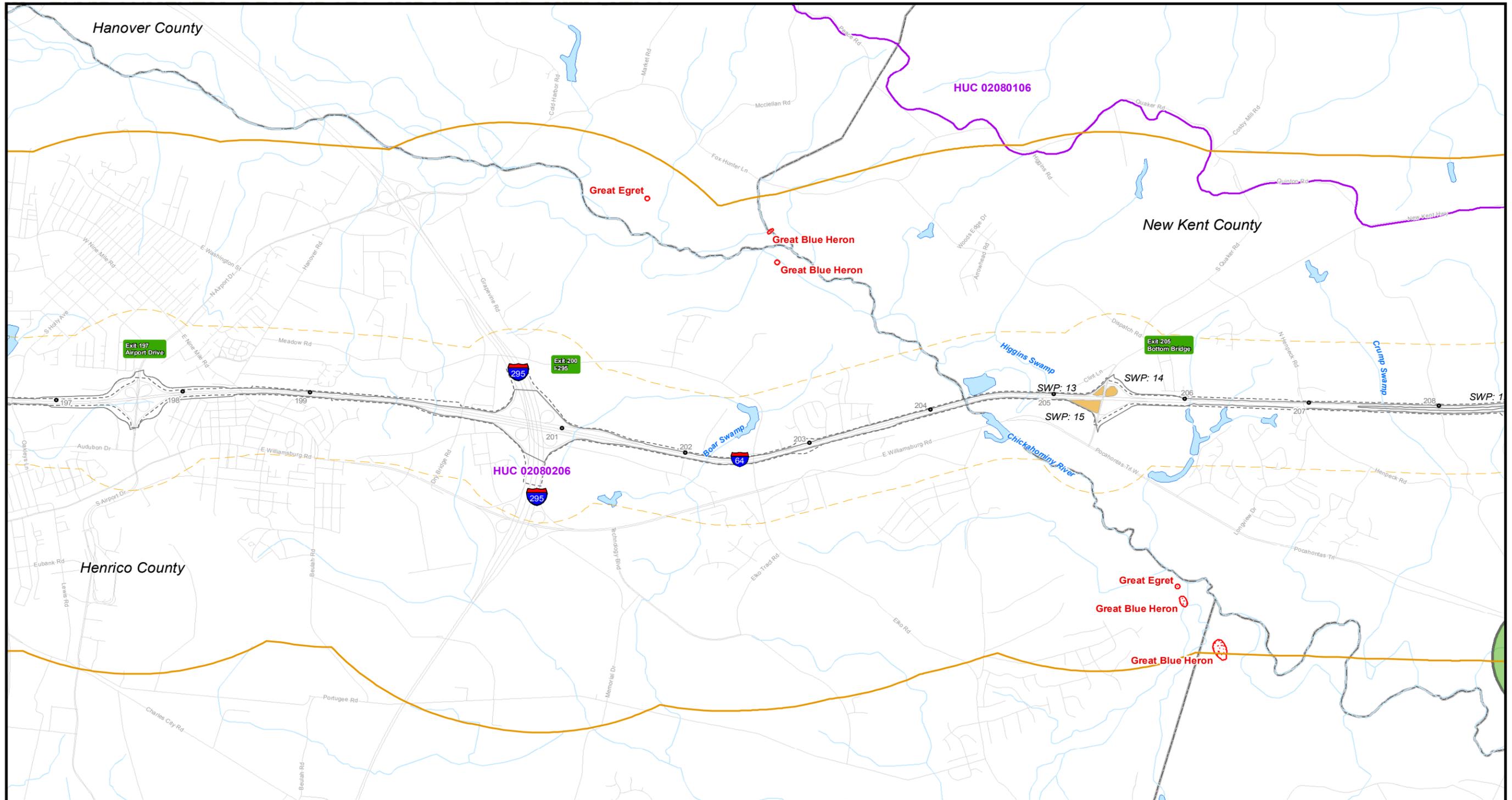
Essential Fish Habitat: Bluefish, Atlantic Butterfish, Summer Flounder, Black Sea Bass, King Mackerel, Spanish Mackerel, Cobia, Red Drum throughout the study area.
 Essential Fish Habitat: Windowpane Flounder, Dusky Shark from Williamsburg to I-664 Interchange.
 Habitat Area of Particular Concern: Sandbar Shark from MM 239 to I-664 Interchange.
 Anadromous Fish, T&E Species and Colonial Waterbirds data courtesy of Virginia Fish and Wildlife Information Service; Bald Eagle nest data courtesy of the Center for Conservation Biology



Map 1 of 9



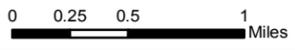
0 0.25 0.5 1 Miles



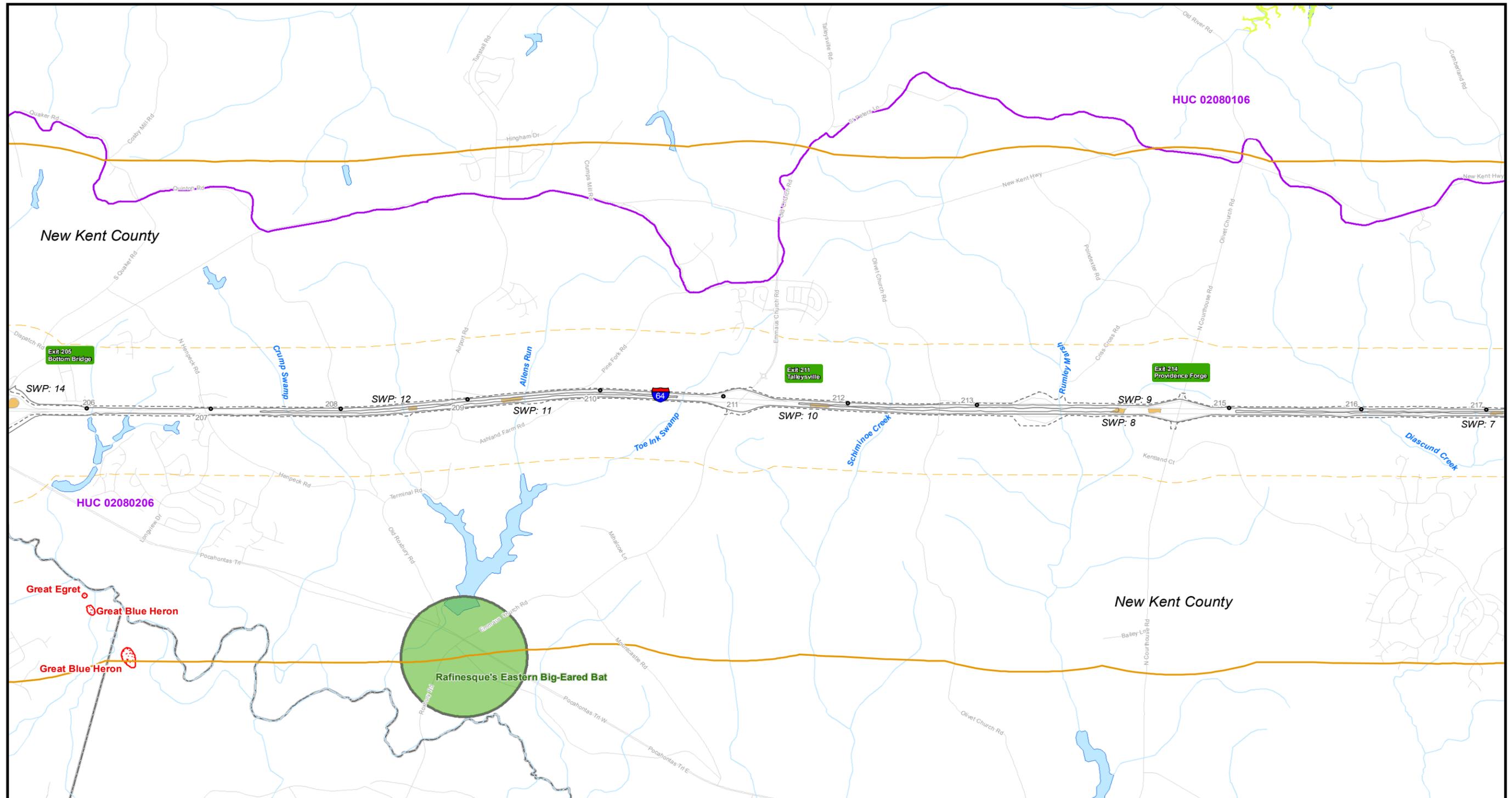
- Limits of Widest Alternative Footprint
- - Existing Right of Way
- USGS Topoquadrangle Surface Water (Non-Assessed)
- Non-Assessed Water Bodies
- Locality Jurisdiction
- Two Mile Project Area Buffer
- Half Mile Project Area Buffer
- Anadromous Fish Use Area Confirmed
- Anadromous Fish Use Area Potential
- Colonial Water Birds
- T&E Species - Excluding Bald Eagles
- Bald Eagle Nest Location
- Grafton Ponds Natural Area Preserve
- Hydrologic Unit Code Boundary (HUC)
- Potential Small Whorled Pogonia Assessed Habitat Areas (SWP)**
- High
- Medium
- Low

Figure III.E.2 Threatened and Endangered Species, Unique Wildlife Resources, and Habitat

Essential Fish Habitat: Bluefish, Atlantic Butterfish, Summer Flounder, Black Sea Bass, King Mackerel, Spanish Mackerel, Cobia, Red Drum throughout the study area.
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 Anadromous Fish, T&E Species and Colonial Waterbirds data courtesy of Virginia Fish and Wildlife Information Service; Bald Eagle nest data courtesy of the Center for Conservation Biology



Map 2 of 9



- Limits of Widest Alternative Footprint
- - Existing Right of Way
- USGS Topoquadrangle Surface Water (Non-Assessed)
- Non-Assessed Water Bodies
- Locality Jurisdiction
- Two Mile Project Area Buffer
- Half Mile Project Area Buffer
- Anadromous Fish Use Area Confirmed
- Anadromous Fish Use Area Potential
- Colonial Water Birds
- T&E Species - Excluding Bald Eagles
- Bald Eagle Nest Location
- Grafton Ponds Natural Area Preserve
- Hydrologic Unit Code Boundary (HUC)
- Potential Small Whorled Pogonia Assessed Habitat Areas (SWP)**
- High
- Medium
- Low

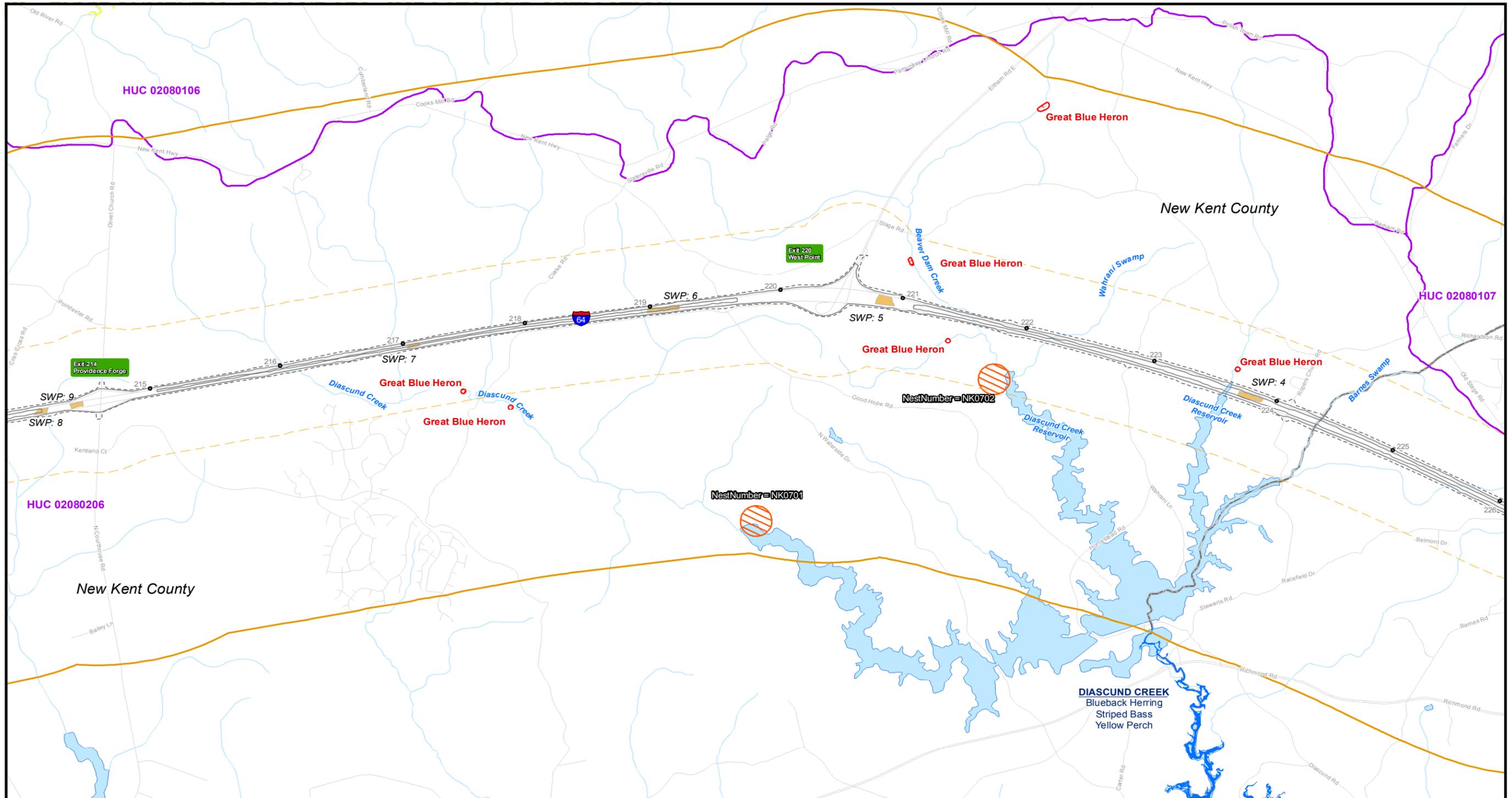
Figure III.E.2 Threatened and Endangered Species, Unique Wildlife Resources, and Habitat

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 Habitat Area of Particular Concern: Sandbar Shark from MM 239 to I-664 Interchange.
 Anadromous Fish, T&E Species and Colonial Waterbirds data courtesy of Virginia Fish and Wildlife Information Service; Bald Eagle nest data courtesy of the Center for Conservation Biology



0 0.25 0.5 1 Miles

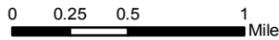
Map 3 of 9

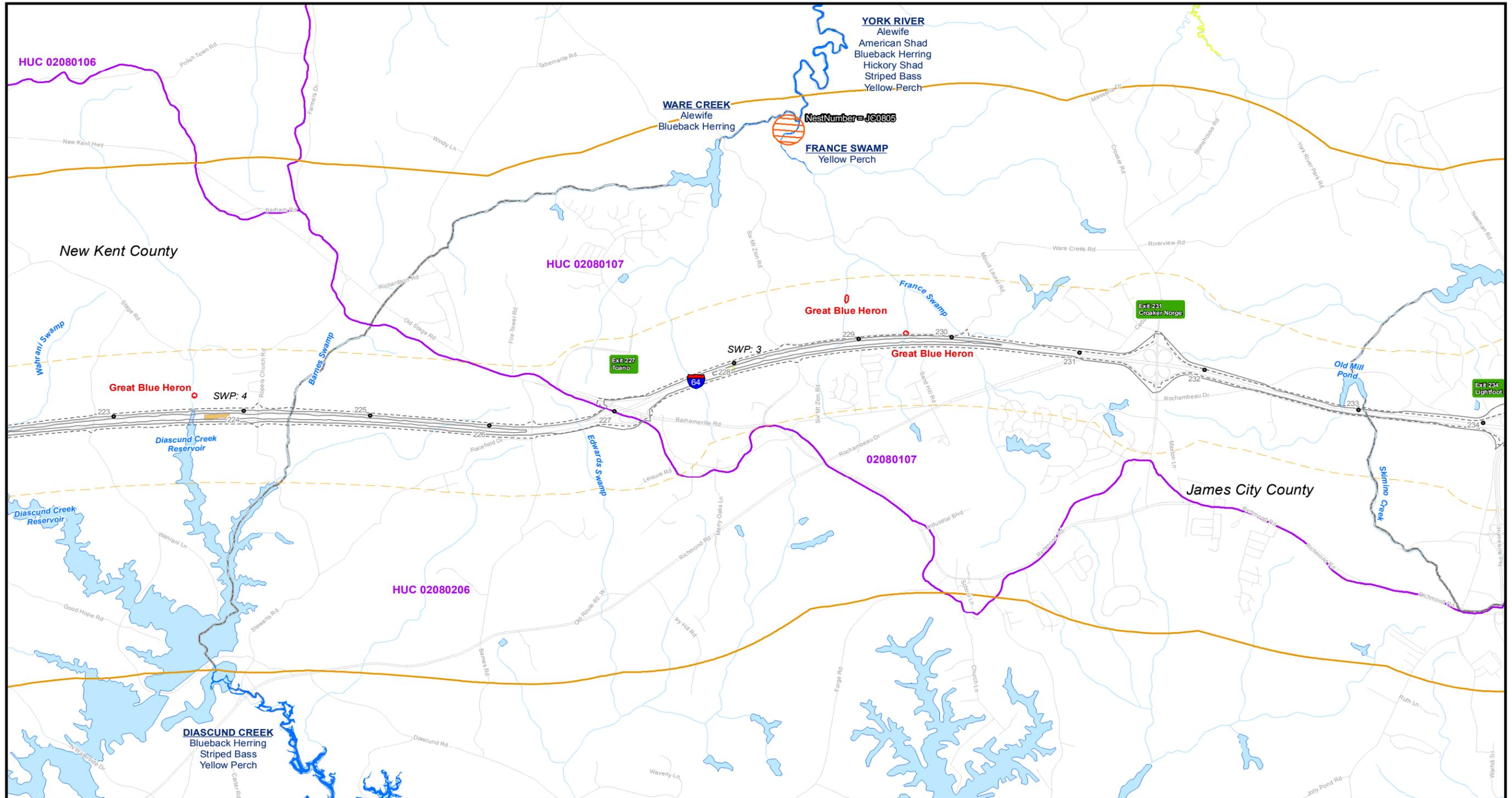


- Limits of Widest Alternative Footprint
- - Existing Right of Way
- USGS Topoquadrangle Surface Water (Non-Assessed)
- Non-Assessed Water Bodies
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- T&E Species - Excluding Bald Eagles
- Bald Eagle Nest Location
- Grafton Ponds Natural Area Preserve
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- Potential Small Whorled Pogonia Assessed Habitat Areas (SWP)
 - High
 - Medium
 - Low

Figure III.E.2 Threatened and Endangered Species, Unique Wildlife Resources, and Habitat

Essential Fish Habitat: Bluefish, Atlantic Butterfish, Summer Flounder, Black Sea Bass, King Mackerel, Spanish Mackerel, Cobia, Red Drum throughout the study area.
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 Anadromous Fish, T&E Species and Colonial Waterbirds data courtesy of Virginia Fish and Wildlife Information Service; Bald Eagle nest data courtesy of the Center for Conservation Biology





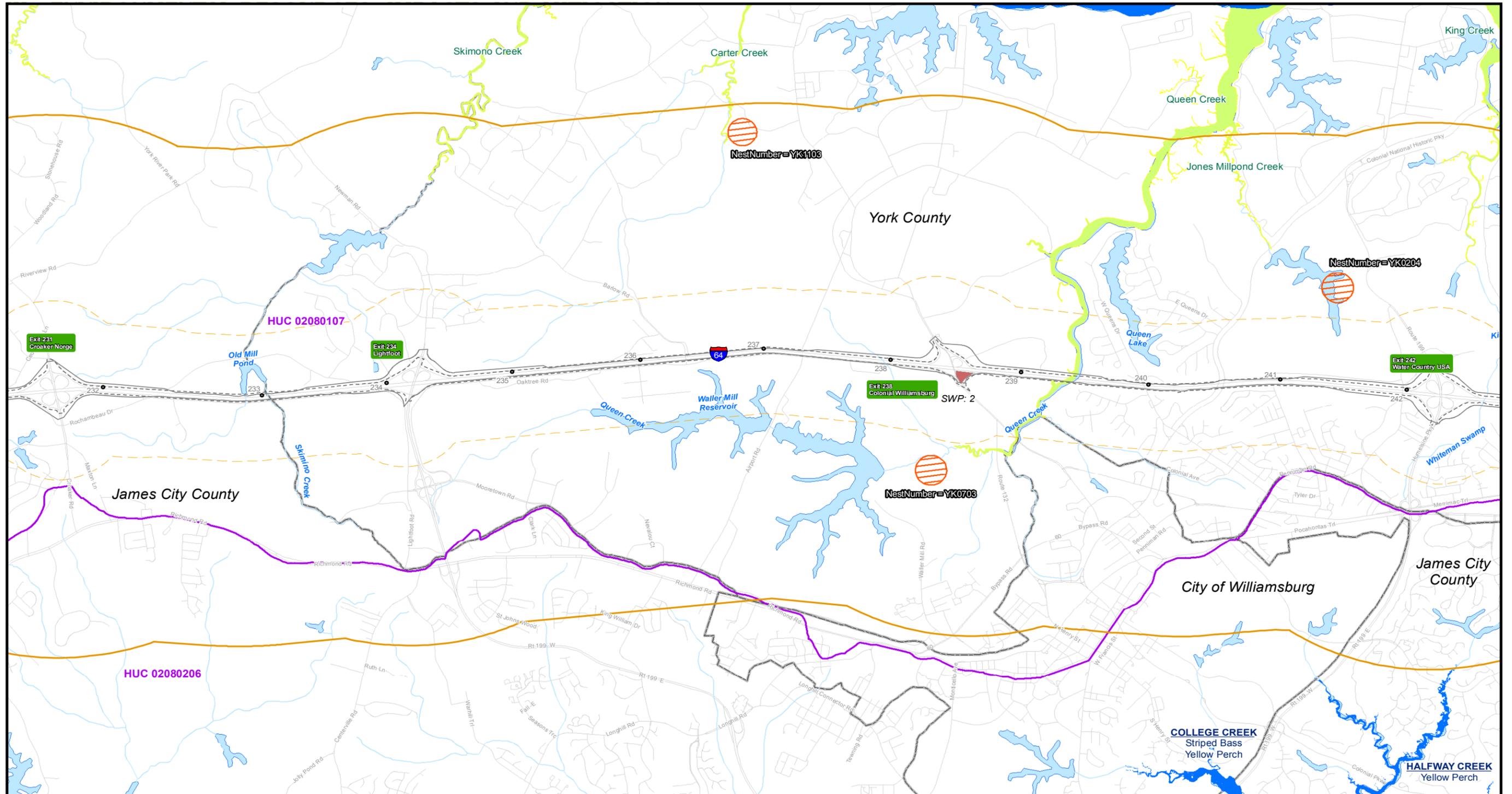
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|--|---|--|
| <ul style="list-style-type: none"> — Limits of Widest Alternative Footprint - - Existing Right of Way USGS Topoquadrangle Surface Water (Non-Assessed) Non-Assessed Water Bodies Locality Jurisdiction Two Mile Project Area Buffer Half Mile Project Area Buffer | <ul style="list-style-type: none"> Anadromous Fish Use Area Confirmed Anadromous Fish Use Area Potential Colonial Water Birds T&E Species - Excluding Bald Eagles Bald Eagle Nest Location Grafton Ponds Natural Area Preserve Hydrologic Unit Code Boundary (HUC) | <p>Potential Small Whorled Pogonia Assessed Habitat Areas (SWP)</p> <ul style="list-style-type: none"> High Medium Low |
|--|---|--|

Figure III.E.2 Threatened and Endangered Species, Unique Wildlife Resources, and Habitat

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 Habitat Area of Particular Concern: Sandbar Shark from MM 239 to I-664 Interchange.
 Anadromous Fish, T&E Species and Colonial Waterbirds data courtesy of Virginia Fish and Wildlife Information Service; Bald Eagle nest data courtesy of the Center for Conservation Biology



Map 5 of 9



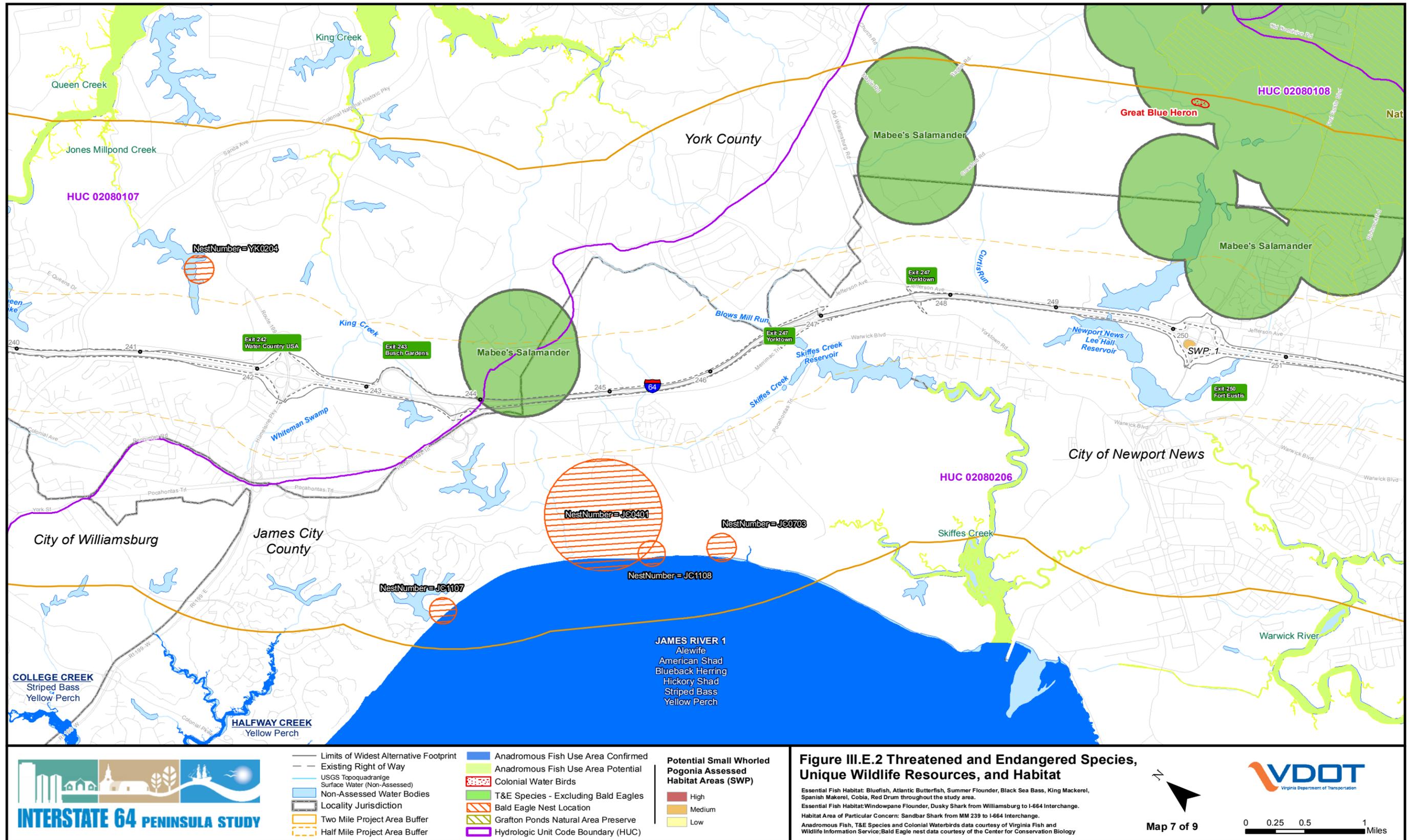
- Limits of Widest Alternative Footprint
- - Existing Right of Way
- USGS Topoquadrangle Surface Water (Non-Assessed)
- Non-Assessed Water Bodies
- Locality Jurisdiction
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- - - Half Mile Project Area Buffer
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- T&E Species - Excluding Bald Eagles
- Bald Eagle Nest Location
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- High
- Medium
- Low

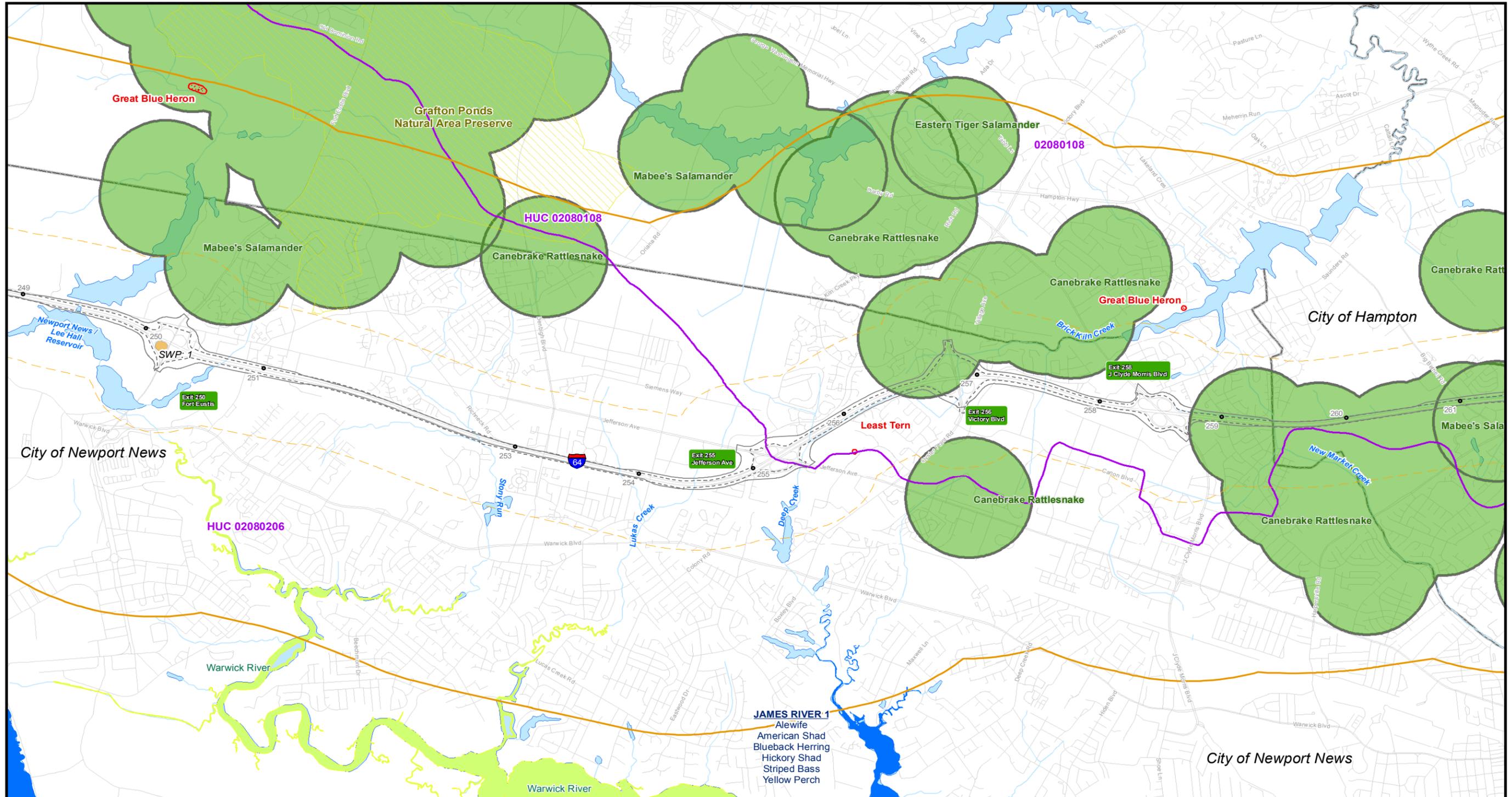
Figure III.E.2 Threatened and Endangered Species, Unique Wildlife Resources, and Habitat

Essential Fish Habitat: Bluefish, Atlantic Butterfish, Summer Flounder, Black Sea Bass, King Mackerel, Spanish Mackerel, Cobia, Red Drum throughout the study area.
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 Habitat Area of Particular Concern: Sandbar Shark from MM 239 to I-664 Interchange.
 Anadromous Fish, T&E Species and Colonial Waterbirds data courtesy of Virginia Fish and Wildlife Information Service; Bald Eagle nest data courtesy of the Center for Conservation Biology

Map 6 of 9

0 0.25 0.5 1 Miles





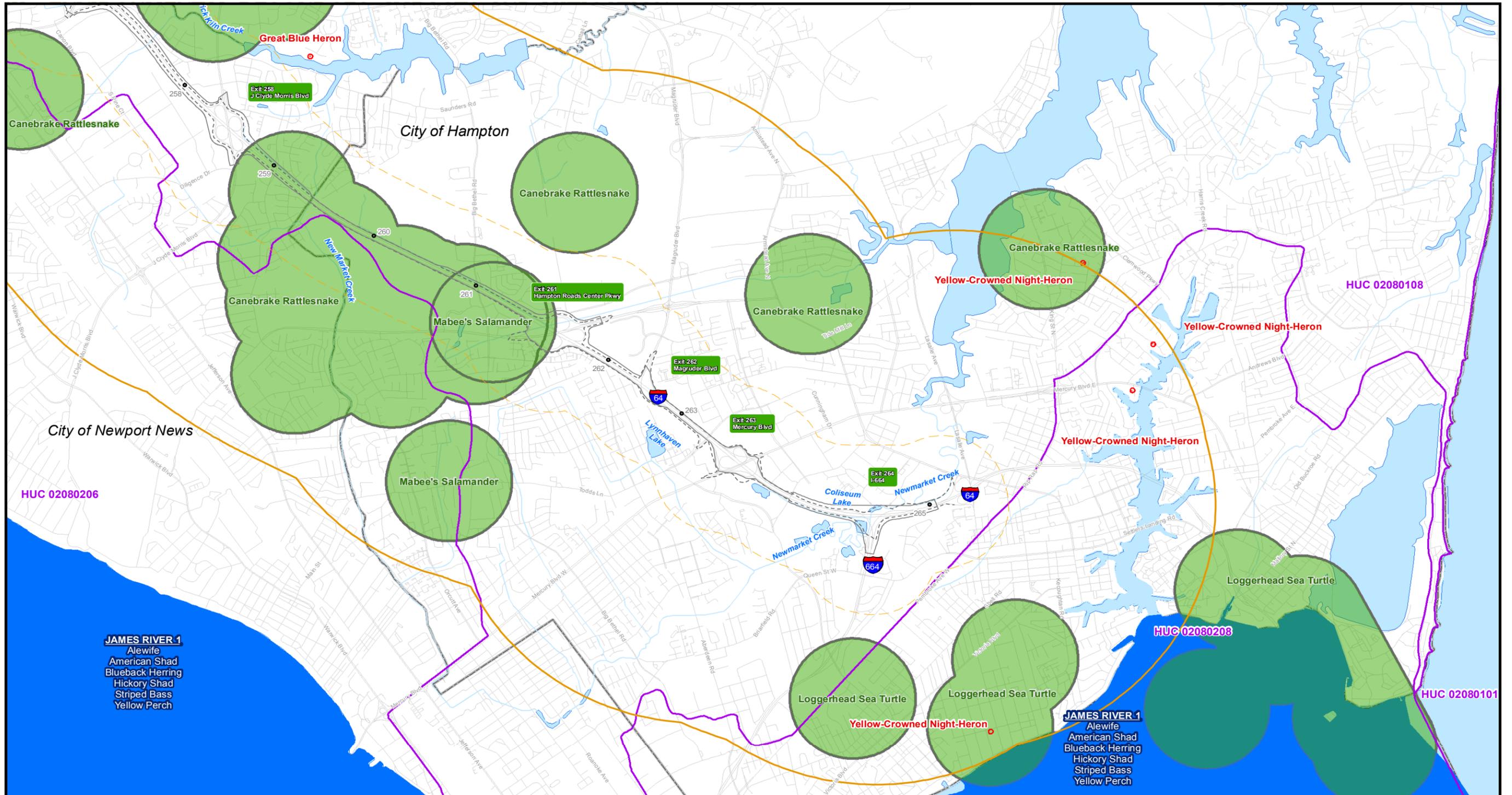
- Limits of Widest Alternative Footprint
- - Existing Right of Way
- USGS Topoquadrangle Surface Water (Non-Assessed)
- Non-Assessed Water Bodies
- Locality Jurisdiction
- Two Mile Project Area Buffer
- Half Mile Project Area Buffer
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- Anadromous Fish Use Area Potential
- Colonial Water Birds
- T&E Species - Excluding Bald Eagles
- Bald Eagle Nest Location
- Grafton Ponds Natural Area Preserve
- Hydrologic Unit Code Boundary (HUC)
- Potential Small Whorled Pogonia Assessed Habitat Areas (SWP)
- High
- Medium
- Low

Figure III.E.2 Threatened and Endangered Species, Unique Wildlife Resources, and Habitat

Essential Fish Habitat: Bluefish, Atlantic Butterfish, Summer Flounder, Black Sea Bass, King Mackerel, Spanish Mackerel, Cobia, Red Drum throughout the study area.
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 Anadromous Fish, T&E Species and Colonial Waterbirds data courtesy of Virginia Fish and Wildlife Information Service; Bald Eagle nest data courtesy of the Center for Conservation Biology

Map 8 of 9

0 0.25 0.5 1 Miles



JAMES RIVER 1
 Alewife
 American Shad
 Blueback Herring
 Hickory Shad
 Striped Bass
 Yellow Perch

JAMES RIVER 1
 Alewife
 American Shad
 Blueback Herring
 Hickory Shad
 Striped Bass
 Yellow Perch



- Limits of Widest Alternative Footprint
- - Existing Right of Way
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- Non-Assessed Water Bodies
- Locality Jurisdiction
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- Anadromous Fish Use Area Potential
- Colonial Water Birds
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- Bald Eagle Nest Location
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- Medium
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Figure III.E.2 Threatened and Endangered Species, Unique Wildlife Resources, and Habitat

Essential Fish Habitat: Bluefish, Atlantic Butterfish, Summer Flounder, Black Sea Bass, King Mackerel, Spanish Mackerel, Cobia, Red Drum throughout the study area.
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 Anadromous Fish, T&E Species and Colonial Waterbirds data courtesy of Virginia Fish and Wildlife Information Service; Bald Eagle nest data courtesy of the Center for Conservation Biology



Map 9 of 9



0 0.25 0.5 1 Miles

III. ENVIRONMENTAL RESOURCES, IMPACTS AND MITIGATION

the southeast interchange loop of Exit 238 (Colonial Williamsburg) was determined to be of high potential habitat for the Small whorled pogonia. The other fourteen areas were either determined to be of medium (13 areas) or low (one area) quality.

The Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) was listed as federally endangered on February 6, 2012. However, this species has not yet been included in the agencies database system. Through communication with the NMFS the species was identified within the York River and this system’s tributaries.

Potential Impacts

As described in **Chapter II – Alternatives Considered, Section D** of this **Final EIS**, Alternative 1 has been identified as the Preferred Alternative. Alternative 1 allows the option to widen to the outside of the existing road corridor or within the median of the existing road corridor. The decision on whether to widen to the outside or the inside of the roadway would be made on a section-by-section basis, and the development of these operationally independent sections would be closely coordinated with the Richmond Area MPO, the Hampton Roads TPO and other state and federal resource and regulatory agencies. By allowing for outside or inside widening to be determined on a section-by-section basis, this Alternative provides opportunities to avoid and minimize impacts. For the purpose of the impact analysis in this **Final EIS**, Alternative 1 is assumed to have the same footprint as Alternative 1A. Since Alternative 1A widens to the outside of the existing roadway, this Alternative is assumed to provide the most conservative assessment of environmental impacts.

As described in the following section, potential impacts are reported for the No-Build Alternative and for each of the Build Alternatives. A summary table providing resource impacts associated with each of the Alternatives is included in **Chapter V – Comparison of Alternatives** of this **Final EIS**.

No-Build Alternative:

The No-Build Alternative would not involve any project-related construction or changes to the natural environment. As a result, project-related environmental effects from the No-Build Alternative are not anticipated.

Build Alternatives:

All of the Build Alternatives have the potential to affect threatened or endangered species or habitats along the project corridor. The Mabee’s salamander and the Canebrake rattlesnake are located

in the immediate vicinity of the project corridor. Each Build Alternative intersects the identified habitat areas for these species. The presence of these species would require close coordination with the resource and regulatory agencies and potential survey/assessment and design considerations.

The study also identified areas of potential habitat for the Small whorled pogonia within the Alternative limits. An official habitat survey conducted by a certified specialist would likely be required for this species as part of the project permitting process. This survey, which must be conducted by an approved professional, must be completed between May 25th and July 15th of a given year and submitted to the agencies for their review and recommendation.

Eleven Bald eagle nests were identified within the two mile radius of the project corridor, which require special coordination with the resource and regulatory agencies, with possible construction time-of-year restrictions. Bald eagles are currently de-listed under the federal ESA; however, they are still recognized as a threatened species at the state level and are protected by the federal Bald and Golden Eagle Protection Act (Eagle Act) (16 U.S.C. §668-668d) and the Migratory Bird Treaty Act (MBT Act) (16 U.S.C. §703-712). However, all of the nest locations were located outside of the 660-foot nest protection zone, and there are no anticipated impacts to this species.

As the project progresses, additional coordination would be required with the appropriate agencies for all species identified within the two mile radius of the project corridor.

Preferred Alternative:

For the purpose of the impact analysis in this **Final EIS**, Alternative 1 is assumed to have the same footprint as Alternative 1A. The Preferred Alternative has the same potential impacts to threatened and endangered species as the other Build Alternatives. This is due to the locations of the threatened and endangered species in relation to the Build Alternatives.

Mitigation Measures

The presence of federal and state threatened or endangered species in the vicinity of the project requires special consideration and coordination with various federal and state agencies. Through the coordination with these agencies, potential impacts to target species and their habitats can be evaluated and avoided by implementing various practices as part of the project design. Examples of

mitigation measures which may be employed to avoid impacts to threatened and endangered species and their habitats include shifting alignment to avoid potential areas, spanning/bridging resources and the use of bottomless arch culverts, countersinking of culverts, limiting clearing of existing vegetation to the greatest extent possible, strict adherence to erosion and sediment control guidelines, and the implementation of stormwater best management practices and adherence to maintaining applicable buffer widths to a species habitat.

If impacts can not be avoided, time-of-year restrictions for construction may be required and these restrictions would be determined through the permitting process. In addition, a Section 7 consultation (in accordance with the ESA) may be required for a species if impacts can not be avoided. Habitat assessments and species surveys may be required to determine the presence of a threatened or endangered plant species or habitat. These species surveys must be completed by an agency certified or approved specialist, and may have restrictions on time-of-year when the surveys can be conducted.

6. Wildlife and Habitat

Methodology

The presence of federal and state identified habitat areas or specific wildlife resources in the vicinity of the project require special consideration and coordination with the various federal and state agencies throughout project development. Although parklands and other natural areas are present throughout the corridor, sections of the corridor, particularly near the Cities of Richmond, Newport News and Hampton, are highly urbanized and most natural resources have been altered during years of landscape manipulation for development. However, within the central section of the corridor, there are a number of undisturbed and/or highly naturalized areas in the vicinity of the project. Despite the many years of disturbance that have diminished the extent and quality of the natural habitat within the corridor, there remains a number of natural resources that enhance the area. Many of these resources, summarized below, are found throughout the corridor and are regulated by a number of different federal and state agencies.

The VDGIF documents both confirmed and potential Anadromous Fish Use Areas throughout Virginia. Anadromous fish are those migratory fish species which spend most of their lives in the sea and migrate to fresh water to breed. The NMFS National Oceanic

III. ENVIRONMENTAL RESOURCES, IMPACTS AND MITIGATION

and Atmospheric Administration (NOAA) division also oversees anadromous fish resources, and identifies these habitat resources through on-line mapping. Both the VDGIF and the NMFS databases were reviewed to determine the presence of anadromous fish use areas within the vicinity of the project corridor. Direct coordination was also conducted with the NMFS NOAA staff to discuss species which have not yet been updated to the database.

Colonial Water Birds (also referred to as Colonial Wading or Nesting Birds) include herons, egrets, ibises, gulls, terns, skimmers, cormorants and pelicans. These birds share the unusual characteristic of nesting in dense assemblages, breeding in very few locations. The loss of these breeding areas may have profound consequences on a population level. Both the VDCR and the VDGIF comment on a project's effect on this resource.

Any federal agency that takes an action that could adversely affect essential fish habitat (EFH) by reducing the quantity or quality of habitat must work with the NMFS NOAA to identify and reduce potential impacts. EFH includes all types of aquatic habitat where fish (considering all lifecycle stages) spawn, breed, feed, or grow to maturity. A Habitat Area of Particular Concern (HAPC) is a discrete subset of EFH that provides extremely important ecological functions or is especially vulnerable to degradation. The HAPC designation does not confer additional protection or restrictions, but helps to prioritize conservation efforts and may elevate project review. NOAA EFH Areas Protected from Fishing (APF) are areas in which the NMFS and the regional fishery management councils prevent, mitigate, or minimize adverse effects from fishing on EFH. The NOAA EFH on-line mapping systems were used to identify potential regulated resources within the vicinity of the project corridor.

The VDCR identifies resources considered natural heritage resources across the state. These resources include Natural Communities such as specific hardwood forest types, marshes and Grafton Ponds. Grafton Ponds represent Virginia's best remaining example of a coastal plain pond complex, and the state considers these rare wetland complexes as areas deserving high levels of protection from development. These rare systems also support several locally rare or state threatened species including Harper's fimbriatilis (*Fimbristylis perpusilla*), Mabee's salamander (*Ambystoma mabeei*), Pondspice (*Litsea aestivalis*), Cuthbert turtlehead (*Chelone cuthbertii*) and Barking treefrog (*Hyla gratiosa*).

As defined by the VDCR, an invasive species is a non-native (alien, exotic, or non-indigenous) plant, animal, or disease that causes or is likely to cause ecological and economic harm to the natural system. Invasive species are classified by levels of invasiveness (High, Medium and Occasional) based on a number of factors including the cumulative impact on natural areas, the potential to disperse and invade natural areas, distribution and abundance, difficulty of management and impacts on other species. Highly invasive plant species generally disrupt ecosystem processes and cause major alterations in plant community and overall structure. They can easily establish in undisturbed habitats and would colonize disturbed areas rapidly under the appropriate conditions. A number of highly invasive species are common along the corridor and have the potential to become established in the project corridor, particularly in disturbed areas generated during roadway construction.

For more information regarding the wildlife and habitat resources along the project corridor, refer to the *Natural Resources Technical Memorandum*.

Existing Conditions

The presence of terrestrial wildlife within the project corridor is a function of available habitats. Because of the urban and built-up land use present along both termini of the corridor, native wildlife species would be expected to be primarily restricted to the less developed areas along the central portion of the corridor and the natural or park areas or stream valleys/wetlands located in the Cities of Richmond, Newport News and Hampton. Forested stream valleys and various types of wetlands provide habitat for more sensitive wildlife requiring low disturbance. More open, early successional habitats such as those found in many locations along the median and within the interchanges provide habitat for potential disturbance-tolerant species and species adapted to woodland/field edges.

The specific wildlife and habitat resources identified along the corridor are summarized below. There were no identified SAV areas, Trout Waters, Threatened and Endangered Waters, Shellfish Areas, or APFs identified within the immediate vicinity of the project limits. In addition, there are no state-designated scenic rivers and no federally designated wild and scenic rivers located within or near the study area.

Anadromous Fish Use Areas

The VDGIF database identified a number of Confirmed and Potential Anadromous Fish Use Area designations within a two

mile radius of the project corridor. The Potential and Confirmed Anadromous Fish Use Areas are included on **Figure III.E.2** and summarized in **Table III.E.9**.

Based on a review of the NMFS information, both Alewife (*Alosa pseudoharengus*) and Blueback herring (*Alosa aestivalis*) were listed as both a Candidate Species and a Species of Concern within the project corridor. A Candidate Species is a species that is being considered for listing under the ESA as an endangered or a threatened species, but not yet the subject of a proposed rule. A Species of Concern is a species which the agency has some concerns regarding status and threats, but for which insufficient information is available to indicate a need to list the species under the ESA.

The Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) was listed as federally endangered on February 6, 2012. However, this species has not yet been included in the agency's database system. Through communication with the agency, the species was identified within the York River and tributaries.

Colonial Water Birds

Through the project scoping process, the VDCR identified one natural heritage resource denoted as an Animal Assemblage within a two mile radius of the project corridor. This resource, a Colonial Water Bird colony, was located at Beaverdam Creek. A review of the VDGIF database identified a number of Colonial Water Bird designations within the two mile radius of the project corridor. Six Great blue heron (*Ardea herodias*) colonies are located within a half mile of the project corridor (south of the mainline near mile markers 217.5 and 221.5; north of the mainline near mile markers 221, 223.5, 229 and 229.5). Only one of these colonies is located within 500 feet of the project (north of the mainline at mile marker 229.5). The colonies were found primarily along the Chickahominy River and France Swamp, but also noted along Beaverdam Creek, Diascund Creek and Wahrani Swamp. The identified colonies were predominantly Great blue heron while Great egret (*Ardea alba*) colonies were also fairly common. Yellow-crowned night heron (*Nyctanassa violacea*) colonies were identified in smaller numbers, and a single Least tern (*Sterna antillarum*) colony were identified within the vicinity of the project area. The Least tern colony is located within a half mile of the project south of the mainline near mile marker 256. The Colonial Water Bird designations located within a two mile radius of the project corridor are included on **Figure III.E.2**.

III. ENVIRONMENTAL RESOURCES, IMPACTS AND MITIGATION

Table III.E.9: Virginia Department of Game and Inland Fisheries Documented Confirmed and Potential Anadromous Fish Use Areas within a Two Mile Radius of the Project Corridor

Status	Major River Basin	Project Corridor Locality	Stream Name (VDGIF ID)	Confirmed Species
Confirmed	James	James City County	Diascund Creek	Blueback herring, Striped bass, Yellow perch
		City of Richmond, Henrico County	James River (2)	American shad, Blueback herring, Striped bass, Yellow perch
		York County	Halfway Creek	Yellow perch
		James City County, City of Newport News, City of Hampton	James River (1)	Alewife, American shad, Blueback herring, Hickory shad, Striped bass, Yellow perch
	York	James City County	France Swamp	Yellow perch
		James City County	Ware Creek	Alewife, Blueback herring
		York County	York River	Alewife, American shad, Blueback herring, Hickory shad, Striped bass, Yellow perch
Potential	York	York County	Jones Millpond Creek	--
		York County	King Creek	--
		York County	Queen Creek	--
		York County	Carter Creek	--
		York County	Skimino Creek	--
	James	City of Newport News	Warwick River	--
		James City County, City of Newport News	Skiffes Creek	--

Essential Fish Habitat

Based on the NOAA on-line mapping systems, species with designated EFH for at least one life cycle stage within the vicinity of the corridor include: Windowpane flounder (*Scophthalmus aquosus*), Bluefish (*Pomatomus saltatrix*), Atlantic butterflyfish (*Peprilus triacanthus*), Summer flounder (*Paralichthys dentatus*), Black sea bass (*Centropristis striata*), King mackerel (*Scomberomorus cavalla*), Spanish mackerel (*Scomberomorus maculatus*), Cobia (*Rachycentron canadum*), Red drum (*Sciaenops ocellatus*), Dusky shark (*Carcharhinus plumbeus*) and Sandbar shark (*Carcharhinus plumbeus*). The database identified EFH habitat for each species listed above throughout the entire corridor, with the exception of the Windowpane flounder and the Dusky shark whose EFH is limited within the corridor from the City of Hampton to just east of the City of Williamsburg. A HAPC was also identified for the Sandbar shark for all stages of the lifecycle throughout the eastern part of the corridor, from approximately just

west of the Queen Creek crossing to the project termini in the City of Hampton. In addition, no EFH APFs are designated for any waterway within the study area.

Natural Communities

The VDCR identified a number of Natural Communities within a two mile radius of the project corridor. These Natural Communities include Mesic Mixed Hardwood Forest, Basic Mesic Forest, Piedmont/Coastal Plain Oak - Beech/Heath Forest, Coastal Plain Dry Calcareous Forest/Woodland, Oak/Heath Forest, Coastal Plain Depression Wetland, Tidal Freshwater Marsh, Tidal Oligohaline Marsh, Coastal Plain/Piedmont Basic Seepage Swamp and Non-Riverine Flatwood/Swamp. These natural community types may be located throughout the project corridor.

The Grafton Ponds Natural Area Preserve, which is owned by the City of Newport News but is under the VDCR jurisdiction, is located in the project vicinity, but not within the project corridor.

The 375 acre Grafton Ponds Natural Area Preserve is located west of Exit 250, approximately 2,600 feet north of the mainline.

Invasive Species

The highly disturbed nature of highway corridors, in addition to the easy mode of transport by the vehicles traveling the corridor, including vehicles from other regions (both local and national), allows for the establishment of exotic and invasive species. Stands of several aquatic and terrestrial invasive, non-native, exotic, or “nuisance” plant species were identified within the study area including Tree-of-heaven (*Ailanthus altissima*), Japanese stiltgrass (*Microstegium vimineum*), Common reed (*Phragmites australis*) and Common dodder (*Cuscuta gronovii*). The primary invasive species identified within the study area was Japanese stiltgrass.

In addition to plant species, a number of both aquatic and terrestrial animal species threaten the native plant and animal communities in Virginia. Common species that could affect the study area if encountered within construction limits include House mouse, Norway rat, Black rat, Coyote, Nutria, Woodchuck, European starling, English (house) sparrow, Pigeon, Emerald ash borer, Zebra mussel, Rusty crayfish, Chinese mitten crab, Northern snakehead fish, Rapa welk and the imported Fire ant. None of these species were directly observed during field investigations.

Potential Impacts

As described in **Chapter II – Alternatives Considered, Section D** of this **Final EIS**, Alternative 1 has been identified as the Preferred Alternative. Alternative 1 allows the option to widen to the outside of the existing road corridor or within the median of the existing road corridor. The decision on whether to widen to the outside or the inside of the roadway would be made on a section-by-section basis, and the development of these operationally independent sections would be closely coordinated with the Richmond Area MPO, the Hampton Roads TPO and other state and federal resource and regulatory agencies. By allowing for outside or inside widening to be determined on a section-by-section basis, this Alternative provides opportunities to avoid and minimize impacts. For the purpose of the impact analysis in this **Final EIS**, Alternative 1 is assumed to have the same footprint as Alternative 1A. Since Alternative 1A widens to the outside of the existing roadway, this Alternative is assumed to provide the most conservative assessment of environmental impacts.

As described in the following section, potential impacts are reported for the No-Build Alternative and for each of the Build

III. ENVIRONMENTAL RESOURCES, IMPACTS AND MITIGATION

Alternatives. A summary table providing resource impacts associated with each of the Alternatives is included in **Chapter V – Comparison of Alternatives** of this **Final EIS**.

No-Build Alternative:

The No-Build Alternative would not involve any project-related construction or changes to the natural environment. As a result, project-related environmental effects from the No-Build Alternative are not anticipated.

Build Alternatives:

All of the Build Alternatives have the potential to impact terrestrial and aquatic habitat or species along the project corridor. Extensive coordination with the different agencies would continue throughout all stages of project development to reduce potential impacts to these resources. In addition, avoidance and minimization of potential impacts to the natural environment and wildlife would be considered throughout the design and construction phases of the project. Permitting of the project would also address avoidance, minimization and compensatory mitigation measures, as needed.

All of the Build Alternatives have the potential to impact unique wildlife resources including Anadromous Fish Use Areas, EFH and Colonial Water Birds. However, these impacts would be negligible following the measures outlined below. The VDCR Natural Communities, including the Grafton Pond Natural Area Preserve are not anticipated to be impacted by any of the Build Alternatives to any measurable degree.

Terrestrial Wildlife and Habitat

Because the project consists of widening along an existing corridor, the proposed activities would not likely affect any substantial forest resource. Because the proposed project Alternatives follow an existing highway corridor and much of the corridor is already within an urbanized or developed area, impacts to terrestrial habitat would be limited to the displacement of small sections of remaining, often disjunct, non-contiguous tracts of forests. The existing corridor poses a barrier to wildlife movements that would not be substantially altered by the proposed Alternatives. The threat of mortality or injury to wildlife within the corridor would persist but would not likely increase in any measurable amount due to the improvements.

Potential exists for temporary impacts to wildlife with the displacement of vegetated cover within the construction footprint.

The mechanical removal of cover would cause animal migration away from the disturbance resulting in temporary decrease in habitat usage by mostly common edge-dwelling species. Construction activities may also result in wildlife mortality. Foraging behaviors and wildlife use may also be associated with slope stabilization practices, but would only be on a temporary basis.

The VDCR Natural Communities, including the Grafton Pond Natural Area Preserve are not anticipated to be impacted by any of the Build Alternatives to any measurable degree.

Aquatic Wildlife and Habitat

All of the Build Alternatives would reduce aquatic habitat within the corridor to a small degree. The extension of culverts could lead to the direct loss of fish and macroinvertebrates within the construction zone and would permanently alter the available habitat in the impacted areas. However, these areas would likely be colonized again, following the construction activities. There is the potential for increased water quality degradation from stormwater runoff due to the increase in impervious surface affecting overall water quality. However, the relatively small impervious impact that may occur are unlikely to affect the aquatic habitat or the makeup of biological communities to any appreciable degree and best management practices would be employed to reduce potential impacts.

Preferred Alternative:

For the purpose of the impact analysis in this **Final EIS**, Alternative 1 is assumed to have the same footprint as Alternative 1A. The Preferred Alternative has the same potential impacts to wildlife and habitat as the other Build Alternatives. This is due to the locations of the identified wildlife and habitat in relation to the Build Alternatives.

Mitigation Measures

The presence of natural areas and federal and state listed natural habitat and unique wildlife resources in the vicinity of the project requires special consideration and coordination with various federal and state agencies. Through the coordination with these agencies, potential impacts to target species and their habitats can be evaluated and avoided by implementing various practices as part of the project design. Examples of mitigation measures to avoid impacts to wildlife and their habitats may include shifting

alignment to avoid potential areas, spanning/bridging resources and the use of bottomless arch culverts, countersinking of culverts, limiting clearing of existing vegetation to the greatest extent possible, the strict adherence to erosion and sediment control guidelines and the implementation of stormwater best management practices, and adherence to maintaining applicable buffer widths to a species habitat.

If impacts can not be avoided, time-of-year restrictions for construction may be required and these restrictions would be determined through the permitting process. Also, habitat assessments and species surveys may be required to determine the presence of a threatened or endangered plant species. These species surveys must be completed by an agency certified or approved specialist, and may have restrictions on time-of-year when the surveys can be conducted.

Because the majority of the additional roadway would be located within the existing disturbed corridor, the likelihood of an increase in the prevalence of invasive species is expected to be minimal. However, because the clearing of vegetated areas would be necessary for this project, there would be opportunity for invasive species to become established due to extra light penetrating the forest canopy, in addition to disturbed soils. Contract bid packages could include special provision for managing invasive species that are specific to the appropriate sections of VDOT's *Road and Bridge Specifications*. While the newly established right of way is vulnerable to colonization by invasive plant species from the existing highway and adjacent property, implementing special construction provisions may reduce the potential for establishment.

III. ENVIRONMENTAL RESOURCES, IMPACTS AND MITIGATION

F. Visual Quality

Methodology

The National Environmental Policy Act (NEPA) requires that consideration be given to the effects that proposed federal actions or projects are likely to have on the quality of the human environment. One of these environmental factors to consider is visual effects, often referred to as aesthetics. Because specific design decisions regarding construction materials, design, or location are not part of this study, the existing conditions of the corridor and the general conditions of the proposed Alternatives along the corridor are being considered in the analysis of visual impacts.

Sensitive visual resources were identified within the vicinity of the Interstate 64 (I-64) corridor. The existing visual environment for the study area was reviewed in the field through a windshield survey and supplemented with Geographic Information Systems data, aerial photography and U.S. Geological Survey topographic mapping. In addition, comments were solicited from both the public and the Study Team regarding visual resources along the corridor.

This analysis describes the existing visual environment along the corridor. Views can be described as those both from the roadway and of the roadway. Effects would be described as changes that result from the construction of the road and that would change the perception of an observer in a substantial way. This change could be considered as either positive or negative, and can be subjective based on the observer's point of view.

Existing Conditions

The visual environment of I-64, both views from the road and views of the road, is defined by the region's topography, parks and natural areas, historic properties/neighborhoods and development patterns along the corridor spanning from the City of Richmond to the City of Hampton.

The visual setting of the corridor is primarily influenced by the degree of development along the corridor. Although parks and other natural areas are located throughout the corridor, the visual setting along the eastern and western termini of the study area is generally associated with urban and suburban settings. The median is paved at each end of the project corridor in the highly developed areas. Starting in the City of Richmond, the median within the corridor is paved to just east of the Shockhoe Valley Bridge. From

this point east to approximately Exit 205 (Bottoms Bridge) the median is predominantly grasses with sparse trees and shrubs or small clusters of wooded areas. Along the central section of the corridor (from Exit 205 – Bottoms Bridge to Exit 255 – Jefferson Avenue) the median is primarily wooded. From just west of Exit 255 (Jefferson Avenue) the median is paved to the project terminus in the City of Hampton.

The project corridor lies within the Coastal Plain physiographic province. The Coastal Plain topography is extremely flat, and the corridor was designed and constructed to interstate standards with minimal curves and changes in vertical elevations.

For this project, the general visual resources are historic properties/neighborhoods, parks and recreation areas, and other natural habitat features. Visual resources were selected based on their visual proximity to the interstate as well as their associated potential view activity and frequency. The following summarizes some of the primary visual resources identified within the project corridor.

Aquatic Systems

Due to the prevalence of and dendritic nature of streams and wetlands within the Coastal Plain, the interstate crosses a number of these features throughout the entire corridor. The stream systems which are crossed by the road range from relatively small headwater systems to major rivers. There are also numerous wetlands, including floodplain wetlands, along the corridor. The interstate also crosses open waters, such as the Newport News/Lee Hall Reservoir, which is a major reservoir supplying the Hampton Roads region. There is diversity in aquatic habitats with both tidal and non-tidal systems, and a diversity of vegetative types including forested, scrub-shrub and emergent systems. Areas considered as marshes and swamps are also identified along the corridor. Not only do these aquatic habitats provide a visual resource on their own, they also provide the opportunity to view wildlife, particularly bird species. Several of the most prominent stream and wetland systems which are crossed by the interstate include the Chickahominy River, Higgins Swamp, Rumley Marsh, Wahrani Swamp, Queen Creek, the Newport News /Lee Hall Reservoir and Newmarket Creek.

Wooded Areas within the Median

A variety of citizens, organization and localities have expressed that it is important to preserve the aesthetics of the corridor by retaining the wooded median, particularly in the section of I-64 through the historic triangle area comprised of the Cities of

Williamsburg and Yorktown and of Jamestown. According to the public comments, the trees and vegetation provide a parkway feel that is consistent with the themes of this region.

Parks and Recreation Areas

A number of parks and recreational areas are located along the study area corridor, both in the rural areas and the urban/suburban settings. These features include a number of battlefields (Seven Pines, Cold Harbor, Battle of Williamsburg and Battle of Yorktown) and numerous parks (Criss Cross Park, Colonial National Historical Park/Colonial Parkway, Waller Mill Park, Skiffes Creek Park, Stoney Run Park, Beechlake Park, Sandy Bottom Park, Newport News Park and Bluebird Gap Farm Park).

Historic Districts/Neighborhoods

There were several historic districts/neighborhoods identified along the project corridor. These include Chestnut Hill/Plateau Historic District and the Jackson Ward Historic District located in the City of Richmond and the Colonial National Historical Park/Colonial Parkway (also considered a park) located near the City of Williamsburg.

Potential Impacts

As described in **Chapter II – Alternatives Considered, Section D** of this **Final EIS**, Alternative 1 has been identified as the Preferred Alternative. Alternative 1 allows the option to widen to the outside of the existing road corridor or within the median of the existing road corridor. The decision on whether to widen to the outside or the inside of the roadway would be made on a section-by-section basis, and the development of these operationally independent sections would be closely coordinated with the Richmond Area MPO, the Hampton Roads TPO and other state and federal resource and regulatory agencies. By allowing for outside or inside widening to be determined on a section-by-section basis, this Alternative provides opportunities to avoid and minimize impacts. For the purpose of the impact analysis in this **Final EIS**, Alternative 1 is assumed to have the same footprint as Alternative 1A. Since Alternative 1A widens to the outside of the existing roadway, this Alternative is assumed to provide the most conservative assessment of environmental impacts.

As described in the following section, potential impacts are reported for the No-Build Alternative and for each of the Build Alternatives. A summary table providing resource impacts associated with each of the Alternatives is included in **Chapter V – Comparison of Alternatives** of this **Final EIS**.

III. ENVIRONMENTAL RESOURCES, IMPACTS AND MITIGATION

No-Build Alternative:

The No-Build Alternative would not involve any project-related construction or changes to the visual quality along the corridor. As a result, project-related visual effects from the No-Build Alternative are not anticipated.

Build Alternatives:

The Build Alternatives include widening improvements along many of the visual resources identified. However, because the project includes basic improvements along an already existing, busy interstate, effects to these resources for all Build Alternatives are expected to be minimal. The view of the interstate and from the interstate would not be dramatically altered since viewers already see the existing interstate.

Throughout the public involvement process concerns were raised about the amount of increased noise the improvements to I-64 would generate. Concerns raised included the need to build new noise walls along with how to maintain/rehabilitate the existing noise walls, primarily in the urban areas through the City of Richmond area and the City of Newport News/City of Hampton areas. Removal of established stands of trees from the median may be unavoidable in selected areas.

Preferred Alternative:

For the purpose of the impact analysis in this **Final EIS**, Alternative 1 is assumed to have the same footprint as Alternative 1A. The Preferred Alternative has the same potential impacts to visual resources as the other Build Alternatives. This is due to the locations of the visual resources in relation to the Build Alternatives.

Mitigation Measures

A number of minimization principles would be considered as appropriate in the final design to reduce the potential visual effects associated with the Alternatives. Because the project consists of widening an existing corridor, the overall visual quality is already reduced. There would be no new major visual changes along the corridor. Any vegetation removal would be minimized to the greatest extent possible. Additional landscaping (berms, plants, signage, artwork, etc.) may be incorporated into the design, as appropriate. The smallest feasible footprints would be considered throughout the corridor and considerations would be taken to reduce the impacts to wooded sections in the median to the greatest

extent practicable. As the project continues, the goals of the final design analysis for noise walls would be to determine if any warranted highway traffic noise abatement measures are feasible and reasonable, determine the desires of the benefited receptor units and incorporate appropriate aesthetic treatments.

III. ENVIRONMENTAL RESOURCES, IMPACTS AND MITIGATION

G. Historic Properties

Methodology

Section 106 of the National Historic Preservation Act (NHPA) of 1966 (as amended) and its implementing regulations (36 CFR 800) require federal agencies to take into account the effects of their undertakings on historic properties listed in or eligible for listing in the National Register of Historic Places (NRHP) and to provide the Advisory Council on Historic Preservation a reasonable opportunity to comment. The specific steps to accomplish this are defined in 36 CFR Part 800. Under Section 106, federal agencies are required to consult with parties with an interest in the effects of the undertaking on historic properties. The agency consults with the State Historic Preservation Office (SHPO) under Section 106, which in Virginia is the Virginia Department of Historic Resources (VDHR). The goal of consultation is to identify historic properties potentially affected by the undertaking, assess its effects and seek ways to avoid, minimize or mitigate any adverse effects on historic properties.

During the *Interstate 64 (I-64) Peninsula Study*, a *Phase I Reconnaissance Architectural Survey* and *Phase II Intensive Architectural Evaluation Survey* were completed on above-ground resources within the Area of Potential Effects (APE). The identification and evaluation of all below-ground resources has not yet been completed. However, an *Archaeological Assessment* was conducted on the entire study corridor to allow for comparison of the proposed Alternatives. In addition, a *Phase I Archaeological Identification Survey* was conducted in selected areas that were considered to have the potential to contain archaeological resources that may warrant preservation in place.

Identification and evaluation of historic properties is being conducted using a phased process, per 36 CFR 800.4(b)(2). A Programmatic Agreement has been developed to satisfy the requirements under Section 106 of the NHPA as outlined in 36 CFR 800.14(b)(ii) and can be found in **Appendix K - Programmatic Agreement**. A few key commitments include:

- Avoiding the area near the Shockoe Hill Burying Ground and the Colonial National Historical Park/Colonial Parkway.
- Consultation with the U.S. National Park Service regarding improvements in the vicinity of the Colonial National Historical Park/Colonial Parkway.

- Consultation with consulting parties for improvements in the vicinity of the Confederate Peninsular Defenses Fort 9 (Redoubt #9).

This Programmatic Agreement outlines the process by which historic properties potentially affected by the undertaking should be handled during final design and/or construction. This includes identification of archaeological resources, final effect determinations and opportunities to avoid, minimize or mitigate adverse effects on historic properties.

Potential consulting parties were identified and eight of the 34 groups sent invitation letters have requested and have been granted consulting party status. Copies of technical reports and agency coordination documentation related to historic properties have been provided to each of the consulting parties.

A compilation of reports and correspondence, along with more detailed mapping of historic resources, is contained in a separate document called *Historic Properties Documentation*.

Existing Conditions

All identified historic properties along the project area are shown on **Figure III.G.1**.

Identification of Historic Properties: Architecture and Battlefields

During the *Phase I Reconnaissance Architectural Survey*, the Virginia Department of Transportation (VDOT) identified a total of 105 above-ground properties within the project's APE. Seven architectural historic properties were previously listed in the NRHP and one architectural historic property was found to be eligible for the NRHP, as summarized in **Table III.G.1**.

The *Phase II Intensive Architectural Evaluation Survey* conducted during the study evaluated Cedar Knoll, located at 3280 Old Williamsburg Road, which was constructed circa 1816. The home still retains many important vernacular federal style attributes and exhibits key characteristics reflective of its original design and period of construction. This resource was recommended eligible for listing in the NRHP under Criterion C for its architectural significance. The SHPO concurred with this recommendation on May 1, 2012.

Of the 105 properties identified, 10 are Civil War battlefields, as shown in **Table III.G.2**. Six of the battlefields within the project area are eligible for the NRHP and two are potentially eligible. Due to a lack of integrity, the SHPO concurred on August 20, 2012, that the battlefields of Big Bethel and Oak Grove are not considered eligible for listing in the NRHP.

The NRHP boundaries for these battlefields were recommended by the American Battlefield Protection Program (ABPP) in 2009. The I-64 study area passes through the ABPP-recommended potential NRHP boundaries of five of the identified Civil War battlefields: Cold Harbor (042-5017; VA062); Savage's Station (043-0308; VA019); Seven Pines (043-5081; VA014); Williamsburg (099-5282; VA010); and Yorktown (099-5583; VA009).

Identification of Historic Properties: Archaeology

The archaeological APE is a subset of the project APE, and includes any areas in which ground disturbing activities could potentially occur. Archaeological resources potentially exist throughout the project APE. The results of the *Archaeological Assessment* recommend that most previously identified

Table III.G.1: Effect Determination for Listed or Eligible Architectural Resources Identified within the Project Area of Potential Effects

VDHR Resource Number	Resource Name	Resource Type	NRHP Status	Effect Determination
127-0237	Jackson Ward Historic District	Historic District	Listed NRHP	No Effect
127-0472	Sixth Mount Zion Baptist Church	Commercial Building	Listed NRHP	No Effect
127-0352	St. Luke Building, 900 St. James Street	Commercial Building	Listed NRHP	No Effect
127-0389	Shockoe Hill Cemetery	Cemetery	Listed NRHP	No Effect
127-6166	Hebrew Cemetery	Cemetery	Listed NRHP	No Effect
127-0343	Chestnut Hill/Plateau Historic District	Historic District	Listed NRHP	No Effect
043-0078	Cedar Knoll	Building	Eligible	No Adverse Effect
047-0002	Colonial National Historical Park/Colonial Parkway	District	Listed NRHP	No Adverse Effect

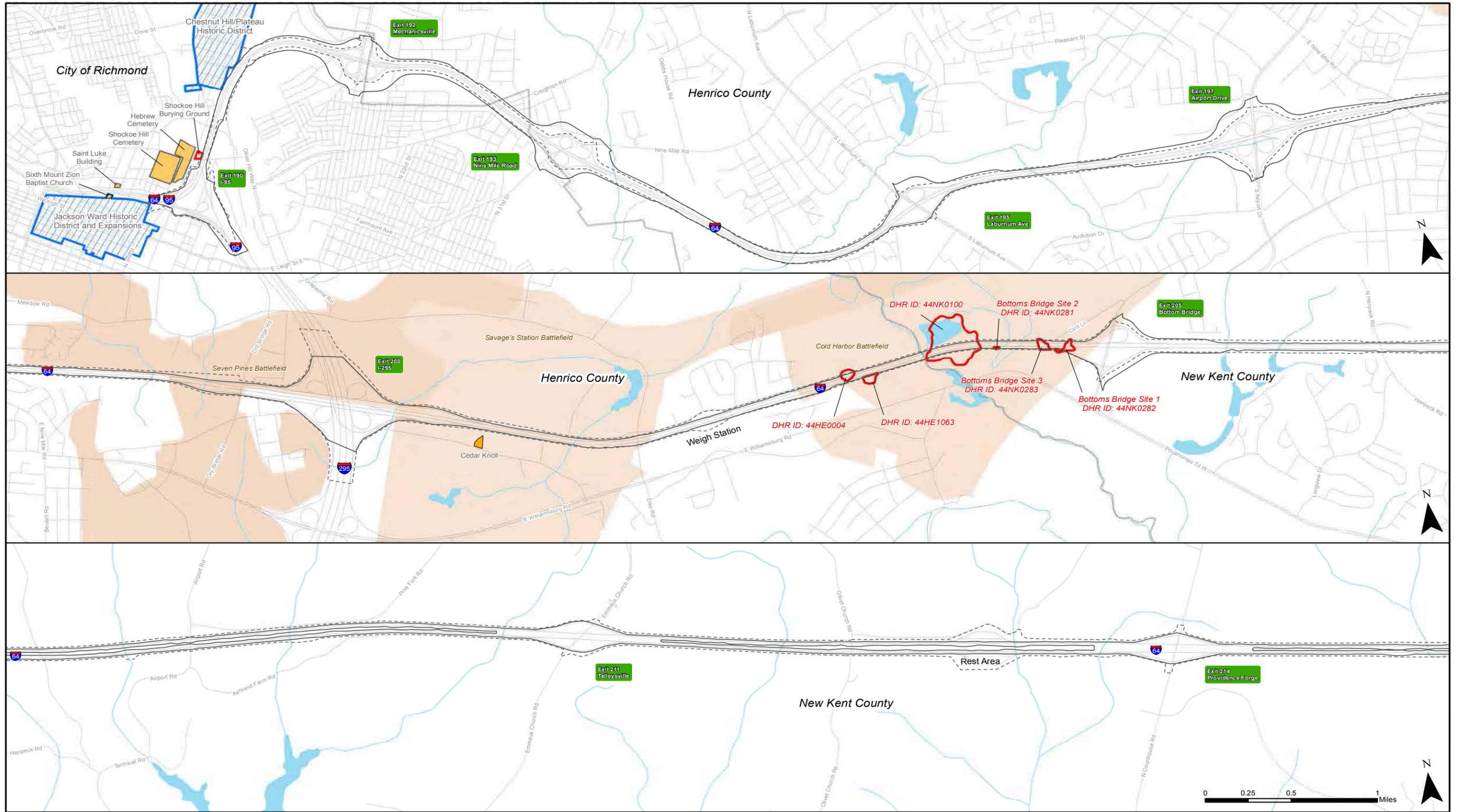


Figure III.G.1 Historic Properties

Map 1 of 3



- Existing Right of Way
- Limits of Widest Alternative Footprint
- Locality Jurisdiction
- USNPS Battlefields (NRHP Boundaries)
- Archaeological Resources
- Architectural Resources
- Historic Districts
- USGS Topoquadrangle Surface Water (Non-Assessed)
- Non-Assessed Water Bodies



Figure III.G.1 Historic Properties
 Map 2 of 3



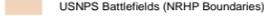
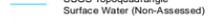
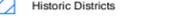
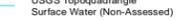
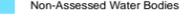
-  Existing Right of Way
-  Limits of Widest Alternative Footprint
-  Locality Jurisdiction
-  USNPS Battlefields (NRHP Boundaries)
-  Archaeological Resources
-  Architectural Resources
-  Historic Districts
-  USGS Topographic Surface Water (Non-Assessed)
-  Non-Assessed Water Bodies



Figure III.G.1 Historic Properties
Map 3 of 3



-  Existing Right of Way
-  Limits of Widest Alternative Footprint
-  Locality Jurisdiction
-  USNPS Battlefields (NRHP Boundaries)
-  Archaeological Resources
-  Architectural Resources
-  Historic Districts
-  USGS Topoquadrangle Surface Water (Non-Assessed)
-  Non-Assessed Water Bodies

III. ENVIRONMENTAL RESOURCES, IMPACTS AND MITIGATION

Table III.G.2: Effect Determination for Battlefield Sites Identified within the Project Area of Potential Effects

Property	Description	NRHP Status	Effect Determination
043-0307; VA075	Chaffin's Farm/New Market Heights Battlefield	Eligible	No Adverse Effect
043-5273; VA018	Garnett and Golding's Farm Battlefield	Eligible	No Adverse Effect
043-5079; VA015	Oak Grove Battlefield	ABPP Recommended Not Eligible	No Historic Properties Affected
043-5073; VA081	Fair Oaks/Darbytown Road Battlefield	Eligible	No Adverse Effect
043-5081; VA014	Seven Pines Battlefield	Eligible	No Adverse Effect
043-0308; VA019	Savage's Station Battlefield	Eligible	No Adverse Effect
042-5017; VA062	Cold Harbor Battlefield	Eligible	No Adverse Effect
099-5282; VA010	Battle of Williamsburg	Recommended Eligible	No Adverse Effect
099-5283; VA009	Battle of Yorktown (Civil War)	Recommended Eligible	No Adverse Effect
114-5297; VA003	Big Bethel Battlefield	ABPP Recommended Not Eligible	No Historic Properties Affected

archaeological sites recommended eligible for listing in the NRHP and other potentially eligible archaeological resources within the I-64 study area likely would be valued chiefly because of what can be learned by data recovery and are unlikely to warrant consideration for preservation in place.

A Phase I Archaeological Identification Survey was conducted within three sections of the I-64 study corridor that were determined to have a high potential for archaeological resources which could potentially warrant consideration for preservation in place. The three areas included the I-64 crossing of the Chickahominy River, also known as Bottoms Bridge; an area within the median approximately 4,000 feet east of the Exit 211 (Talleysville); and two areas adjacent to the Warwick River (Newport News/Lee Hall Reservoir). The goals of the archaeological survey were to identify any archaeological resources over 50 years in age and to make recommendations on the potential NRHP eligibility for all identified resources.

Three newly identified archaeological sites (44NK0281, 44NK0282 and 44NK0283) were recorded and two previously identified sites (44HE1063 and 44NK0100) were located during the Phase I Survey; however Site 44HE0004 was unable to be located during the survey. All of these sites are located within the Bottoms Bridge area. As summarized in **Table III.G.3**, five of these six sites were recommended as potentially being eligible for listing in the NRHP.

The VDHR files contain 19 previously recorded archaeological sites within the I-64 study corridor. The Bryan Manor Plantation Site (099-0065) is listed in the NRHP, Confederate Peninsular

Defenses Fort 9 (Redoubt #9; 44YO0051/099-0040) is eligible, and Redoubt 8 (Site 44YO0050/099-0039) is recommended as potentially eligible for listing in the NRHP. Documentation of the 1816 Shockoe Hill Burying Ground was identified during the study; however, archaeological investigations confirmed that the burying ground was not present within VDOT right of way. There is the possibility that the resource is present outside of the right of way and therefore the Programmatic Agreement details

commitments and treatments for this resource during final design and construction (see **Appendix K – Programmatic Agreement**).

On June 11, 2012, the SHPO concurred with the findings of the *Archaeological Assessment* and *Phase I Archaeological Identification Survey*. They also concurred that, with the exception of Redoubt 8 and the Shockoe Hill Burying Ground, archeological resources within the APE are likely to be valued chiefly because of what can be learned by data recovery and therefore would not likely warrant consideration for preservation in place.

Potential Impacts

As described in **Chapter II – Alternatives Considered, Section D** of this **Final EIS**, Alternative 1 has been identified as the Preferred Alternative. Alternative 1 allows the option to widen to the outside of the existing road corridor or within the median of the existing road corridor. The decision on whether to widen to the outside or the inside of the roadway would be made on a section-by-section basis, and the development of these operationally independent sections would be closely coordinated with the Richmond Area MPO, the Hampton Roads TPO and other state and federal resource and regulatory agencies. By allowing for outside or inside widening to be determined on a section-by-section basis, this Alternative provides opportunities to avoid and minimize impacts. For the purpose of the impact analysis in this

Table III.G.3: Effect Determination for Archaeological Sites Identified within the Project Area of Potential Effects

Property	Description	NRHP Status	Effect Determination
N/A	Shockoe Hill Burying Ground*	Undetermined	See Appendix K - Programmatic Agreement
44HE0004*	Pre-Contact Temporary Camp	Not Eligible	No Effect
44HE1063	Pre-Contact Temporary Camp	Potentially Eligible	Adverse Effect
44NK0100	Pre-Contact Multi-Component Domestic Site	Potentially Eligible	Adverse Effect
44NK0281	Pre-Contact Lithic Scatter; Civil War Component	Potentially Eligible	See Appendix K - Programmatic Agreement
44NK0283	Pre-Contact Temporary Camp and Historic Trash Scatter	Potentially Eligible	Adverse Effect
44NK0282	Pre-Contact Temporary Camp	Potentially Eligible	Adverse Effect
44YO0051/099-0040	Confederate Peninsular Defenses Fort 9 (Redoubt #9)	Eligible	Adverse Effect
099-0065	Bryan Manor Plantation Site	Listed NRHP	See Appendix K - Programmatic Agreement
44YO0050	Redoubt #8	Eligible	See Appendix K - Programmatic Agreement

* Not found within VDOT right of way. For resources present outside of the right of way, the Programmatic Agreement details commitments and treatments for that resource during final design and construction.

III. ENVIRONMENTAL RESOURCES, IMPACTS AND MITIGATION

Final EIS, Alternative 1 is assumed to have the same footprint as Alternative 1A. Since Alternative 1A widens to the outside of the existing roadway, this Alternative is assumed to provide the most conservative assessment of environmental impacts. A summary table providing resource impacts associated with each of the Alternatives is included in **Chapter V – Comparison of Alternatives** of this **Final EIS**.

In accordance with 36 CFR 800.5(a), VDOT has assessed the effects of the project on eligible or listed architectural properties within the project APE. The regulations implementing Section 106 of the NHPA define an effect as an “alteration to the characteristics of a historic property qualifying it for inclusion in or eligibility for the National Register” [36 CFR 800.16(i)]. The effect is adverse when the alteration of a qualifying characteristic occurs in a “manner that would diminish the integrity of the property’s location, design, setting, materials, workmanship, feeling, or association” [36 CFR 800.5(a)].

Recommended effects determinations were provided to the VDHR on February 6, 2013, and the VDHR concurred with those effects on March 8, 2013. A summary of those effects are shown in **Appendix I - Coordination in Response to Comments on the Draft EIS** and are listed in the **Tables III.G.1, III.G.2, and III.G.3** for architectural resources, battlefields, and archaeological resources. Based on this coordination, the project as a whole would have an Adverse Effect on historic properties.

The APE abuts the northern boundary of the Jackson Ward Historic District (127-0237), the northern boundary of the Sixth Mount Zion Baptist Church (127-0472), the southern boundary of St. Luke’s Building (127-0352), the southern boundary of the Hebrew Cemetery (127-6166), and the southeastern tip of the Chestnut Hill Historic District (127-0343), all located in the City of Richmond. The NRHP property boundaries for all five of these resources were drawn using the I-64 corridor as a landmark for boundary creation, due to the fact that the characteristics that contribute to the significance of these properties do not exist in the existing I-64 corridor. Modifications in the area of these resources, at the western terminus of the undertaking, only include improvements to the ramps and should not extend beyond the current established interstate boundaries. It was thus recommended that the project would not diminish the integrity of the setting, feeling, association, workmanship, materials, design, or location of these five properties. The VDHR concurred that the project would have No Effect on these five properties.

The Shockoe Hill Cemetery (127-0389), also in Richmond, is located north of the Interstate 95/I-64 interchange near the western terminus. The closest edge of the NRHP resource boundaries is one block north of the project APE, partially separated from the project viewshed by the Hebrew Cemetery. Given the distance between the resource and the APE, it was recommended, and the VDHR concurred, that the undertaking would have No Effect on this historic property, as it would not alter any of the seven aspects of integrity.

Although there are 10 battlefields within the general project area, only eight of them are either eligible or recommended eligible and therefore would have effect determinations made as part of this study. The project would have No Adverse Effect on these eight battlefields, as summarized in **Table III.G.2**.

Cedar Knoll (043-0078) is located east of the Exit 200 (Interstate 295) interchange in Henrico County. The NRHP boundaries of this property are confined to the area surrounding the main house, which is located south of the APE. There is a distance of over 200 feet between the I-64 eastbound lanes and the closest boundary line. Moreover, the viewshed from the main house is blocked from the project area by a thick vegetative shield. The project would not diminish the historic setting and feeling of Cedar Knoll; and therefore, the VDHR concurred that the project would have No Adverse Effect on this property.

I-64 currently crosses over the Colonial Parkway (047-0002), a listed NRHP resource. It is anticipated that the I-64 eastbound and I-64 westbound bridges over the parkway may have to be widened or replaced (in kind) with the Preferred Alternative. The bridges over the parkway are not considered contributing elements to the Colonial Parkway. Since the publication of the **Draft EIS**, a highway deed was identified which indicates that VDOT owns the right of way surrounding the I-64 bridge over the Colonial Parkway (see **Appendix I - Coordination in Response to Comments on the Draft EIS**). According to the deed, the roadway improvements associated with the Build Alternatives would fall within VDOT right of way. The Programmatic Agreement included in **Appendix K - Programmatic Agreement** commits to ensuring actions taken by VDOT and FHWA within this right of way would have No Adverse Effect on the Colonial Parkway or surrounding resources.

Due to the phased nature of the identification and evaluation studies for the I-64 Study, all impacts to archaeological sites were not currently assessed. However, the Programmatic Agreement

outlines a process for identifying sites, evaluating their eligibility for the NRHP, and addressing the project’s impacts to sites eligible for listing in the NRHP during final design.

Seven of the identified archaeological resources are within the archaeological APE for the project. The project is anticipated to have an Adverse Effect on five of these resources as shown in **Table III.G.3**. The effects of the project on archaeological resources will be assessed in accordance with Stipulation II of the Programmatic Agreement included in **Appendix K - Programmatic Agreement**.

Previously identified archaeological resource, Redoubt 8 (44YO0050/099-0039), lies directly adjacent to the project corridor. This site has already been recommended as potentially eligible for listing in the NRHP and the SHPO concurred that it may warrant consideration for preservation in place. As a result, the proposed Build Alternatives have been designed to avoid any impacts to the site boundaries and therefore it is recommended that the project would have No Adverse Effect on this property.

Mitigation Measures

Mitigation for impacts to historic properties was developed through the process specified in the Programmatic Agreement, as shown in **Appendix K - Programmatic Agreement**. This Programmatic Agreement outlines the process by which historic properties potentially affected by the undertaking should be handled during final design and/or construction. This includes identification of archaeological resources, final effect determinations and opportunities to avoid, minimize or mitigate adverse effects on historic properties.

III. ENVIRONMENTAL RESOURCES, IMPACTS AND MITIGATION

H. Section 4(f) Resources

Introduction

Pursuant to Section 4(f) of the U.S. Department of Transportation Act of 1966 (49 U.S.C. Section 303), and Federal Highway Administration’s (FHWA’s) implementing Section 4(f) regulations (23 CFR 774), publicly owned parks, recreational areas, wildlife and waterfowl refuges and historic sites of national state or local significance were identified along the Interstate 64 (I-64) project corridor.

Section 4(f) states that no Section 4(f) resource can be used unless it is demonstrated that there is no feasible and prudent alternative to the use and all possible planning to minimize harm has been incorporated, or the use is determined to be “*de minimis*.”

Historic and archaeological sites in the I-64 study area corridor were identified through the process prescribed in Section 106 of the National Historic Preservation Act of 1966 (36 CFR Part 800). Historic sites listed or determined eligible for listing in the National Register of Historic Places (NRHP) are also considered Section 4(f) resources. Archaeological sites eligible for the NRHP that warrant preservation in place are considered Section 4(f) resources.

Parks and/or recreation areas were identified along the project corridor. Coordination with the officials with jurisdiction over each of the various properties was undertaken to ensure that the properties were publicly owned, open to the public (except refuges), designated as parks and/or recreation areas and serve a significant recreational purpose. Each of these criteria must be present for a property to be considered a Section 4(f) resource.

Table III.H.1 lists and **Figure III.H.1** shows the Section 4(f) resources identified within the I-64 study area.

Once the Section 4(f) resources were identified, each Build Alternative was examined to determine whether or not it used any of the Section 4(f) resources. Each of the Alternatives studied, including the Preferred Alternative, were found to have the same use of four Section 4(f) resources. When a use was determined to occur, the next step was to determine if the use was *de minimis*. *De minimis* determinations for historic sites may be made when a No Adverse Effect or No Effect determination is made under the Section 106 process. For parks, recreation areas and refuges, *de minimis* determinations may be made when the officials with jurisdiction agree that the impact does not adversely affect the features, attributes and activities that qualify the resource for protection under Section 4(f).

Table III.H.1: Summary of Section 4(f) Resources Within the Project Study Area

Type	Site	4(f) Use
Historic/Battlefield	Cold Harbor Battlefield	Yes, <i>de minimis</i>
Park	Newport News Park	Yes, <i>de minimis</i>
Historic/Battlefield	Battle of Yorktown	Yes, <i>de minimis</i>
Park	Bluebird Gap Farm	Yes, <i>de minimis</i>
Historic District	Jackson Ward Historic District and Expansions	No
Historic/Architectural	Sixth Mount Zion Baptist Church	No
Historic/Architectural	Saint Luke Building	No
Historic/Architectural	Shockoe Hill Cemetery	No
Historic/Archaeological	Shockoe Hill Burying Ground	No
Historic/Architectural	Hebrew Cemetery	No
Historic District	Chestnut Hill/Plateau Historic District	No
Historic/Battlefield	Chaffin’s Farm/New Market Heights Battlefield	No
Historic/Battlefield	Fair Oaks/Darbytown Road Battlefield	No
Historic/Battlefield	Garnett and Golding’s Farm Battlefield	No
Historic/Battlefield	Seven Pines Battlefield	No
Historic/Architectural	Cedar Knoll	No
Historic/Battlefield	Savage’s Station Battlefield	No
Park	Criss Cross Park	No
Park	Waller Mill Park	No
Historic District/Park	Colonial National Historical Park/Colonial Parkway	No
Historic/Battlefield	Battle of Williamsburg	No
Historic/Archaeological	Redoubt 8	No
Park	Skiffe’s Creek Park	No
Park	Stoney Run Park	No
Park	Beechlake Park	No
Park	Sandy Bottom Park	No

III. ENVIRONMENTAL RESOURCES, IMPACTS AND MITIGATION

FHWA intends to make *de minimis* findings on the following four resources:

- Cold Harbor Battlefield.
- Newport News Park.
- Battle of Yorktown.
- Bluebird Gap Farm.

There are no other planned uses of Section 4(f) resources. However, potential impacts to these resources would be evaluated, as an operationally independent section is advanced through the phased process. Although a number of other historic properties, specifically battlefields, were identified as potential *de minimis* impacts, the Build Alternatives would not use those resources; and therefore, Section 4(f) would not apply.

In the **Draft Environmental Impact Statement (EIS)**, the Colonial National Historical Park, which includes the Colonial Parkway, was identified as a potential Section 4(f) resource with an anticipated *de minimis* impact. Since the publication of the **Draft EIS**, a highway deed was identified which indicates that the Virginia Department of Transportation (VDOT) owns the right of way surrounding the I-64 bridge over the Colonial Parkway (see **Appendix I - Coordination in Response to Comments on the Draft EIS**). According to the deed, the roadway improvements associated with the Build Alternatives would fall within VDOT right of way and would not encroach upon the U.S. National Park Service's (USNPS) Colonial National Historical Park or the Colonial Parkway. Therefore, there would not be a Section 4(f) use of this property.

The **Draft EIS** identified two archaeological sites that warranted consideration for preservation in place: the Shockoe Hill Burying Ground and Redoubt 8 (44YO0050). Archaeological sites eligible for the NRHP that warrant preservation in place are considered Section 4(f) resources; and therefore, the Study Team made the commitment to avoid these resources. Since that time, archaeological investigations have confirmed that the burying ground is not present within VDOT right of way. However, resources related to the burying ground may exist outside of VDOT right of way and necessitate avoidance. Commitments made to avoid Redoubt 8 in the **Draft EIS** are still valid in this **Final EIS**. The Programmatic Agreement (see **Appendix K – Programmatic Agreement**) outlines commitments and treatments of historic properties, and provides details on the avoidance recommendations for each of these resources during final design and construction.

Description of Section 4(f) Resources with Anticipated *De Minimis* Impacts

Impacts and uses discussed in the following sections are based on conceptual design information. FHWA is in a position to make a finding of *de minimis* impact in this **Final EIS** for the four resources based on the responses from the officials with jurisdiction. However, FHWA is not making a finding of *de minimis* impact until a **Record of Decision (ROD)** is issued for an operationally independent section that uses one of the four resources. The Newport News Park is located within the section of I-64 which has been identified as the first likely operationally independent section; therefore, if a **ROD** were issued for this section, a *de minimis* finding would be made at that time. Brief descriptions of the Section 4(f) resources that are anticipated to have *de minimis* impacts are included in this section.

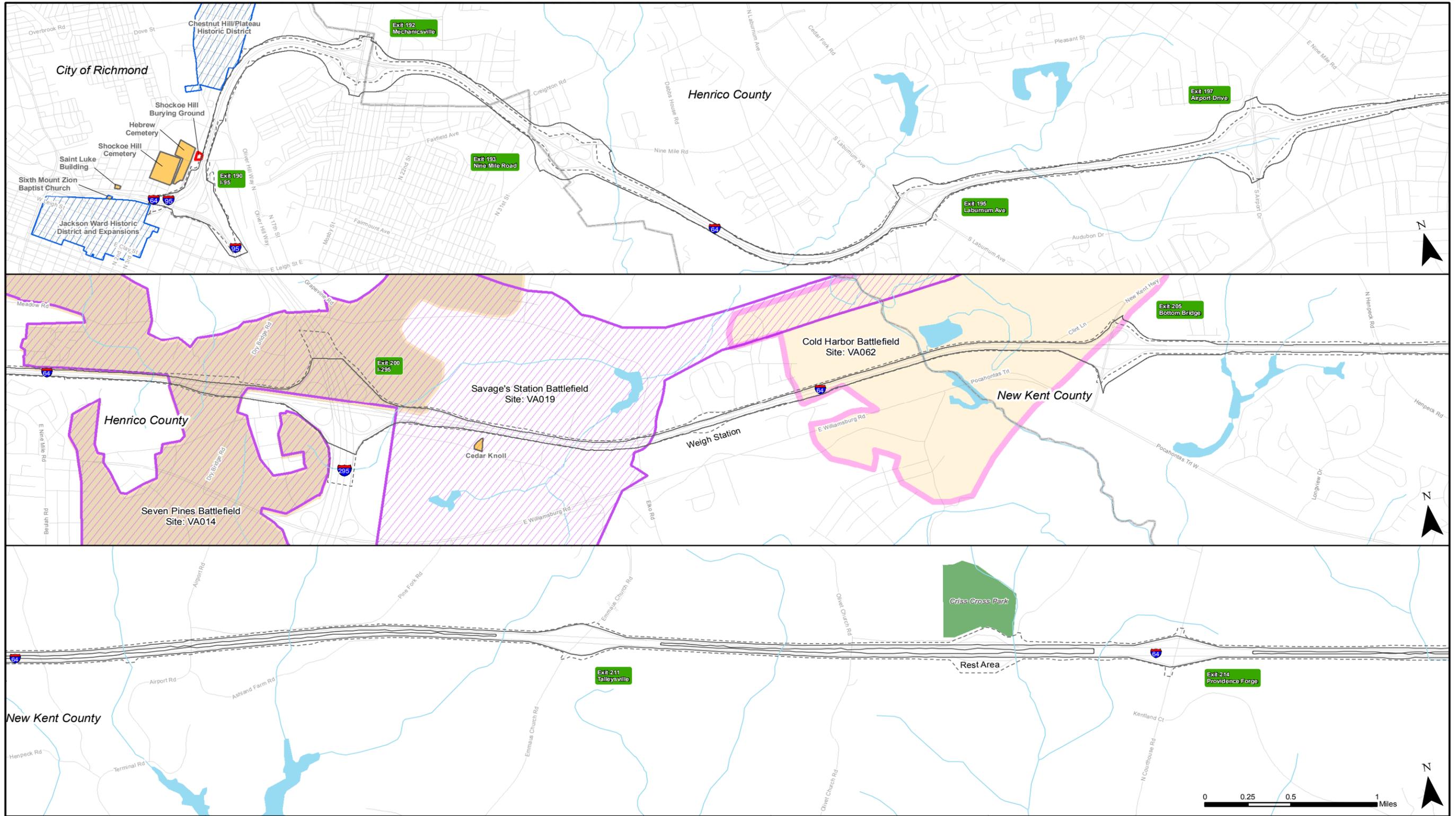


Figure III.H.1 Section 4(f) Resources
Map 1 of 3



- Existing Right of Way
- ▭ Limits of Widest Alternative Footprint
- ▭ Locality Jurisdiction
- ▭ Historic Districts
- ▭ USGS Topoquadrangle Surface Water (Non-Assessed)
- ▭ Non-Assessed Water Bodies
- ▭ Parks
- ▭ Archaeological Resources
- ▭ Architectural Resources
- ▭ Savage's Station
- ▭ Cold Harbor Battlefield
- ▭ Seven Pines Battlefield
- ▭ Battle of Williamsburg
- ▭ Battle of Yorktown



Figure III.H.1 Section 4(f) Resources
Map 2 of 3



- | | | | |
|--|--|--------------------------|-------------------------|
| Existing Right of Way | Historic Districts | Parks | Savage's Station |
| Limits of Widest Alternative Footprint | USGS Topoquadrangle Surface Water (Non-Assessed) | Archaeological Resources | Cold Harbor Battlefield |
| Locality Jurisdiction | Non-Assessed Water Bodies | Architectural Resources | Seven Pines Battlefield |
| | | | Battle of Williamsburg |
| | | | Battle of Yorktown |



Figure III.H.1 Section 4(f) Resources
Map 3 of 3



Existing Right of Way	Historic Districts	Parks	Savage's Station
Limits of Widest Alternative Footprint	USGS Topoquadrangle Surface Water (Non-Assessed)	Archaeological Resources	Cold Harbor Battlefield
Locality Jurisdiction	Non-Assessed Water Bodies	Architectural Resources	Seven Pines Battlefield
			Battle of Williamsburg
			Battle of Yorktown

III. ENVIRONMENTAL RESOURCES, IMPACTS AND MITIGATION

Cold Harbor Battlefield (VA062; Virginia Department of Historic Resources (VDHR) No. 042-5017)

Relationship

Figure III.H.1 shows the relationship of the USNPS American Battlefield Protection Program’s (ABPP) recommended NRHP boundaries for the Cold Harbor Battlefield in relation to the I-64 study corridor.

Area

The Cold Harbor Battlefield is located in Henrico and New Kent Counties. The battlefield area is comprised of 37,423 acres, 29,417 acres of which have been recommended for the NRHP by the USNPS ABPP. The I-64 corridor study area passes through the isolated southeastern margin of the battlefield where both I-64 and Route 60 cross the Chickahominy River west of the Exit 205 (Bottoms Bridge) interchange. This area is within the ABPP-recommended NRHP boundaries for the Cold Harbor Battlefield, though the Core Area (including the Cold Harbor Battlefield Park Visitor Center) is located several miles to the northwest.

Ownership

The Cold Harbor Battlefield area consists of both public and privately owned property on multiple parcels. Where the I-64 corridor study area passes through the isolated portion, ownership is private.

Activities

The Cold Harbor Battlefield Park Visitor Center offers both interpretive walking tours and hiking trails. Driving tours are also possible. No public activities are offered where the I-64 corridor study area passes through the isolated portion of the battlefield.

Access

The Cold Harbor Battlefield area is accessed via various roadways throughout Henrico and New Kent Counties.

Similarly Used Lands

There are other similarly used lands in the study area, including the Seven Pines Battlefield and Savage’s Station Battlefield.

Clauses Affecting Ownership

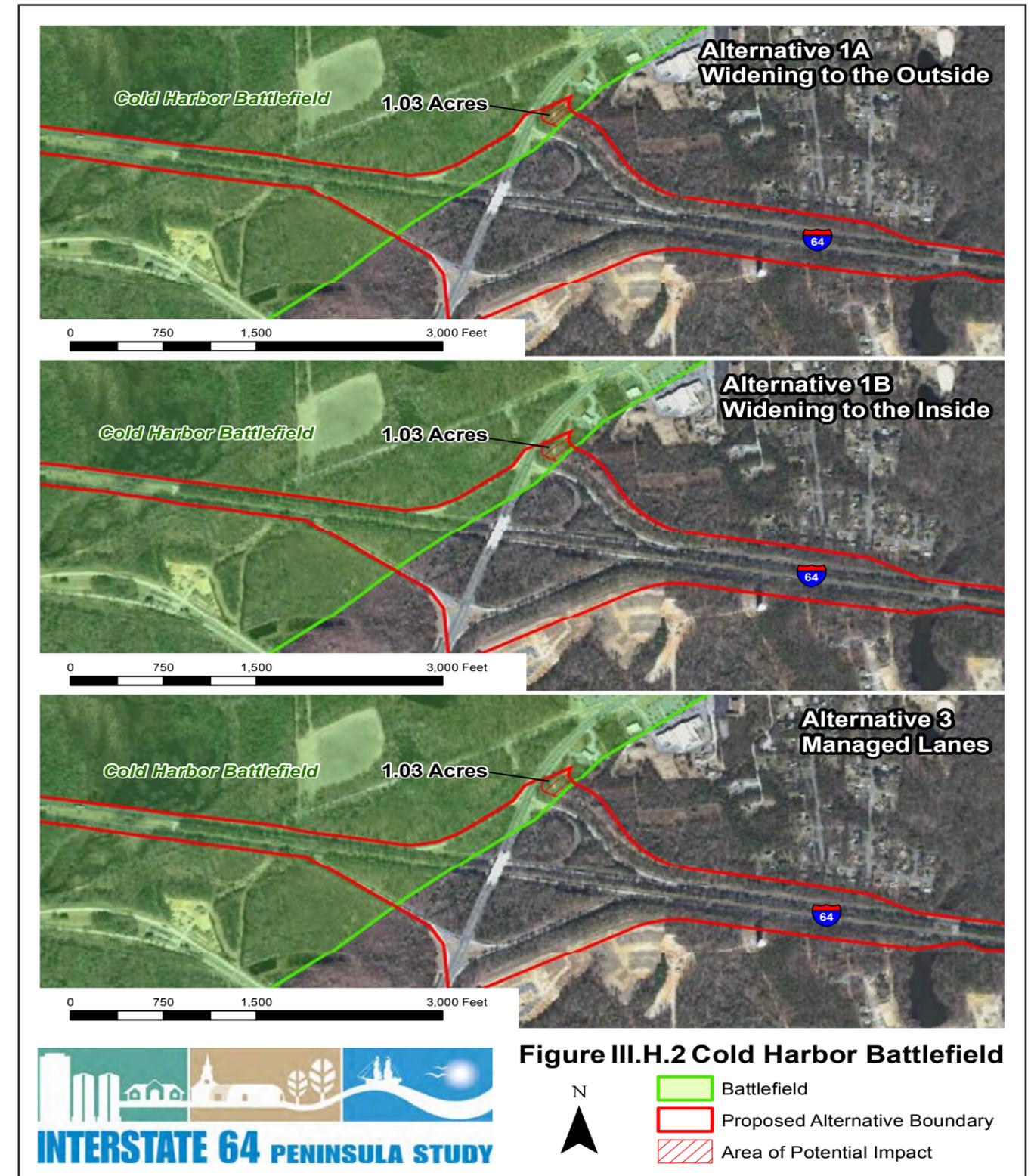
There are no known clauses affecting ownership of the Cold Harbor Battlefield area regarding transportation improvements.

Unusual Characteristics

There are no unusual characteristics associated with the Cold Harbor Battlefield.

Use

Any of the proposed Build Alternatives, including the Preferred Alternative, could require increasing the width of existing right of way by up to 250 feet in the northeast corner of Exit 205 (Bottoms Bridge) for a total of approximately one acre. Graphics depicting the potential impacts are included in Figure III.H.2.



III. ENVIRONMENTAL RESOURCES, IMPACTS AND MITIGATION

Newport News Park

Relationship

Figure III.H.1 shows the relationship of the Newport News Park to the I-64 study corridor.

Area

The Newport News Park is located in the City of Newport News and is an 8,000 acre natural park hosting campers and wildlife in the woodlands, meadows and lakes within its boundaries.

Ownership

The Newport News Park is owned by the City of Newport News and administered by the City Department of Parks, Recreation and Tourism.

Activities

The property is utilized for camping, hiking, bicycling, fishing, canoeing, paddle boating, row boating, golfing, archery and various festivals throughout the year. In addition, the Newport News Park contains various Civil War fortifications, earthworks and redoubts and is a designated stop on the official Virginia Civil War Trails network.

Access

The Newport News Park is accessed via multiple points within the property along Fort Eustis Boulevard, Crafford Road and the Colonial Historical Park.

Similarly Used Lands

There are other properties in the vicinity that serve similar functions, including Skiffes Creek Park and Stoney Run Park. The City of Newport News operates multiple parks, but the Newport News Park is the only one of this size in the City. The City also operates 35 other parks ranging from 0.3 acres to 279 acres.

Clauses Affecting Ownership

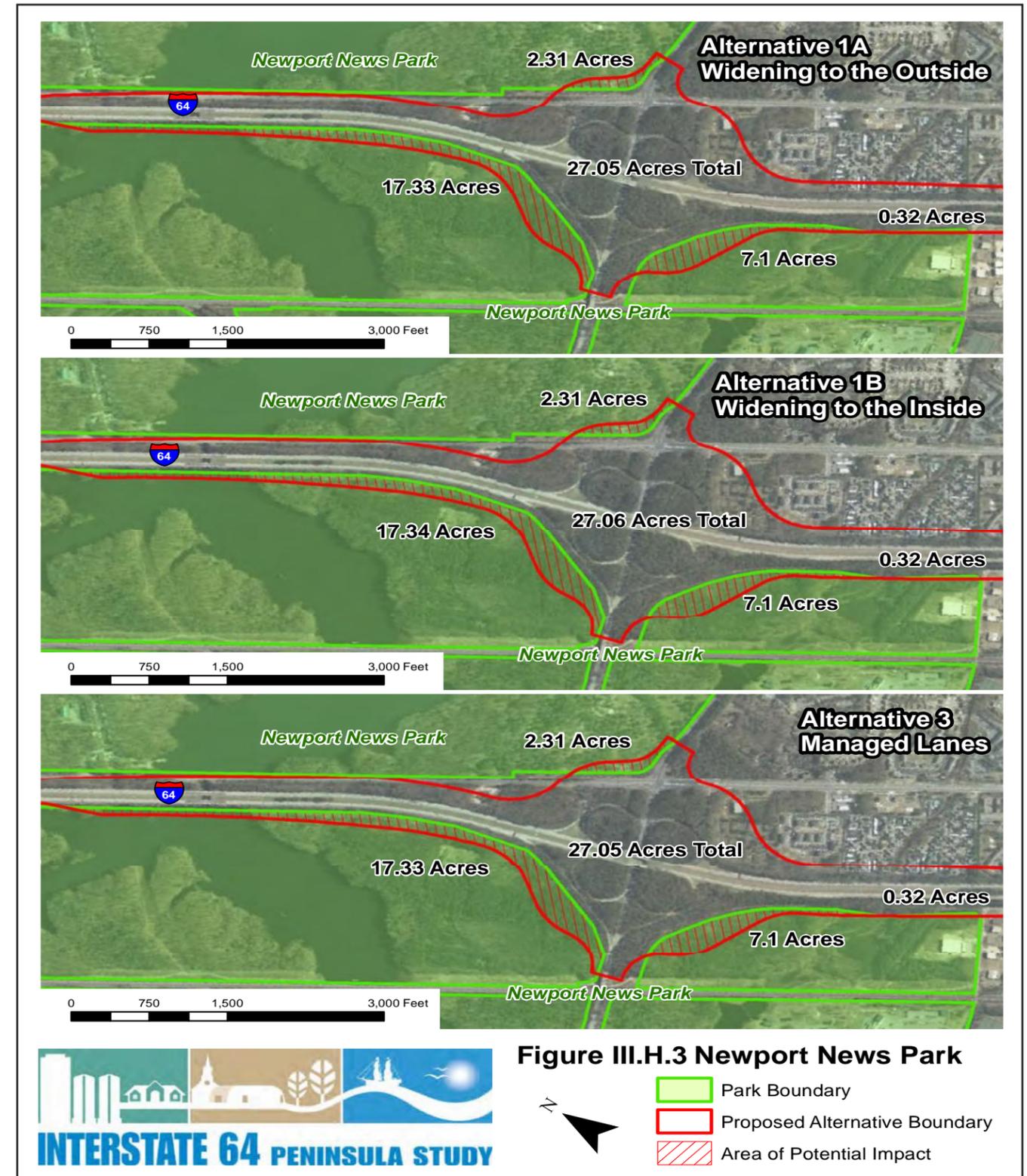
The Newport News Park was improved with Land and Water Conservation Funds, also known as Section 6(f) funds; and therefore, conversion of lands or facilities acquired with these funds must be coordinated with the U.S. Department of Interior and replacement lands in kind is likely required.

Unusual Characteristics

The Newport News Park is the largest park in the City of Newport News and is also the second largest municipal park in the country.

Use

Any of the proposed Build Alternatives, including the Preferred Alternative, could require increasing the width of existing right of way by up to 150 feet along the mainline of I-64 and an additional 75 to 320 feet at different locations within the Exit 250 (Fort Eustis Boulevard) interchange area for a total of approximately 27 acres. Graphics depicting the potential impacts are included in Figure III.H.3.



III. ENVIRONMENTAL RESOURCES, IMPACTS AND MITIGATION

Battle of Yorktown (VA009; VDHR No. 099-5283)

Relationship

Figure III.H.1 shows the relationship of the USNPS American Battlefield Protection Program's (ABPP) recommended NRHP boundaries for the Battle of Yorktown USNPS ABPP-recommended potential NRHP boundaries to the I-64 study corridor.

Area

The Battle of Yorktown area is located in the City of Newport News. The battlefield area is comprised of approximately 63,961 acres, 17,734 acres of which have been recommended eligible for listing in the NRHP. The I-64 corridor study area crosses into the southwestern margin of the ABPP-recommended potential NRHP boundaries of the Yorktown Battlefield, in an area between two localized and discontinuous Core Areas (Lee's Mill and Dam No. 1) along the headwaters of the Warwick River. The principal Core Area is located a considerable distance to the northeast in the vicinity of Yorktown. Although the property has not been evaluated for the NRHP, it is assumed to be eligible for the purposes of this evaluation and thus is considered a historic site.

Ownership

The Battle of Yorktown area consists of both public and privately owned property on multiple parcels. The I-64 corridor study area passes through the portion of the battlefield overlapping the Newport News Park.

Activities

Within the project corridor, the majority of the Battle of Yorktown lies within the Newport News Park, which is utilized for camping, hiking, bicycling, fishing, canoeing, paddle boating, row boating, golfing, archery and various festivals throughout the year. Civil War fortifications, including earthworks and redoubts, from the Battle can be seen within the Park, which is a designated stop on the official Virginia Civil War Trails network.

Access

The Battle of Yorktown area is easily accessed along multiple roadways, including Fort Eustis Boulevard and Warwick Boulevard.

Similarly Used Lands

There are other similarly used lands in the study area, including other battlefields such as the Battle of Williamsburg and other parks such as Skiffes Creek Park and Stoney Run Park.

Clauses Affecting Ownership

There are no known clauses affecting ownership of the Battle of Yorktown area regarding transportation improvements.

Unusual Characteristics

There are no unusual characteristics associated with the Battle of Yorktown. Although the property has not been evaluated for the NRHP, it is assumed to be eligible for the purposes of this evaluation and thus is considered a historic site.

Use

Any of the proposed Build Alternatives, including the Preferred Alternative, could require increasing the width of existing right of way by up to 380 feet along the mainline of I-64 and within the Exit 250 (Fort Eustis Boulevard) interchange area for a total of approximately 62.38 acres. Graphics depicting the potential impacts are included in Figure III.H.4.

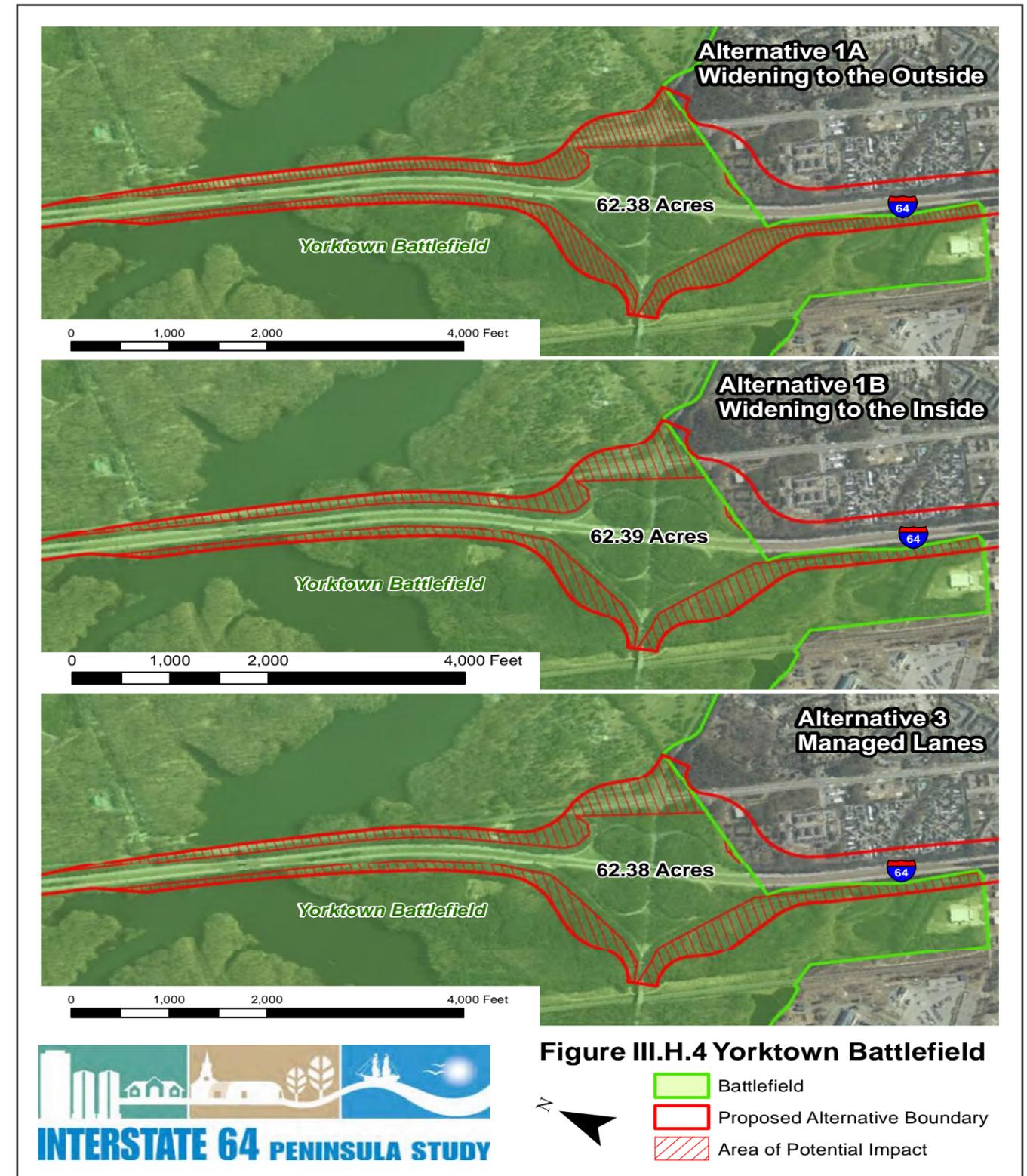


Figure III.H.4 Yorktown Battlefield

III. ENVIRONMENTAL RESOURCES, IMPACTS AND MITIGATION

Bluebird Gap Farm

Relationship

Figure III.H.1 shows the relationship of the Bluebird Gap Farm property to the I-64 study corridor.

Area

Bluebird Gap Farm is located in the City of Hampton and is comprised of approximately 60 acres.

Ownership

The Bluebird Gap Farm property is owned by the City of Hampton and maintained by the City of Hampton Parks and Recreation Department.

Activities

Bluebird Gap Farm is comprised of an animal farm/petting zoo that hosts various domestic and wild animal species that visitors are able to view and feed. Interactive experiences, such as hayrides sheep shearing and horseshoeing demonstrations, also are offered. The Farm provides a shelter with picnic tables and additional picnic areas throughout the property. Several farm activity-related structures, such as a pig sty, are found on the property. The site also contains the Hampton Master Gardeners' Display Garden and Arboretum, a playground, a nature trail and a stage with seating for special events and activities. The original City of Hampton train station and an old cemetery bearing the Davis family graves dating to 1835 also are located at the Farm.

Access

Bluebird Gap Farm is accessed by vehicle via a driveway entrance from Pine Chapel Road.

Similarly Used Lands

There are other properties in the study area that have similar amenities as Bluebird Gap Farm, though the mix of amenities differs by facility. For example, the Virginia Living Museum in the City of Newport News offers botanical gardens and indoor and outdoor animal displays. The Sandy Bottom Nature Park in the City of Hampton has nature trails, picnicking and a nature center. The Norfolk Botanical Garden in the City of Norfolk has gardens viewable from pedestrian trails, train and boat, but has none of the other elements that Bluebird Gap Farm possesses. Other properties in the general vicinity offer such amenities as nature trails and picnicking without the same experiential opportunities as Bluebird Gap Farm.

Clauses Affecting Ownership

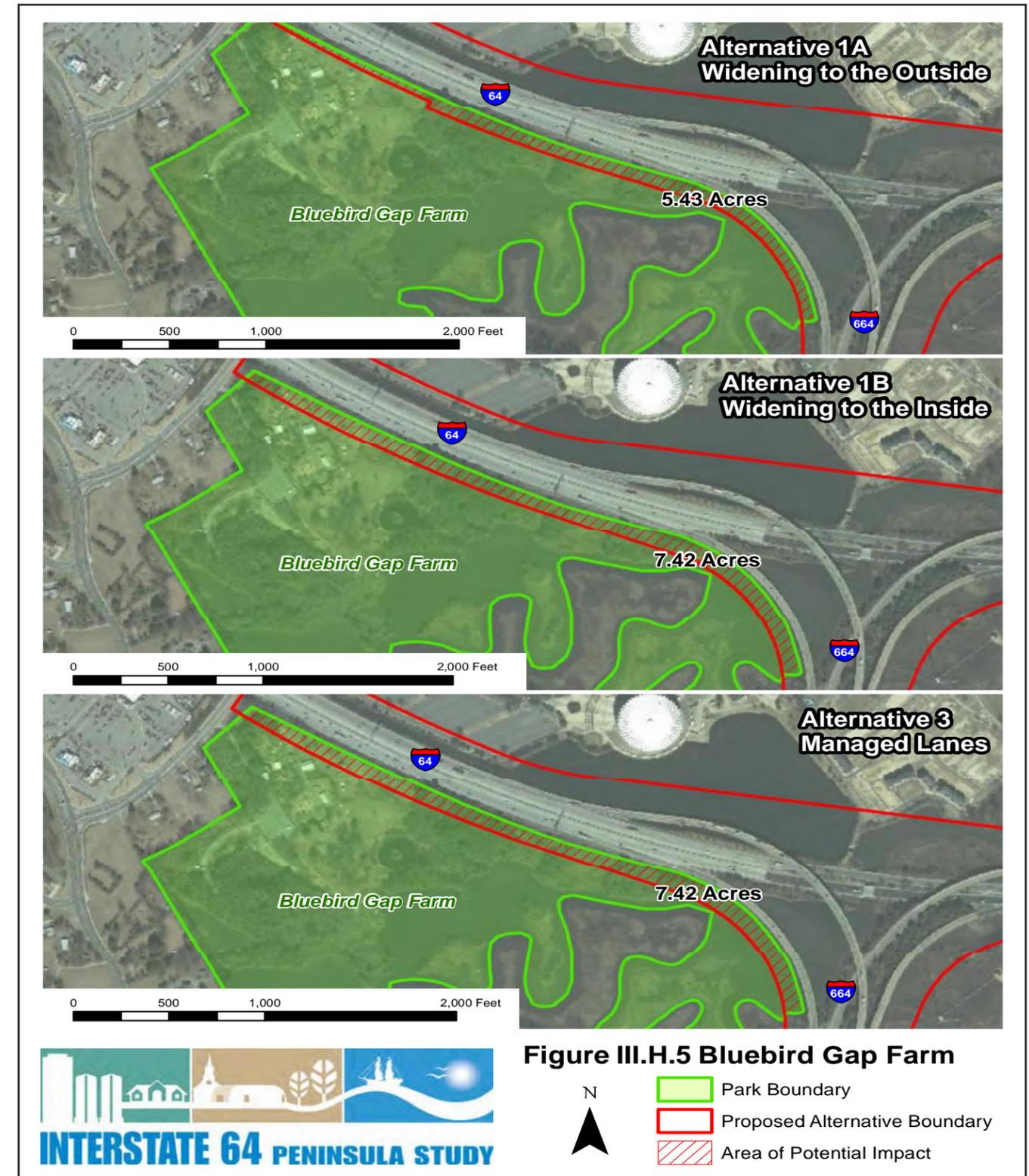
There are no known clauses affecting ownership of the property with respect to transportation improvements.

Unusual Characteristics

There are no unusual characteristics associated with the Bluebird Gap Farm.

Use

Any of the proposed Build Alternatives, including the Preferred Alternative, could require increasing the width of existing right of way by up to 110 feet along the section of I-64 which borders Bluebird Gap Farm for a total of approximately seven acres. Graphics depicting the potential impacts are included in Figure III.H.5.



III. ENVIRONMENTAL RESOURCES, IMPACTS AND MITIGATION

I. Contaminated Sites

Methodology

Available federal, state and local agency databases were reviewed to identify sites that are indicative of potential solid wastes or hazardous materials contamination along the Interstate 64 (I-64) corridor. The sites include industrial properties, petroleum product storage facilities and other properties potentially containing materials that are flammable, toxic, corrosive or reactive. A field reconnaissance was performed in June 2011 to confirm the existence of sites identified through the database searches along the I-64 corridor and to identify other suspect sites. The project boundaries were expanded in 2012. A second field reconnaissance was performed in May 2012 to confirm the existence of sites identified through database searches and to identify suspect sites.

For the purpose of this analysis, any confirmed or suspect sites within 200 feet of the I-64 corridor were included as Sites of Potential Concern in **Table III.I.1** and **Figure III.I.1**. However, Pollution Response Program and Emergency Response Notification System incidents are not listed as Sites of Potential Concern because these cases were evaluated and either remediated or were otherwise determined to pose low risk.

Existing Conditions

There are 13 Sites of Potential Concern within 200 feet of the I-64 corridor. **Table III.I.1** includes a listing of these sites and they can be viewed on **Figure III.I.1**.

Potential Impacts

As described in **Chapter II – Alternatives Considered, Section D** of this **Final EIS**, Alternative 1 has been identified as the Preferred Alternative. Alternative 1 allows the option to widen to the outside of the existing road corridor or within the median of the existing road corridor. The decision on whether to widen to the outside or the inside of the roadway would be made on a section-by-section basis, and the development of these operationally independent sections would be closely coordinated with the Richmond Area MPO, the Hampton Roads TPO and other state and federal resource and regulatory agencies. By allowing for outside or inside widening to be determined on a section-by-section basis, this Alternative provides opportunities to avoid and minimize impacts. For the purpose of the impact analysis in this **Final EIS**, Alternative 1 is assumed to have the same footprint as Alternative 1A. Since Alternative 1A widens to the outside of the existing roadway, this Alternative is assumed to provide the most conservative assessment of environmental impacts.

As described in the following section, potential impacts are reported for the No-Build Alternative and for each of the Build Alternatives. A summary table providing resource impacts associated with each of the Alternatives is included in **Chapter V – Comparison of Alternatives** of this **Final EIS**.

No-Build Alternative:

The No-Build Alternative would not involve any project-related construction and therefore no impacts would result. However, projects already programmed and funded in the Virginia Department of Transportation Fiscal Year 2013-2018 Six-Year Improvement Program will be implemented under the No-Build Alternative and could impact contaminated sites.

Build Alternatives:

Most Sites of Potential Concern are petroleum releases from gasoline stations that are outside of, but in some cases bordering, the I-64 corridor limits. Of all the sites, only information found for the Camp Peary Site 49 has indicated contamination (Polychlorinated Biphenyls, (PCBs)) migrating onto the I-64 corridor. Therefore, based on the database searches and field inspection, impacts from most Sites of Potential Concern will likely not be encountered for any of the proposed Build Alternatives during roadway construction activities (particularly if in the median). However, additional analysis of these potentially contaminated sites and how they may be impacted by the project would need to be conducted as preliminary and final design plans are developed. Potential issues due to contaminated groundwater are of a particular concern. Contract provisions may need to be developed to address the management of any contaminated materials during construction.

Preferred Alternative:

For the purpose of the impact analysis in this **Final EIS**, Alternative 1 is assumed to have the same footprint as Alternative 1A. The Preferred Alternative has the same potential impacts to Sites of Potential Concern as the other Build Alternatives. This is due to the locations of the identified Sites of Potential Concern in relation to the Build Alternatives.

III. ENVIRONMENTAL RESOURCES, IMPACTS AND MITIGATION

Table III.I.1: Sites of Potential Concern

Site Name	Address and Location	Approximate Distance from I-64 Corridor	Latitude and Longitude	Description
Mechanicsville Shell Station	2000 Mechanicsville Turnpike (Route 360), Exit 192	200 feet south of eastbound off-ramp	N37°33'14.45" W77°24'42.32"	Site is an active gasoline station with one closed Pollution Complaint (PC) (90-0515). The underground storage tanks (USTs) are located on the western portion of the property.
Citgo Station	2001 Mechanicsville Turnpike (Route 360), Exit 192	200 feet south of eastbound off-ramp	N37°33'13.54" W77°24'39.74"	Site is an active gasoline station with one closed PC (88-0618). The USTs are located on the southern portion of the property.
Blue Tires and Custom Wheels	3607 Nine Mile Road (Route 33), Exit 193	160 feet west of westbound off-ramp	N37°32'36.6" W77°23'22.4"	Site is the former National Auto Transmission Rebuilder with a closed PC (97-4216).
Former Viasystems Technologies Corporation	4105 Laburnum Avenue (Route 197), Exit 195	Property borders I-64 to the south	N37°31'52.66" W77°21'28.13"	A Resource Conservation and Recovery Act site for solvents in groundwater (U.S. Environmental Protection Agency (USEPA) Identification Number (ID#) VAD066000993). A groundwater pump and treat system operated on the site, which has been re-developed for retail as The Shops at White Oak Village.
Former Bookers Citgo Service	4103 South Laburnum Avenue (Route 197), Exit 195	110 feet north of westbound off-ramp	N37°32'0.5" W77°21'45.0"	Station is inactive with a closed PC (91-0565).
Crowder's Service Center	4104 South Laburnum Avenue (Route 197), Exit 195	120 feet north of westbound on-ramp	N37°31'59.7" W77°21'47.1"	Station is active with two closed PCs (91-0864 and 92-1434).
Applebee's Restaurant	4336 South Laburnum Avenue (Route 197), Exit 195	120 feet south of eastbound off-ramp	N37°31'48.4" W77°21'35.8"	Restaurant is operating at the location of a closed PC (96-4049).
Stuckey's/Sentry Food Mart	9220 Old Stage Road (Route 30), Exit 227	<100 feet from eastbound on-ramp	N37°25'7.3" W76°49'15.8"	Site has two closed PCs (91-1281 and 98-2209) and one open PC (06-5053). USTs may have been removed. However, USTs are still registered with the Virginia Department of Environmental Quality (VDEQ) and no closure report is known. The north end of the site is adjacent to I-64 eastbound on-ramp.
Former Virginia State Police (VSP) Williamsburg Area Office	147 Fenton Mill Road (Route 602), between Exits 234 and 238	100 feet north from edge of I-64	N37°25'7.8" W76°42'40.5"	Site is currently a U.S. Forestry office, but was previously the VSP Williamsburg Area Office. Site has a closed PC (96-2339) from removed gasoline USTs.
Old Gas Station	409 East Rochambeau Drive, between Exits 234 and 238	120 feet south from edge of I-64	N37°20'9.3" W76°42'49.8"	An old gas station that most likely predates tank records. Site possibly contains abandoned USTs and/or a release.
Camp Peary – Site 49	Adjacent to I-64 on north side, between mile markers 235-238.5 (Queen Creek)	Forms north border of I-64	N37°19'15.40" W76°41'42.11"	Facility is on USEPA's Comprehensive Environmental Response, Compensation and Liability Information System list. Site 49 was a former swimming pool used as a dump site for soils, construction debris and materials with PCBs. The pool was < 200 feet from I-64. Low levels of PCBs were also found along a drainage pathway that conveys stormwater westward underneath I-64.
Naval Weapons Station Yorktown	Adjacent to I-64 on north side, near mile markers 243-246	Forms north border of I-64	N37°13'31.54" W76°36'53.06"	Site was finalized on the National Priorities List in October 1992 (USEPA ID# VA8170024170). A Federal Facilities Agreement established 16 environmental sites, 19 site-screening areas and 21 areas of concern. However, it appears that none of these impacted sites directly border I-64.
Waste Management, Inc. Bethel Landfill	100 North Park Lane, City of Hampton	Forms north border of I-64	N 37°4'24.42" W76°26'13.55"	VDEQ Solid Waste Facility Permit 580. However, landfill operations appear > 200 feet from I-64.



Figure III.I.1 Sites of Potential Concern

Map 1 of 3



- USGS Topoquadrangle
- Surface Water (Non-Assessed)
- Non-Assessed Water Bodies
- Locality Jurisdiction
- Existing Right of Way
- Limits of Widest Alternative Footprint
- Sites of Potential Concern

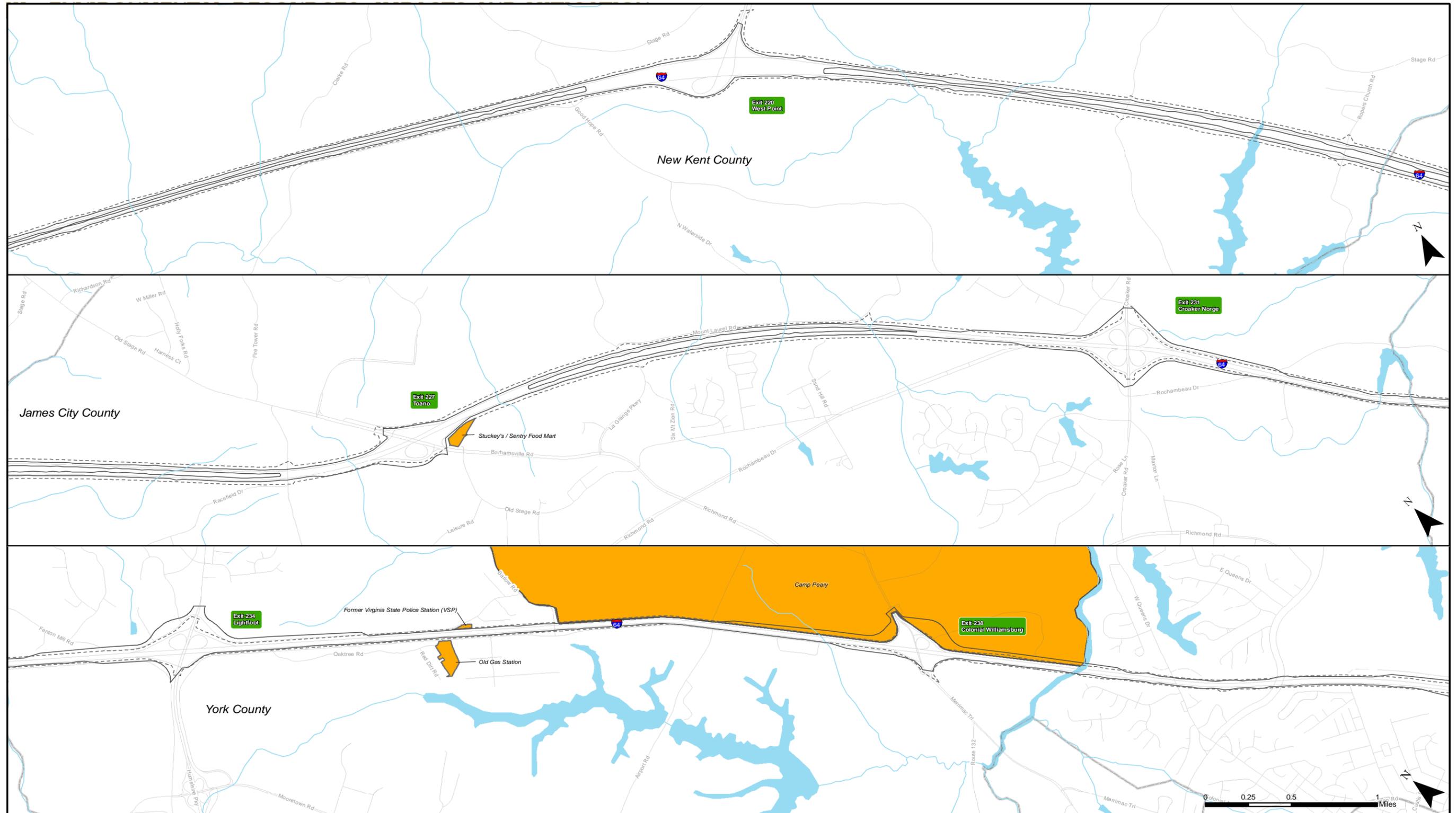


Figure III.I.1 Sites of Potential Concern
Map 2 of 3



-  USGS Topoquadrangle Surface Water (Non-Assessed)
-  Non-Assessed Water Bodies
-  Locality Jurisdiction
-  Existing Right of Way
-  Limits of Widest Alternative Footprint
-  Sites of Potential Concern



Figure III.I.1 Sites of Potential Concern
Map 3 of 3



- USGS Topoquadrangle Surface Water (Non-Assessed)
- Non-Assessed Water Bodies
- Existing Right of Way
- Limits of Widest Alternative Footprint
- Locality Jurisdiction
- Sites of Potential Concern

III. ENVIRONMENTAL RESOURCES, IMPACTS AND MITIGATION

J. Indirect and Cumulative Effects Assessment

The assessment of indirect and cumulative effects is required of proposed federal actions as established by the National Environmental Policy Act (NEPA), and implemented by the Council on Environmental Quality (CEQ). In addition, several other statutes require federal agencies to consider indirect and cumulative effects of transportation improvement projects, including the Clean Water Act (CWA) Section 404 (b)(1) guidelines, the regulations implementing the conformity provisions of the Clean Air Act (CAA), the regulations implementing Section 106 of the National Historic Preservation Act (NHPA) and the regulations implementing Section 7 of the Endangered Species Act (ESA), among others.

The CEQ regulations indicate that indirect effects (also known as secondary effects) are caused by an action such as the proposed project, and occur later in time or farther removed in distance than direct effects, but are still reasonably foreseeable. These effects may include growth inducing effects and other impacts related to changes that would not otherwise occur without the project implementation.

Cumulative effects result from the incremental impact of an action when added to other past, present and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively substantial actions taking place over a period of time. “Effect” and “impact” are used synonymously in the CEQ regulations, and are used interchangeably in this assessment.

The goals and outcomes of the Indirect and Cumulative Effects analysis were derived from CEQ cumulative impact guidance, *Guidance for Estimating the Indirect Effects of Proposed Transportation Projects*, (National Cooperative Highway Research Program (NCHRP), Report 403, 1998), the CEQ regulations, and the Federal Highway Administration (FHWA) regulations. These goals and outcomes are summarized in FHWA’s *Guidance: Questions and Answers Regarding the Consideration of Indirect and Cumulative Impacts in the NEPA Process* (<http://www.environment.fhwa.dot.gov/projdev/qaimpact.asp>) and have been addressed in the documents prepared for the *Interstate 64 (I-64) Peninsula Study*. These goals and outcomes include:

- Identification and agreement on the roles and responsibilities of participants and cooperating agencies in the project development process;

- Identification of appropriate project study area;
- Complete inventory of features, resources, ecosystems, and human communities of concern within the project study or influence area;
- Clarification of major and important versus the minor issues associated with the proposed action and alternatives;
- Identification of other actions impacting or potentially affecting the major resources, ecosystems, and human communities;
- Definition of assessment goals, techniques, and methodology for analysis of identified potential effects;
- Establishment of appropriate resource geographic and temporal boundaries related to the identified scope of analysis;
- Identification of planning considerations in the local area, including directions and goals, land uses, and transportation plans for incorporation into the study; and
- Identification of initial alternatives to the proposal and to avoid and minimize harm to the environment.

1. Indirect Effects

The purpose of the indirect effects analysis is to assess those impacts caused by an action, such as the proposed project, and occur later in time or farther removed in distance than direct effects, but are still reasonably foreseeable. Indirect effects are also referred to as induced impacts because they are the type of impacts that would not or could not occur if it were not for the implementation of the project. Indirect effects include those that occur further away in space or time from the direct effects of the action. For example, a change in water quality caused by the action that affects conditions downstream would be considered an indirect effect.

Indirect effects may also occur if the action changes the extent, pace, and/or location of development and if this change affects environmental resources. One example of this type of indirect effect is when a planned development has a clear causative relationship with the action, and completion of the development is dependent upon implementation of the action.

As described in the *Indirect and Cumulative Effects Technical Memorandum*, the indirect impact analysis followed an eight-step process to determine and evaluate indirect effects. The eight steps followed are listed in **Table III.J.1**.

Table III.J.1: Eight Step Approach to Estimate Indirect Impacts

Step 1 – Initial Scoping: The basic approach, effort required, and geographical boundaries of the study are determined.
Step 2 – Identify Study Area Direction and Goals: Information regarding the study area is compiled with the goal of defining the context for assessment.
Step 3 – Inventory Notable Features: Additional data on environmental features are gathered and synthesized with a goal of identifying specific environmental issues by which to assess the project.
Step 4 – Identify Impact-Causing Activities: Fully describe the component activities of each project alternative.
Step 5 – Identify Potentially Significant Indirect Effects for Analysis: Indirect effects associated with project activities and alternatives are cataloged, and potentially significant effects meriting further analysis are identified.
Step 6 – Analyze Indirect Effects: Qualitative and quantitative techniques are employed to estimate the magnitude of the potentially significant effects identified in Step 5 and describe future conditions with and without the proposed transportation improvement.
Step 7 – Evaluate Analysis Results: The uncertainty of the results of the indirect effects analysis is evaluated for its ramification on the overall assessment.
Step 8 – Assess Consequences and Develop Mitigation: The consequences of indirect effects are evaluated in the context of the full range of project effects. Strategies to avoid or lessen any effects found to be unacceptable are developed. Effects are reevaluated in the context of those mitigation strategies.

Source: *Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects*, (National Cooperative Highway Research Program, Report 466, 2002)

The potential indirect effects of the No-Build and Build Alternatives on the notable resources/features identified during the *I-64 Peninsula Study* are described in the next section.

III. ENVIRONMENTAL RESOURCES, IMPACTS AND MITIGATION

Socioeconomics and Land Use

No-Build Alternative:

Changes in existing and planned land use would not be expected with the No-Build Alternative. It is assumed that approved projects and land uses would develop as planned. There would not be direct effects as a result of the proposed project. However, the increasing travel-time delays associated with the No-Build Alternative would not benefit the planned development along the I-64 corridor.

Close coordination with appropriate localities, agencies, and affected property owners would be required to ensure that land use conversions are consistent with local land use policies and plans. Any land use conversions that are inconsistent with land use policies would require appropriate mitigation measures.

Build Alternatives:

Growth related indirect effects are expected when a project alternative changes the rate, type, location, or amount of growth that is expected in an area. Indirect effects can also be expected when a project changes patterns of land use, population density, or growth rate.

The Build Alternatives for the *I-64 Peninsula Study* would increase traffic volumes on I-64 due to the increased capacity on that road, as described in the *Traffic and Transportation Technical Memorandum*. However because I-64 is already an existing corridor, and no new interchanges are proposed as part of the project, improvements to I-64 are unlikely to attract a substantial number of new populations within or outside the project area. The project may affect the travel choices people make. For example, widening I-64 may induce commuters to use I-64 instead of a parallel route. This change is not expected to have substantial effects on land use, population density, or growth rates within or outside the project area.

Since improvements have the potential to improve access for the freight industry to get materials and goods to market, the Build Alternatives may create a positive economic effect to the region. As stated in the *Purpose and Need Technical Memorandum*, most of the freight in this region is shipped via truck (54.93%), or rail (34.66%). All other modes of shipping are used much less frequently. I-64 cannot effectively accommodate the truck and freight traffic in addition to the passenger vehicle volumes, resulting in traffic congestion and safety concerns. The importance of I-64 to freight movement and the regional/state economy continues to increase due to continued economic development and ongoing Port of Virginia expansion projects.

Neighborhoods and Community Facilities

No-Build Alternative:

Indirect impacts to existing and planned neighborhoods and community facilities would not be expected with the No-Build Alternative. It is assumed that approved projects would develop as planned. However, the increasing travel-time delays associated with the No-Build Alternative would not benefit the neighborhoods and facilities along the I-64 corridor and may inhibit the viability of these existing communities by increasing congestion and pollution and decreasing the desire to live in these surrounding areas.

Build Alternatives:

Indirect effects on neighborhoods and community facilities are often seen when a project makes important community resources, such as grocery stores, social facilities, schools, or places of worship, less accessible. However, the Build Alternatives being studied are on the existing alignment of I-64. The improvements are likely to improve accessibility to the destinations. Major transportation improvements could assist in improving response times for emergency services. Coordination between the applicable public agencies, local government and emergency service providers would reduce the likelihood of adverse impacts. Foraging areas from nesting areas or other effects. Because the Build Alternatives being considered are proposed as modifications to an existing major highway system, it is anticipated that these types of indirect effects would not occur.

Environmental Justice

No-Build Alternative:

Indirect impacts to environmental justice (EJ) populations would not be expected with the No-Build Alternative. It is assumed that existing populations and communities would function as they do today. However, the increasing travel-time delays associated with the No-Build Alternative would not benefit these populations along the I-64 corridor and may inhibit the viability of these existing communities by increasing congestion and pollution and decreasing the desire to live in these surrounding areas.

Build Alternatives:

Some minor indirect effects to EJ populations or demographics may occur as a result of induced development and redevelopment. Public safety and mobility would be improved for the communities as roadway networks are completed by increased development. Overall, the expanding regional roadway network could have minor indirect effects.

Natural Resources

Waters of the United States, Including Wetlands

No-Build Alternative:

Indirect impacts to Waters of the United States, including Wetlands, would not be expected with the No-Build Alternative.

Build Alternatives:

There are numerous stream and wetland systems within and beyond the study corridor. It is anticipated that the Build Alternatives would impact Waters of the United States, including wetlands, to some degree. Total direct impacts are discussed in the *Natural Resources Technical Memorandum*. Most of the systems being impacted have already been altered and affected by the original construction of the interstate and surrounding development. Since this project involves widening of the existing interstate, effects to streams and wetlands are unavoidable with each of the Build Alternatives.

Some examples of potential indirect impacts to Waters of the United States, including wetlands, can include future runoff from the facility affecting water quality, either due to materials washing off the road surface or due to increased potential for sedimentation caused by concentration of runoff; shading of wetlands and streams causing a future change in stream temperature and plant life; disruption of hydrology that supports aquatic resources, and possibly decreasing their value to wildlife. Stormwater management and the effects of runoff on water quality are further described in the next section under Water Quality.

Because the Build Alternatives include widening of existing bridges over wetlands and streams, it is possible that the Build Alternatives may have indirect effects due to shading. While it is possible that the original construction of I-64 years ago may have disrupted hydrology of wetlands and stream systems, because the Build Alternatives are on the existing location of I-64, they are unlikely to cause further disruptions in the hydrology of these systems.

Since the original construction of I-64, many environmental laws, regulations and ordinances have been implemented to avoid and minimize direct and therefore indirect effects to the important resources. Between now and design year 2040, it is likely that there may be indirect impacts to Waters of the United States, including wetlands, which would be addressed during the permitting and mitigation process by the permitting agencies as required by the Section 404(b)(1) guidelines.

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Water Quality

No-Build Alternative:

There are a number of drainage features such as bridges, culverts and stormwater management facilities that were constructed in the 1960's as part of the original sections of I-64 that would not be improved with the No-Build Alternative. Water quality would continue to see indirect effects due to runoff from existing impervious areas that would not be properly treated and addressed due to any outdated and ineffective drainage features.

Build Alternatives:

The Build Alternatives include increased impervious surface that would increase runoff from the facility, which therefore would have indirect effects on water quality. Indirect effects are those resulting from the associated use of the roadway and increased impervious area, as well as maintenance and storm water runoff carrying particulates, metals, oil and grease, organics, nutrients and other substances. Indirect effects have the potential to affect aquatic life in the reservoirs. Grading operations may expose large areas of soil that could be eroded by wind and rain. Vegetation and naturally occurring soil stabilizers are sometimes removed, leading to an increase in sedimentation in surface water.

However, due to the adherence to strict erosion and sediment controls for design and construction of the project, water quality would likely see a benefit as a result of this project due to the requirement for improvements to the existing drainage features along with the use of additional Best Management Practices (BMPs) throughout the corridor. Measures to minimize harm, to the extent that they are known, would be included in a Record of Decision for an operationally independent section. For this reason, it is anticipated that indirect effects to surface and groundwater resources would be minimal for the Build Alternatives.

Floodplains

No-Build Alternative:

When the I-64 corridor was initially constructed, it was located within floodplain areas along the Hampton Roads Peninsula. The existing corridor currently lies within approximately 50 acres of Federal Emergency Management Agency (FEMA) mapped 100-year floodplains, which continues to cause negative effects on storage areas for floodwaters and alters flooding characteristics. These indirect impacts would be expected to continue to occur with the No-Build Alternative.

Build Alternatives:

The I-64 corridor crosses numerous stream systems within the FEMA mapped 100-year floodplains. Since this project involves

widening of the existing interstate roadway, direct encroachment into floodplains are unavoidable. Strict adherence to the requirements for changes to surface water elevation would be followed.

Roadway projects have the potential to cause indirect effects to FEMA mapped 100-year floodplains due to increased sedimentation entering a floodplain caused by both disturbances during construction activities as well as increased impervious areas once construction of an improved or widened roadway is complete. To minimize these indirect effects to floodplains, final design elements may include bridging of floodwaters to further reduce encroachment and allow for unrestricted passage of floodwaters. In addition, appropriate erosion and sediment control measures and BMPs would be incorporated into the design and construction of the Build Alternatives, both of which would effectively benefit the water quality within the area. Measures to minimize harm, to the extent that they are known, would be included in a **Record of Decision (ROD)** for an operationally independent section. For this reason, it is anticipated that indirect effects to floodplains would be minimal for the Build Alternatives.

Threatened and Endangered Species

No-Build Alternative:

Indirect impacts to threatened and endangered species would not be expected with the No-Build Alternative.

Build Alternatives:

Seven animal and three plant federal and/or state listed species have been confirmed within a two mile radius of the project corridor, with two of these species confirmed within the immediate vicinity of the corridor. Indirect effects to threatened and endangered species are typically caused by projects that have the potential to isolate wildlife habitats or confine movements of wildlife, or by projects that have the potential to cause wildlife to move out of the area due to highway disruptions, separation of foraging areas from nesting areas or other effects. Because the Build Alternatives being considered are proposed as modifications to an existing major highway system, it is anticipated that these types of indirect effects would not occur.

Section 4(f) Resources

No-Build Alternative:

Changes to Section 4(f) resources would not be expected with the No-Build Alternative; however, the increasing travel-time delays associated with the No-Build Alternative may inhibit the viability of publicly owned parks, recreational areas, wildlife and waterfowl

refuges and historic sites of national, state or local significance by increasing congestion and pollution and decreasing the desire to visit and utilize the Section 4(f) resources within the corridor.

Build Alternatives:

Indirect effects to Section 4(f) resources may include both positive and negative effects that would promote development that could impact the resource, increase traffic near the resource, or improve access to the resource for visitors. As described previously, the Build Alternatives for the study include the widening of an existing corridor. None of the Alternatives are expected to make more than minor changes in land use (including visual changes), population density, or growth rate. According to the Section 4(f) review done as part of the study, *de minimis* findings are anticipated for each of the four Section 4(f) uses.

Summary

As mentioned in the analysis, neither the No-Build nor Build Alternatives are expected to make more than minor changes or alterations in the behavior and function of the affected environment caused by project encroachment or induced growth. The corridor should experience growth and development in the study time frame with or without the proposed project, as evidenced by population and employment projections; however, this growth would be consistent with local comprehensive plans. Additionally, neither the No-Build nor Build Alternatives would result in more than minor changes to traffic patterns and accessibility since I-64 is already an existing corridor, no new interchanges are proposed as part of the project and any improvements to I-64 would be largely within the existing right of way.

The indirect effects to natural resources, specifically Waters of the United States, including wetlands; water quality; floodplains; and threatened and endangered species also would not be significant. These resources are regulated under permits and/or approval processes by state and federal agencies, therefore limiting the potential for any indirect effects to be allowed to occur without requiring coordination of any impacts or required mitigation to resources. In addition, direct and indirect impacts on resources protected by other environmental laws (e.g., Waters of the United States) would be further assessed and mitigated in the future final design and permitting stages of an operationally independent section. These future efforts are described in **Appendix L - Phased Approach for Implementation - NEPA Process** of the **Final EIS**.

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Overall, based on this analysis, including literature reviews, regulatory agency coordination and agency and public involvement, there has been no substantial controversy identified over the project or its impacts. Through this coordination and analysis, no potentially significant indirect effects were identified and no indirect effects have been determined to be unacceptable to the agencies or the public.

As described in **Appendix L - Phased Approach for Implementation - NEPA Process** of the **Final EIS**, as individual operationally independent sections of the project corridor are identified, FHWA and the Virginia Department of Transportation (VDOT) would update the environmental analysis, including the direct and indirect impacts on resources described in this **Final EIS** as necessary, in order to issue a **ROD** for each operationally independent section. The **ROD** would formalize any measures to mitigate the indirect effects from the operationally independent section. Once a **ROD** is issued for an operationally independent section, that section would move into the final engineering design phase.

2. Cumulative Effects

In accordance with the CEQ regulations and FHWA guidance, cumulative impact is defined as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time” (40 CFR § 1508.7). A cumulative impact includes the total effect on a natural resource, ecosystem, or human community due to past, present, and future activities or actions of federal, non-federal, public, and private entities. Cumulative impacts may also include the effects of natural processes and events, depending on the specific resource in question. Cumulative impacts include the total of all impacts to a particular resource that have occurred, are occurring, and would likely occur as a result of any action or influence, including the direct and reasonably foreseeable indirect impacts of a federal activity. Accordingly, there may be different cumulative impacts on different environmental resources. However, not all of the resources directly impacted by a project will require a cumulative impact analysis. The resources subject to a cumulative impact assessment are determined on a case-by-case basis.

The cumulative effects of the *I-64 Peninsula Study* were evaluated following the 5-step methodology outlined in the *Indirect and Cumulative Effects Memorandum*. Those effects as a result of the No-Build and Build Alternatives on notable resources affected by the project are presented as follows.

Socioeconomic and Land Use

In examining the cumulative incremental effects to the socioeconomic conditions and land use in the I-64 area, a variety of conditions and features were identified and the potential impacts as a result of the Build Alternatives were determined. As described in the *Socioeconomic and Land Use Technical Memorandum*, land use was reviewed within a 500 foot buffer from existing right of way on either side of I-64. Establishing locality land use characteristics involved identifying existing and anticipated future land use in the corridor. After establishing the baseline land use characteristics that currently exist, the Build Alternatives were evaluated to assess the potential each would have for causing direct or indirect changes in existing land use. General land uses for the study area are found in the *Socioeconomic and Land Use Technical Memorandum*.

The Build Alternatives could potentially affect existing and future land use in several ways. These include directly converting land from its existing use to transportation use, limiting or precluding planned future developments from occurring, and indirectly inducing unplanned development as well as supporting and enhancing planned development. However, because the Build Alternatives would involve acquiring right of way along an existing interstate corridor, none of the Build Alternatives are expected to make more than minor changes in land use, population density, or growth rate. While the Build Alternatives may result in conversion of land use and potential displacements, particularly at the interchanges, the project is anticipated to have an overall positive impact on the regional economy by improving mobility.

In examining the cumulative effects of the I-64 Peninsula project with past, present and reasonably foreseeable future actions, it was determined that as a result of federal and state regulations, along with local planning efforts, that a substantial contribution of effects to socioeconomic conditions and land use from the Build Alternatives is not anticipated.

Neighborhoods and Community Facilities

In examining the cumulative incremental effects to the I-64 area, neighborhoods and community facilities, these areas and facilities were identified and the potential impacts as a result of the Build Alternatives were determined. As described in the *Socioeconomic*

and Land Use Technical Memorandum, the neighborhoods and housing communities found in the vicinity of the I-64 corridor, specifically in the urban areas of the City of Richmond, Henrico County, the City of Newport News and the City of Hampton, are typically older, built out and in varying stages of revitalization. According to Census data, these areas often include lower income populations. Neighborhoods found within close proximity to interstates tend to be located in more urban settings such as Richmond, Newport News and/or Hampton, and more rural areas don't always have clearly defined neighborhoods. The Richmond area neighborhoods and housing communities include Shockoe, Jackson Ward, Church Hill, Ginger Park, Bellevue, Highland Park and Fulton. Neighborhoods and housing communities in the Newport News area that are easily accessible to I-64 include The Forest, Snidow, Hanover Heights, Courthouse Green, Turnberry, Warwick Lawns, Campbell, Kiln Creek, Village Green, Deerfield, Bayberry, Morrison, Swansea Manor, and Robinson Terrace. The City of Hampton neighborhoods and housing communities in proximity to I-64 include Northampton, Magruder, Aberdeen and Mercury Central. Other community facilities located in proximity to the I-64 corridor include schools, churches and/or cemeteries and community centers. **Table III.A.1** in this **Final EIS** includes facilities located within a 500 foot buffer of existing right of way on either side of I-64.

Since the majority of the I-64 mainline improvements with any of the Build Alternatives would be done within the existing right of way, substantial impacts to existing neighborhoods and community facilities are not anticipated. Property impacts along a few sections of the I-64 mainline, and within the potential areas of improvement for the interchange areas, would result in the acquisition of residential parcels. Along the mainline I-64 corridor, the acreage between the existing right of way and the proposed right of way was determined for each Build Alternative, resulting in small fractions of parcels to be acquired, which totaled up to an overall total acreage of mainline right of way to be acquired for each parcel type. The estimates done during the **EIS** studies are conservative estimates and the actual calculation of relocations is expected to decrease as the project design is advanced and more detailed roadway right of way requirements are determined. **Table 3** of the *Right of Way Technical Memorandum* depicts the numbers of property acquisitions for the mainline and interchanges for each Build Alternative. Additional information on the anticipated property acquisitions can also be found in the *Right of Way Technical Memorandum*.

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Table 6 of the *Indirect and Cumulative Technical Memorandum* lists the community facilities that would be impacted by the Build Alternatives. The Build Alternatives would impact the facilities to the same degree (partial acquisition versus full acquisition). Additional information on right of way anticipated to be required is provided in the *Right of Way Technical Memorandum* and **Section A** of this chapter.

Affected property owners would receive assistance in accordance with the applicable federal and/or state requirements. The acquisition of property and the relocation of residents, businesses, farms and non-profit organizations, if needed, would be conducted in accordance with all applicable federal laws, regulations and requirements, including but not limited to, 23 CFR 710, the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended and its implementing regulations found in 49 CFR 24.

In examining the cumulative effects of the I-64 Peninsula project with past, present and reasonably foreseeable future actions, it was determined that as a result of these federal and state regulations, along with local planning efforts, a substantial contribution of effects to neighborhoods and community facilities is not anticipated.

Environmental Justice

In examining the cumulative incremental effects to the I-64 area, EJ populations were identified and the potential impacts as a result of the Build Alternatives were determined. As described in the *Socioeconomic and Land Use Technical Memorandum* and **Section A** of this chapter, the EJ analysis was conducted in accordance with FHWA guidance.

The study area was defined, and the demographic analysis was initiated to identify EJ populations. Census data was used at the block group level. The 2010 Census data was used wherever possible, however 2000 Census data was used and noted when 2010 data was not available. Minorities and low income populations were identified to determine the area of potential impact, and the demographic information was examined to determine how potential impacts and benefits to the total population would affect the EJ populations. Finally, a determination was made whether or not the project would have disproportionately high and/or adverse impacts on the EJ populations in the study area.

Based on 2010 Census data, 50 of the 72 block groups in the socioeconomic study area have a minority population of 29% or

greater. The minority populations were predominantly in the City of Richmond, Henrico County, the City of Newport News and the City of Hampton. Based on the 2000 Census data, seven of the 72 block groups within the study area had a median household income below \$23,550.

The purpose of the EJ analysis is to identify any disproportionately high and/or adverse effects on EJ populations, and to ensure that EJ populations have been able to participate in the decision-making process. Each of the Build Alternatives and options were considered, and potential impacts that would directly affect the study area were gathered. The location and severity of anticipated impacts associated with the various options were used to determine if EJ populations would be disproportionately impacted. The construction and operation of the I-64 improvements associated with the Build Alternatives would have the potential to create a variety of impacts to EJ populations. **Table III.A.5** in this **Final EIS** notes the number of minority and low income block group populations that could be impacted by each of the Build Alternatives. The Build Alternatives would potentially affect the same EJ populations. Although each Build Alternative has the potential to impact property, neighborhood cohesion and isolation, access and mobility, EJ populations would not be impacted disproportionately as compared to non-EJ groups.

In examining the cumulative effects of the I-64 Peninsula project with past, present and reasonably foreseeable future actions, it was determined that disproportionate effects to EJ populations are not anticipated. Increased mobility, access to transit, greater employment opportunities through redevelopment activities and enhanced connection to community resources is anticipated to result in a beneficial cumulative impact to EJ populations.

Natural Resources

Water of the United States, including Wetlands

In examining the cumulative incremental effects to the I-64 area, Waters of the United States, including wetlands, were identified and the potential impacts as a result of the Build Alternatives were determined. As described in the *Natural Resource Technical Memorandum* and **Section E** of this chapter, the I-64 project corridor falls within three of the 12 major river basins in Virginia, specifically the James River (Lower James River sub-basin), the York River and the Chesapeake Bay/Atlantic Ocean and Small Coastal Basins, with all drainage ultimately entering the Chesapeake Bay.

The study identified numerous Waters of the United States within the project corridor. **Figure III.E.1** in the **Final EIS** shows the location of these systems along the corridor. A total of 99.93 acres of wetlands and 148,493 linear feet of other waters were identified within the project corridor. The types of resources identified are summarized in **Table III.E.1** of the **Final EIS**. Of the overall total acreages identified, 70.40 acres of wetlands were considered non-tidal and 29.53 acres were considered tidal wetlands. Additional information on the Waters of the United States can be found in the *Natural Resources Technical Memorandum*.

As identified in these studies, many of the systems have been heavily manipulated through past ditching or filling activities associated with the road development and previous improvements. In addition, a number of the channels appear to have developed from drainage from the roadway and a number of wetland systems appear to have developed through constraints associated with drainage to the interchanges and median. Despite the high degree of previous disturbance, these systems may still provide ecological functions such as wildlife habitat, flood control and water quality benefits such as nutrient uptake and sediment trapping.

In accordance with the federal and state regulations governing streams and wetlands, efforts have been made to reduce the potential for impacts to jurisdictional Waters of the United States wherever possible. However, because this project involves the widening of an existing corridor, which currently crosses numerous stream and wetland systems, impacts are unavoidable. In addition, along the greatest areas of impact and in areas where bridges already exist, the true footprint of the impact would be minimized due to bridging activities. Also, in many cases the impacts are the result of culvert extensions and not complete fill of the system itself. In addition since the construction area for all Build Alternatives is similar, total impacts among the Alternatives is similar. **Tables III.E.3 - III.E.5** of the **Final EIS** summarize the potential impacts resulting from each Build Alternative to the Waters of the United States along the project corridor. Additional details regarding the systems and potential impacts can be found in the **Natural Resources Technical Memorandum**.

Waters of the United States are regulated under Sections 401 and 404 of the CWA, the Virginia Water Protection Permit (VWPP) Program Regulation 9 VAC 25-210 and the Virginia Wetlands Act (Chapter 13, Title 28.2 of the Code of Virginia). Projects affecting these areas would require a permitting decision from the United States Corps of Engineers (Corps), the Virginia Department of

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Environmental Quality (VDEQ) and the Virginia Marine Resource Commission (VMRC). Coordination with the Corps, the VDEQ and the VMRC would be required during the permitting phase of a project to determine the jurisdictional limits of surface waters and to make a final determination of the need for and type of permits. In addition, the compensatory mitigation requirements for both streams and wetlands would be determined by assessing those impacts that cannot be avoided and minimized within each Hydrologic Unit Code (HUC) area. Ideally the mitigation would be within the same or adjacent HUC areas, which limits cumulative effects by the types of projects within each HUC area. Based on the scale of the project, the multiple individual impact area crossings and the potential for tidal impacts, a Section 404 Individual Permit from the Corps, a VWP Individual Permit from the VDEQ and a Subaqueous Bottomlands Permit from the VMRC could be required.

In examining the cumulative effects of the I-64 Peninsula project with past, present and reasonably foreseeable future actions, it was determined that these federal and state regulations and the permitting process would limit temporary and permanent effects to jurisdictional wetland and stream systems within the study area, and thus contributions to substantial effects to Waters of the United States are not anticipated.

Water Quality

In examining the cumulative incremental effects to the I-64 area, existing water quality was assessed and the potential impacts as a result of the Build Alternatives were determined. As described in the *Natural Resource Technical Memorandum* and **Section E** of this chapter, state and federal law requires the VDEQ to report the condition of the Commonwealth's waters. Section 305(b) of the CWA requires each state to submit a biennial report describing the quality of its waters. This process assesses the following six primary designated uses based on the regulatory Water Quality Standards: Aquatic Life, Recreation, Fish Consumption, Shellfishing, Public Water Supply and Wildlife. These primary uses are further broken into sub-categories. Virginia's Water Quality Standards define the water quality needed to support each of these uses by establishing the numeric criteria that physical and chemical data are assessed against. If a waterbody contains more of a pollutant than is allowed by the Water Quality Standards, it would not support one or more of its designated uses, and is considered "impaired". All anthropogenically-impaired waters in

Virginia are placed on a federally mandated 303(d) impaired waters list. Waters that are impaired due to human activities require a plan to restore water quality and associated designated use(s). The VDEQ schedules each of these waters for development of a Total Maximum Daily Load, which is a reduction plan that defines the limit of a pollutant(s) that a water system can receive and still meet water quality standards. The condition of the Commonwealth's waters is summarized in the Virginia Water Quality Assessment 305(b)/303(d) Integrated Report. For more information regarding water quality issues along the project corridor, refer to the *Natural Resources Technical Memorandum*.

Table III.E.6 of this **Final EIS** lists the nine surface water segments intersecting the project corridor that have been listed as impaired waters (Categories 4 and/or 5) in the VDEQ 2010 Integrated Report. **Figure III.E.1** of this **Final EIS** shows the location of these systems along the corridor. Escherichia coli, Enterococcus and Fecal Coliform, all non-highway related pollutants, are responsible, at least in part, for impairment in most of the systems.

All of the Build Alternatives have the potential to increase levels of certain contaminants within the affected surface waters. These increases would be expected to be minimized with the use of approved sediment and erosion control during construction and implementation of stormwater best management practices. However the Build Alternatives could still affect water quality to some degree, exacerbating problems within sub-watersheds where contaminant levels are already elevated. Additional information on potential water quality impacts during construction along with suggested mitigation measures can be found in the *Natural Resource Technical Memorandum* and **Section E** of this chapter.

In examining the cumulative effects of the I-64 Peninsula project with past, present and reasonably foreseeable future actions, it was determined that development projects would need to adhere to the federal and state regulations governing activities affecting water quality and thus contributions to substantial effects to water quality are not anticipated.

Floodplains

In examining the cumulative incremental effects to the I-64 area, floodplains areas were identified and the potential impacts as a result of the Build Alternatives were determined. As mentioned in **Section II.D.2** of the *Indirect and Cumulative Effects Technical Memorandum* and further described in the *Natural Resource*

Technical Memorandum and **Section E** of this chapter, the I-64 corridor crosses numerous stream systems within the FEMA mapped 100-year floodplain.

The majority of the floodplain encroachments from the proposed Build Alternatives would be from the perpendicular crossing of floodplains, not from longitudinal (parallel) encroachments, which were avoided. These longitudinal crossings have been avoided because they would result in more floodplain fill, reducing conveyance and floodplain storage. Individual impacts to any one floodplain are relatively small in both size and severity. Efforts to avoid and minimize impact to 100-year floodplains would continue as the project advances. Hydraulic and hydrologic studies would be performed to determine if any floodplain encroachments would have negative effects on storage areas for floodwaters or alter flooding characteristics. Techniques that would be investigated to further minimize or avoid impacts may include alignment shift to ensure the narrowest possible crossing and bridging of floodwaters to further reduce encroachment and allow for unrestricted passage of floodwaters. In addition, in accordance with VDOT standards, changes to the surface water elevation are not allowed as part of the project design and construction. **Table III.E.7** of this **Final EIS** summarizes the potential specific encroachments (expressed as area in acres crossed by the construction footprint) into the FEMA-designated 100-year floodplains for each Build Alternative.

Several federal and state regulations and policies govern fill and construction in floodplains to ensure that proper consideration is given to the avoidance and mitigation of adverse floodplain effects. These regulations include Executive Order 11988, US Department of Transportation Order 5650.2, entitled the "Floodplain Management and Protection" and the National Flood Insurance Act of 1968. In Virginia, the VDCR is responsible for coordination of all state floodplain programs, and floodplains are also governed by local Flood Insurance Programs administered by localities and supervised by FEMA. The VDCR Floodplain Management Program and VDOT construction specifications for the roadway itself also address downstream floodplain and floodway effects.

In examining the cumulative effects of the I-64 Peninsula project with past, present and reasonably foreseeable future actions, it was determined that these federal and state requirements would limit impacts to floodplains within the study area, and therefore contributions to substantial effects to floodplains are not anticipated.

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Threatened and Endangered Species

The U.S. Fish and Wildlife Service and the National Marine Fisheries Service regulate and protect federally listed threatened and endangered species under the ESA with the primary goal of conserving and recovering listed species. The ESA, with few exceptions, prohibits activities affecting threatened and endangered species unless authorized by a permit. In addition to the federal oversight, threatened and endangered species are also regulated at the state level. The Virginia Department of Game and Inland Fisheries has adopted the federal list as well as a state list of threatened and endangered species, with the primary focus of managing Virginia's wildlife to maintain optimum populations of all species and conserve biodiversity.

In examining the cumulative incremental impact on the I-64 area, threatened and endangered species and their habitats were identified and the potential impacts as a result of the Build Alternatives were determined. As described in the *Natural Resource Technical Memorandum* and **Section E** of this chapter, there are 10 federal and state threatened and/or endangered species and/or their habitat located within a two-mile radius of the I-64 study corridor. Most of these species were listed with numerous occurrences throughout the corridor. These species include: Rafinesque's eastern big-eared bat, Peregrine falcon, Canebrake rattlesnake, Mabee's salamander, Eastern tiger salamander, Loggerhead sea turtle, Bald eagle, Small whorled pogonia, Swamp pink and Harper's fimbriatilis.

All of the Build Alternatives have the potential to affect threatened or endangered species or habitats along the project corridor. The Mabee's salamander and the Canebrake rattlesnake are located in the immediate vicinity of the project corridor. Each Build Alternative intersects the identified areas for these species. The presence of these species would require close coordination with the resource and regulatory agencies and potential survey/assessment and design considerations.

The study also identified areas of potential habitat for the Small whorled pogonia within the Build Alternatives limits. An official habitat survey conducted by a certified specialist would likely be required for this species as part of the project permitting process. This survey, which must be conducted by an approved professional, must be completed between May 25th and July 15th of a given year and submitted to the agencies for their review and recommendation.

In addition, 11 Bald eagle nests were identified within the two-mile radius of the project corridor, which require special coordination with the resource and regulatory agencies. Bald eagles are currently de-listed under the federal ESA; however, they are still recognized as a threatened species at the state level and are protected by the federal Bald and Golden Eagle Protection Act (Eagle Act) (16 U.S.C. §668-668d) and the Migratory Bird Treaty Act (MBT Act) (16 U.S.C. §703-712). However, all of the nest locations were located outside of the 660-foot nest protection zone, and there are no anticipated impacts to this species.

Due to the presence of federal and state listed threatened and endangered species and/or habitat documented within the vicinity of the study area, construction time-of-year restrictions may be required. These restrictions would be determined through the permitting process. Also, habitat assessments and species surveys may be required to determine the presence of a threatened or endangered species or habitat. These species surveys, if needed, would be completed by an agency certified or approved specialist, and may have restrictions on time-of-year when the surveys can be conducted. Additional design or construction considerations, such as the use of bubble curtains, maintaining construction buffer widths, etc., may also be requested or required by the agencies.

In examining the cumulative effects of the I-64 Peninsula project with past, present and reasonably foreseeable future actions, it was determined that, as a result of federal and state threatened and endangered species regulations, contributions to substantial effects to threatened and endangered species are not anticipated.

Section 4(f) Resources

In examining the cumulative incremental impact on the I-64 area, Section 4(f) resources were identified and the potential impacts as a result of the Build Alternatives were determined. As described in **Section H** of this chapter, Section 4(f) of the U.S. Department of Transportation Act of 1966 (49 U.S.C. Section 303), states that no Section 4(f) resource can be used unless it is demonstrated that there is no feasible and prudent alternative to the use and all possible planning to minimize harm has been incorporated, or the impact is determined to be "de minimis".

Section 4(f) resources including publicly owned parks, recreational areas, wildlife and waterfowl refuges and historic sites of national state or local significance were identified along the I-64 project corridor. As a result of these studies, 26 properties within the I-64 corridor were identified as Section 4(f) resources. Based on the anticipated impacts of the Build Alternatives and consultation with

the Virginia Department of Historic Resources and landowners, FHWA intends to make *de minimis* findings on four of these resources when issuing a **ROD** for an operationally independent section that contains one or more of these properties. These four resources are: the Cold Harbor Battlefield, Newport News Park, Battle of Yorktown and Bluebird Gap Farm. Coordination letters regarding each of these properties can be found in **Appendix I – Coordination in Response to Comments on the Draft EIS** of this **Final EIS**. There are no other planned uses of the other 22 identified Section 4(f) resources, however potential impacts to these resources would be evaluated, as necessary, as an operationally independent section is advanced through the phased process. These future efforts are described in **Appendix L - Phased Approach for Implementation - NEPA Process** of the **Final EIS**.

In examining the cumulative effects of the I-64 Peninsula project with past, present and reasonably foreseeable future actions, it was determined that as a result of federal Section 4(f) regulations, substantial effects to Section 4(f) resources from federally funded are not anticipated. However, the Build Alternatives could contribute to private development projects that may result in the loss of historic properties and archaeological resources; impacts to historic districts and battlefields due to future development.

Summary of Cumulative Effects

There are a number of cumulative effects that the study area has seen over the years as a result of traditional sprawling land use patterns, including:

- Loss of open space and agricultural lands;
- Degradation of water and air quality;
- Decreased mobility due to declining levels of service of roadways (i.e. traffic congestion);
- Increased commute times due to traffic congestion;
- Increases in auto dependency and fuel consumption;
- Loss of sense of place and community due to isolation of land uses;
- Isolation (i.e., separation) of employees from activity centers, homes, daycare and schools;
- Decline in economic activity in employment centers; and
- Reduced economic opportunity in existing buildings, facilities and services.

III. ENVIRONMENTAL RESOURCES, IMPACTS AND MITIGATION

The purpose of this cumulative analysis was to assess substantial effects on resources within the study area that result from past, present, and reasonably foreseeable future projects, in addition to the proposed Build Alternatives analyzed for the *I-64 Peninsula Study*. **Tables III.J.2** and **III.J.3** depict the past and reasonably foreseeable future transportation projects in the area.

Overall, the No-Build Alternative is not expected to substantially alter development patterns within the corridor and therefore it is not anticipated to contribute to the cumulative impacts of any natural or historic resources evaluated as part of this study. However, it could have an adverse effect on the social and economic resources since it could essentially stagnate growth and development in the project corridor, impacting job opportunities and the economic health of the region.

The Build Alternatives are expected to add incremental impacts to the overall cumulative effects of past and future actions to each of the resources considered; however, those impacts are expected to be both positive and negative. While the alternatives may result in conversion of land use and potential displacements, particularly at the interchanges, the project is anticipated to have an overall positive impact on the regional economy by improving mobility.

Cumulative effects may result from the construction of one of the study Build Alternatives, although they are not anticipated to be significant. Cumulative effects to the most notable project area features described in this analysis are summarized in **Table 9** of the *Indirect and Cumulative Effects Technical Memorandum*.

Existing land use policies and development regulations support the proposed project, which would provide a substantial improvement to an established, overburdened transportation corridor. As with any project that involves change, the Build Alternatives have the potential to contribute to positive and negative environmental effects within the study corridor. However, this project would provide benefits in terms of regional accessibility, which in turn would benefit economic growth.

As described in **Appendix L - Phased Approach for Implementation - NEPA Process** of the **Final EIS**, as individual operationally independent sections of the project corridor are identified, FHWA and VDOT would update the environmental analysis, including the cumulative effects, as necessary in order to issue a **ROD** for each operationally independent section. The **ROD** would formalize any measures to mitigate the cumulative effects. Once a **ROD** is issued for an operationally independent section, that section would move into the final engineering design phase.

Table III.J.2: Past Projects within the Project Study Area

Approximate Location	Approximate Date	Project Description
Corridor-wide	Between 1979 and 2006	Various widening projects
Corridor-wide	Between 1981 and 2001	Various interchange upgrades
Exit 190; City of Richmond	1998	Major bridge reconstruction at I-95
Exit 190; City of Richmond	2001	Major bridge reconstruction over the railroad
Exit 193; City of Richmond	1985	Major bridge reconstruction at Route 615 (Fairfield Avenue)
Exit 193; Henrico County	1988	Major bridge reconstruction at Route 33 (Nine Mile Road)
Exit 193; Henrico County	2004	Major bridge reconstruction at Stoney Run Parkway
Exit 195; Henrico County	1986	Major bridge reconstruction at Masonic Lane
Exit 195; Henrico County	1988	Major bridge reconstruction over the Norfolk Southern Railroad
Exit 197; Henrico County	1996	Major bridge reconstruction at Airport Drive
Exit 200; Henrico County	1992	Major bridge reconstruction at Drybridge Road
Exit 200; Henrico County	2006	Major bridge reconstruction at Meadow Road
Exit 200; Henrico County	2001	New fly-over ramp from SB I-295 to EB I-64
From Exit 200 to Exit 272	2006	Contra flow lane reversal system
Exit 205; New Kent County	1991	Major bridge reconstruction over the Chickahominy River
Exit 242; York County	1977	Major bridge reconstruction at Route 641 (Penniman Road)
Exit 243; York County	2002	New interchange for the entrance to Busch Gardens
Exit 247; York County	1982	Major bridge reconstruction at the Route 143 ramp
Exit 247; City of Newport News	1981	Major bridge reconstruction at Route 143 (Jefferson Avenue)
Exit 250; City of Newport News	1982	Major bridge reconstruction at Industrial Park Drive
Exit 255; City of Newport News	1977	Major bridge reconstruction at Route 173 (Denbigh Boulevard)
Just west of Exit 255 to Exit 264; Cities of Newport News and Hampton	2006	10.7 mile eight-lane widening project
Just west of Exit 255 to Exit 264; Cities of Newport News and Hampton	2001	Addition of HOV lanes
Exit 258; City of Newport News	2000	Major bridge reconstruction at Harpersville Road
Exit 258 to Exit 261; Cities of Newport News and Hampton	Between 1990 and 1995	4.0-mile section of I-64 was widened from 4 to 6 lanes in two projects
Exit 262 to Exit 268; City of Hampton	Between 1979 and 1988	6.5 miles of I-64 was widened from 4 to 6 lanes
Exit 264; City of Hampton	1981	First widening project; included 1.2 miles of widening to I-664

III. ENVIRONMENTAL RESOURCES, IMPACTS AND MITIGATION

Table III.J.3: Reasonably Foreseeable Future Projects within the Project Study Area

Project Name	Approximate Location	Project Description
I-95/I-64 Interchange Overlap	Exit 190; City of Richmond	Interchange Reconstruction
Stoney Run Parkway Interchange	Between Exit 193 and Exit 195; Henrico County	New interchange
I-295 Improvements	Exit 200; Henrico County	Widening under construction
I-64 Improvements	Between Exit 197 and Exit 220	Widening of existing interstate
Skiffes Creek Connector	Exit 247; James City County	New interchange to provide access to Green Mount Industrial Park
I-64/Bland Blvd Interchange	Between Exit 250 and Exit 255; City of Newport News	New interchange for multimodal facility
Hampton Roads Bridge-Tunnel	Hampton Roads Harbor	Improvements to existing bridge-tunnel
Patriot's Crossing/Third Crossing	Hampton Roads Harbor	New bridge-tunnel
Midtown/Downtown Tunnel	Hampton Roads Harbor	Improvements to existing bridge-tunnel
Norfolk International Terminals	Hampton Roads Harbor	Ongoing expansions and improvements
Craney Island Eastward Expansion	City of Portsmouth	Expansion of the dredged material placement area
Craney Island Marine Terminal	Hampton Roads Harbor	Construction of a new port terminal
Craney Island Road and Rail Connector	City of Portsmouth	Multimodal link to provide road and rail access to the marine terminal
US 460 Corridor Improvements	Southeastern Virginia between Petersburg and Chesapeake	Proposed toll road paralleling existing US 460
CSX Peninsula Line	Hampton Roads Peninsula Area	Addition of a second track
Richmond-Hampton Roads Passenger Rail	From Richmond through Petersburg to Norfolk	New rail service
Southeast High Speed Rail	Washington, DC to Charlotte, NC	New rail line with connections in Richmond

III. ENVIRONMENTAL RESOURCES, IMPACTS AND MITIGATION

K. Construction Impacts

Project construction impacts are defined as those impacts that are localized, temporary and short-term, occurring only during the construction period. These impacts generally are limited to the immediate construction area and would occur primarily in the form of traffic changes along with physical changes to land use from earth moving and vegetation removal by means of construction equipment. Throughout construction, impacts are controlled by the use of specifically defined and/or regulated construction practices. The following describes these practices for the elements likely to be affected during construction.

Air Quality

The temporary air quality impacts from construction consist primarily of emissions produced during the construction of this project by heavy equipment and vehicle travel to and from the site. Earthmoving and ground-disturbing operations would also generate airborne dust. Construction emissions are short-term or temporary in nature. In order to mitigate these emissions, construction activities are to be performed in accordance with the Virginia Department of Transportation's (VDOT) *Road and Bridge Specifications*.

The project lies in an area designated by the Virginia Department of Environmental Quality (VDEQ) as an emissions control area for volatile organic compounds and nitrogen oxides (9 VAC 5-20-206), and as such, all reasonable precautions should be taken to limit the emissions of these pollutants. In addition, for work in this area, the following VDEQ air pollution regulations must be adhered to during the construction of this project: 9 VAC 5-45-760, Cutback Asphalt restrictions; 9 VAC 5-130, Open Burning restrictions; and 9 VAC 5-40-90, Fugitive Dust precautions.

Noise

Construction activities would cause intermittent fluctuations in noise levels throughout the construction area. The degree of noise impact would vary, as it is directly related to the types of equipment used and the proximity to the noise-sensitive land uses within the project area. Based on a review of the project area, no considerable, long-term construction-related noise impacts are anticipated. Any noise impacts that do occur as a result of roadway construction measures are anticipated to be temporary in nature and would cease upon completion of the project construction phase.

The following would be utilized to help minimize potential construction-related noise impacts. A detailed discussion of VDOT's construction noise policy can be viewed in Section 107.16(b) 3 Noise of VDOT's *Road and Bridge Specifications*.

- The Contractor's operations shall be performed so that exterior noise levels measured during a noise-sensitive activity shall not exceed 80 decibels. Such noise level measurements shall be taken at a point on the perimeter of the construction limit that is closest to the adjoining property on which a noise-sensitive activity is occurring. A noise-sensitive activity is any activity for which lowered noise levels are essential if the activity is to serve its intended purpose and not present an unreasonable public nuisance. Such activities include, but are not limited to, those associated with residences, hospitals, nursing homes, churches, schools, libraries, parks, and recreational areas.
- VDOT may monitor construction-related noise. If construction noise levels exceed 80 decibels during noise sensitive activities, the Contractor shall take corrective action before proceeding with operations. The Contractor shall be responsible for costs associated with the abatement of construction noise and the delay of operations attributable to noncompliance with these requirements.
- VDOT may prohibit or restrict certain work activities that produce objectionable noise so that they would not occur between 10 PM and 6 AM. If other hours are established by local ordinance, the local ordinance shall govern.
- Equipment shall in no way be altered so as to result in noise levels that are greater than those produced by the original equipment.
- When feasible, the Contractor shall establish haul routes that direct his vehicles away from developed areas and ensure that noise from hauling operations is kept to a minimum.
- These requirements shall not be applicable if the noise produced by sources other than the Contractor's operation at the point of reception is greater than the noise from the Contractor's operation at the same point.

Soils and Erosion

Construction activities such as earthmoving, clearing vegetation, grubbing and grading would result in the disturbance of soils along with the potential for soil erosion and sedimentation. Other construction activities which would disturb soils include, but are

not limited to, the placement of culverts, stormwater retention/detention ponds, diversion ditches and channels along with the movement of construction vehicles and machinery, the placement of headwalls and storm water collection inlets, the placement of materials and excavated overburden stockpiling and the placement of fill throughout the construction site. These soil disturbances are expected to be generally minor, short-term and localized.

Construction activities involving steeply sloped areas and in highly erodible soils would present the greatest potential for soil erosion and water pollution during construction. The extent and permanence of this occurring are highly dependent on the measures used for sedimentation and erosion control. The degree of long-term soil erosion depends on the alteration of slopes, soil types, ground cover and the control of runoff.

Traffic

Construction activities for improving a major corridor such as Interstate 64 (I-64) would result in impacts to traffic. This could include lane shifts or lane closures on I-64, impacts to the interchange ramps, and lane closures or detours on the roads that cross over and under I-64 while bridges are being widened or replaced.

In order to mitigate potential construction-related traffic impacts, a Transportation Management Plan (TMP) would be completed for each of the individual construction components. The TMP consists of a:

- Maintenance of Traffic plan – detailed plans showing the Contractor how to build the project while maintaining through traffic and local traffic, while at the same time providing the Contractor with a safe working/staging area.
- Public Communications Plan – a process for notifying the public of upcoming traffic changes due to construction, and notifying them of any unscheduled traffic delays during construction.
- Transportation Operations Plan – a process for responding to and managing the traffic impacts of incidents within the work zone.

The TMP would comply with all appropriate VDOT and Federal Highway Administration requirements, including the *Virginia Work Area Protection Manual* and the *Manual on Uniform Traffic Control Devices*.

III. ENVIRONMENTAL RESOURCES, IMPACTS AND MITIGATION

The TMP would consider the following when developing a plan for construction, in order to mitigate the impacts of construction:

- Providing for the safety of both the traveling public and for construction workers.
- Minimizing traffic impacts. If lane closures are necessary, traffic analysis would be used to determine allowable lane closures, allowable times/days for those closures, and any reasonable measures that could be used to mitigate the impacts. If detours are necessary, reasonable detour routes would be identified and any traffic impacts along the detour route identified.
- Considering the impacts of construction on pedestrians and bicyclists for roads traveling over or under I-64.
- Identifying locations where construction vehicles and equipment can safely enter and exit the work zone.
- Developing a plan of construction that allows the project to be built in a quality manner, quickly, and efficiently.

Visual Quality

Temporary changes to the visual quality throughout the project limits would occur during the construction phase of the project. These changes would primarily occur in the form of equipment and materials, storage and yarding areas, construction fences/barriers, traffic control devices and changes to the landscape associated with land clearing and earth moving operations. These visual changes would occur only during the construction period and would be removed from the visual environment at the completion of construction.

Waters of the United States (including Wetlands) and Water Quality

All permanent and temporary impacts to streams and wetlands, including those associated with the construction activities, are regulated under Sections 401 and 404 of the Clean Water Act, the Virginia Water Protection Permit (VWPP) Program Regulation 9 VAC 25-210, and the Virginia Wetlands Act (Chapter 13, Title 28.2 of the Code of Virginia). There are both tidal and non-tidal wetland and stream systems located within the project corridor. Impacts to these systems resulting from the discharge of fill material into, or encroachment in, on, or over these systems may require a Section 404 United States Army Corps of Engineers (Corps) permit, a VDEQ VWPP, and a Virginia Marine Resources Commission (VMRC) subaqueous bottomlands permit.

Due to the number of stream and wetland systems located along the corridor, impacts (including temporary impacts) during construction of the roadway improvements are unavoidable. A number of considerations should be reviewed during the design and construction of this project to alleviate potential concerns. The temporary staging areas for equipment, field offices, and materials should be carefully selected and constructed to avoid any impacts to surface waters and wetlands. Staging areas should be sited away from sensitive areas, possibly within interchange loops or the median or in other previously cleared areas. The clearing of vegetation should be limited to the greatest extent possible throughout all construction practices.

Hydrophytic vegetation and hydric soils may be affected by adjacent work or may be temporarily impacted by stormwater runoff and sedimentation while the project areas are cleared and graded.

Strict adherence to erosion and sediment control measures and plans would be required throughout all construction practices. The erosion and sediment control plans should address all potential issues resulting from ground disturbance, including erosion control, sedimentation control, temporary stormwater management measures, dust control, and in-stream work at stream crossings. Several best management practices which may be employed include silt fence, straw bales, check dams, sediment basins and other methods to capture potential sediment from exposed soils. Culvert installations and/or extensions may require pump-around practices, resulting in the temporary termination of flow through certain stream segments.

In accordance with the anticipated state and federal permits, all temporarily disturbed wetland areas and streams or streambanks may be restored to preexisting conditions within 30 days of completing work at each temporary impact area. These restoration practices may include reestablishing preconstruction contours and planting or seeding with appropriate wetland vegetation according to cover type (emergent, scrub/shrub, or forested) or a riparian seed mix and woody species. In accordance with the required permits, these temporarily disturbed areas may be required to maintain wetland or riparian vegetation through the second year post-disturbance. In addition, any materials including fill, construction debris, and excavated and woody materials temporarily stockpiled in wetlands should be placed on mats or geotextile fabric, immediately stabilized to prevent entry into state

waters, managed such that leachate does not enter state waters, and completely removed within 30 days following completion of that construction activity. Any disturbed areas should be returned to original contours, restored within 30 days following removal of the stockpile, and restored with the same vegetative cover type originally present, including supplemental erosion control grasses, if necessary.

Access roads and associated bridges or culverts should be constructed to minimize the adverse effects on surface waters to the maximum extent practicable. Access roads constructed above preconstruction contours and elevations in surface waters should be bridged or culverted to maintain surface flows. Any heavy equipment in temporarily impacted wetland areas or stream channels should be placed on mats, geotextile fabric, or other suitable material, to minimize soil disturbance to the maximum extent practicable. All equipment and materials should be removed immediately upon completion of work.

During construction, there is also the potential for non-point source pollutants to enter surface waters. To minimize these potential impacts, best management practices for equipment / materials operation and storage would be followed. The erosion and sedimentation control measures would also assist in minimizing any potential impacts. In the event of accidental spills, the Contractor is required to immediately notify all appropriate local, state, and federal agencies and to take immediate action to contain and remove the contaminant.

A Stormwater Pollution Prevention Plan would need to be prepared and the Virginia Stormwater Management Program Permit would need to be acquired from the Virginia Department of Conservation and Recreation. The construction work would be completed in accordance with local requirements and practices, where practicable. In addition, the Corps, the VDEQ, and the VMRC permits would provide permit conditions for avoiding, minimizing, and addressing potential temporary impacts to both surface waters and water quality.

At the federal level, the National Pollutant Discharge Elimination System (NPDES) Stormwater program addresses potential temporary impacts to wetland and other waters from stormwater discharges from a construction site. An NPDES Construction permit would be required for this project.

III. ENVIRONMENTAL RESOURCES, IMPACTS AND MITIGATION

Wildlife and Habitat

Strict adherence to erosion and sediment control plans and measures would be required throughout all construction practices. In addition to reducing potential impacts to water quality, these practices would also reduce and/or eliminate any potential impact directly to wildlife and/or their habitat.

The noise generated from the construction activities and the presence of the machinery and workers themselves may temporarily displace some species of wildlife from the edge of the interstate. Since the limits of construction would be adjacent to the existing interstate, these noises are anticipated to be minimal, having little to no effect on wildlife.

III. ENVIRONMENTAL RESOURCES, IMPACTS AND MITIGATION

L. Short-Term Impacts/Long-Term Benefits

This evaluation outlines the immediate benefits derived from the proposed construction of any of the Build Alternatives as compared to the future losses caused by the proposed action. The following section describes both the short and long-term gains and losses in relation to the Build Alternatives. Short-term effects and uses of the environment are primarily associated with the construction phase of the project while long-term effects are considered for the life of the facility. Overall, the short-term impacts and use of resources by any of the Build Alternatives during construction would not substantially detract from the enhancement of long-term productivity and mobility for the local area, region and the Commonwealth of Virginia.

Short-Term Gains

The construction of any of the Build Alternatives would create jobs primarily for material suppliers, construction workers and construction inspectors necessary for the construction of the project. It is possible that these positions can be filled with area residents, or people who move into the local areas as a result of the job opportunities created by the project. The new local residents and the concentration of workers within the project area would benefit the local economy by increasing sales to such establishments as motels, restaurants, banks, gas stations, grocery stores and other commercial and retail establishments within the project area. Increased sales tax would be derived from the sales at these establishments and from the sales of materials required for the project construction.

Short-Term Losses

As the construction of any of the Build Alternatives is completed the positions created by the project may be eliminated. As a result of this loss of jobs, some local residents may leave the local area in order to find work elsewhere, or remain in the local area and draw unemployment benefits. Either increased unemployment or a decreased work force would affect the local economy. With the completion of construction the concentration of workers within the project area would be reduced thus decreasing retail and commercial sales which would result in a decrease of sales tax revenues.

The construction of any of the Build Alternatives would also result in travelers taking alternate routes to avoid the construction areas. The use of these alternate routes may increase fossil fuel consumption and may discourage patronage of local businesses, lowering sales and sales tax revenues. The use of alternate routes may also disrupt the travel habits of local residents since they may be required to travel on more heavily traveled roadways, which may experience increasing congestion and delays due to the increase in traffic during the construction period. There would also be modifications to access of individual properties primarily in the construction zones around the interchange areas along with an increase in truck traffic necessary to provide the construction materials to the site.

The construction of any of the Build Alternatives would also include the removal of existing vegetation due to the construction of the project and through the storage and movement of construction vehicles. A temporary increase in soil erosion, noise levels and a degradation of air quality due to emissions from reduced travel speeds combined with fugitive dust created by the construction is to be expected. There would also be the need for local water resources for construction uses such as, but not limited to, the mixing of aggregates, road wetting and water needed for landscaping applications.

Long-Term Gains

The long-term benefits associated with any of the Build Alternatives would begin upon completion of construction and are expected to last the entire life of the roadway facility. The projected reduction in traffic congestion and more consistent travel speeds would result in a more efficient use of fossil fuels. Decreased travel time would also result in quicker commutes and decreased delivery times for emergency and commercial vehicles. The construction of any of the Build Alternatives may also reduce traffic from existing local roadways through the change of travel patterns caused by attracting traffic to the improved facility. Reducing traffic on these local roadways would result in increased safety and decreased noise levels and air pollution along these roadways. The decrease in traffic along these local roadways would also improve access to the existing businesses along these routes. These affects would result in an enhanced overall environment for the communities along these roadways.

Long-Term Losses

The construction of any of the Build Alternatives would require the conversion of property from residential and commercial use to highway use. Real estate taxes paid on these properties would be eliminated and in some instances the loss of commercial structures may result in the loss of jobs. This could be off-set by potential increased property values in areas surrounding the 25 interchanges and possible attraction of new development and businesses to these improved, less congested interchange areas.

III. ENVIRONMENTAL RESOURCES, IMPACTS AND MITIGATION

M. Irreversible and Irretrievable Resources

The construction of any of the Build Alternatives would involve a commitment of natural, physical, human and fiscal resources that would be irreversible and irretrievable.

Considerable amounts of fossil fuels, labor and highway construction materials would be irretrievably expended for the construction of any of the Build Alternatives. Anticipated construction materials would include, but are not limited to, aggregates, asphalt, bituminous pavement, cement, gravel sand. The fuels, electricity and labor required to manufacture, transport and apply these materials would be irretrievably lost. As of the time of this document these construction materials are not in short supply and their use would not have an adverse effect upon the continued availability of these resources.

Another consideration is the loss of real estate/land which would result in the loss of tax revenues to the counties and cities. Even though the structures required for any of the Build Alternatives may be replaced with structures of equal or greater value in other locations, the tax revenues received from the original location would be lost. However, due to the relative sizes of the taxing entities, it has been determined that the losses incurred would not have long-term adverse effects to the respective tax bases. The properties surrounding the existing 25 interchange locations would likely increase in value and would remain taxable land. The taxes collected from these properties would compensate for the taxes lost as a result of any of the Build Alternatives. Details on the specific property impacts with each of the Build Alternatives can be found in **Section A** of this chapter and in the *Right of Way Technical Memorandum*.

The construction of any of the Build Alternatives would require a substantial expenditure of fiscal resources to pay for the labor and materials which would also be an irreversible and irretrievable commitment of resources.

The irreversible and irretrievable commitment of resources required for improving Interstate 64 is off-set by the benefits that residents in the immediate area, region and state would experience from the improved quality of the transportation system. These benefits would consist of improved accessibility and safety, savings in time reduction in congestion which are anticipated to outweigh the commitment of the resources that are described as irreversible and irretrievable.



INTERSTATE 64 PENINSULA STUDY

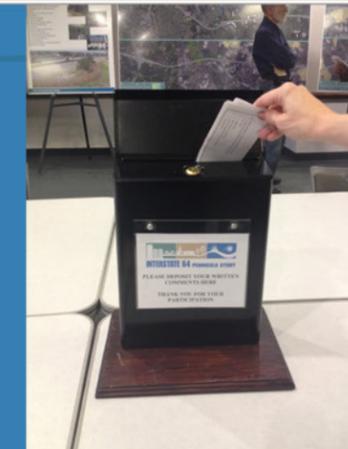
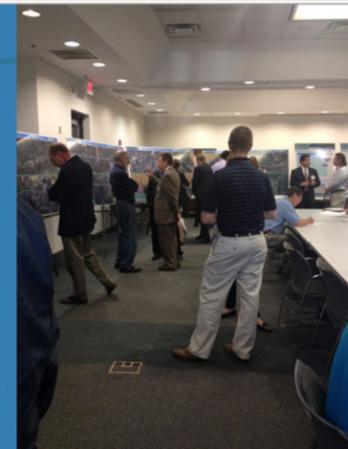
IV. PUBLIC COMMENTS and AGENCY COORDINATION




Virginia Department of Transportation

**Interstate 64 Peninsula Study
Cooperating/Participating Agency Meeting
Preliminary Alternatives**

April 26, 2012
Nicholas Nies
Project Manager, Environmental Division



IV. PUBLIC COMMENTS AND AGENCY COORDINATION

The Virginia Department of Transportation (VDOT) has coordinated with local, state and federal agencies and implemented a public involvement program to provide information and solicit comments on the *Interstate 64 (I-64) Peninsula Study*. This chapter describes the process used and the results of these efforts.

A. Scoping Meetings

Scoping is an early, open and on-going process used to determine the range of improvement concepts, issues and impacts that the study would address in accordance with the National Environmental Policy Act (NEPA). The scoping process includes coordination with the general public as well as the appropriate federal, state, regional and local agencies. Federal Highway Administration (FHWA) published a Notice of Intent in the Federal Register on January 20, 2011, to announce the intent to prepare this **Final Environmental Impact Statement (EIS)**.

Agency Scoping Meeting

An Agency Scoping Meeting was held on March 22, 2011, in Richmond, Virginia. The agencies and localities invited to this meeting are listed in **Table IV.1**.

A total of 31 federal, state, regional and local agency representatives attended the Agency Scoping Meeting. Along with the Study Team, a representative from the Office of the Secretary of Transportation also attended. Agencies represented at the scoping meeting are identified in **Table IV.1**. The meeting consisted of an overview of the study process and introduction to the Study Team. Other issues discussed at the meeting included project planning status, sensitive features and areas of concern, cooperating agencies, project schedule and the Study Team expectations. Materials which were to be presented at the upcoming Citizen Information Meetings were reviewed.

A Scoping Information Package was also distributed at the meeting. This document contained preliminary information about the proposed study, a depiction of the study corridor, summaries of the need for the improvements, the decisions that FHWA and VDOT would make upon completion of the study, the environmental review process, public outreach activities, agency coordination efforts and the study schedule.

Table IV.1: Agencies and Localities Invited to Agency Scoping Meeting (March 22, 2011)

Agency and Locality Name
Advisory Council on Historic Preservation
U.S. Army Corps of Engineers
U.S. Coast Guard
U.S. Department of Agriculture, Natural Resources Conservation Service, Chesapeake Office
U.S. Department of Commerce, National Oceanic and Atmospheric Administration *
U.S. Department of Defense, Camp Peary *
U.S. Department of Housing and Urban Development
U.S. Department of the Interior, Fish and Wildlife Service
U.S. Department of the Interior, National Park Service, Northeast Region
U.S. Department of the Interior, Office of Environmental Project Review
U.S. Department of Transportation, Federal Railroad Administration
U.S. Department of Transportation, Federal Transit Administration
U.S. Environmental Protection Agency *
Virginia Department of Agriculture and Consumer Services
Virginia Department of Aviation
Virginia Department of Conservation and Recreation
Virginia Department of Environmental Quality
Virginia Department of Forestry
Virginia Department of Game and Inland Fisheries *
Virginia Department of Health
Virginia Department of Historic Resources *
Virginia Department of Housing and Community Development
Virginia Department of Mines, Minerals and Energy *
Virginia Department of Rail and Public Transportation *
Virginia Marine Resources Commission *
Virginia Economic Development Partnership
Virginia Institute of Marine Science *
Virginia Outdoors Foundation

Agency and Locality Name (continued)
City of Hampton *
City of Newport News *
City of Richmond *
City of Williamsburg *
Henrico County *
James City County *
New Kent County *
York County *
Hampton Roads Transportation Planning Organization *
Richmond Area Metropolitan Planning Organization *
Historic Triangle Collaborative *

* Attended Agency Scoping Meeting.

Participants were encouraged to submit comments at the Agency Scoping Meeting and/or submit comments in writing to the Study Team after the meeting. A summary of comments received from these agencies, along with the Study Team’s responses, are included in the *I-64 Peninsula Study Coordination Plan*.

The following agencies provided written comments to VDOT early in the project development process:

- Virginia Marine Resource Commission, dated February 10, 2011.
- U.S. Department of the Interior, U. S. National Park Service (USNPS), dated February 20, 2011.
- U.S. Coast Guard (USCG), dated March 1, 2011.
- Virginia Department of Conservation and Recreation, dated March 14, 2011.
- U.S. Army Corps of Engineers (Corps), dated April 1, 2011.
- Virginia Department of Agriculture and Consumer Service, dated April 5, 2011.
- Virginia Department of Environmental Quality, dated May 3, 2011.

IV. PUBLIC COMMENTS AND AGENCY COORDINATION

Citizen Information Meetings for Scoping and Purpose and Need

Two Citizen Information Meetings for scoping and purpose and need were held for the project in March 2011 at two locations along the study corridor, as listed in **Table IV.2**. These meetings were held to provide the public with project information and for the public to provide input on the scope of issues to be addressed in the study. The meetings focused on two main issues, the purpose and need for the project and identification of sensitive features along the corridor. As required by the Code of Virginia, the meetings were advertised in the local newspapers listed in **Table IV.3**.

Table IV.2: Citizen Information Meetings for Scoping and Purpose and Need

Date	Location	Number of Attendees
March 23, 2011	City of Newport News	42
March 24, 2011	New Kent County	38
Total Attendees		80

Table IV.3: Advertisement Publications for the Citizen Information Meetings for Scoping and Purpose and Need

Newspaper	Dates
Richmond Times-Dispatch (City of Richmond)	March 7 and 14, 2011
Richmond Voice (City of Richmond)	March 9 and 16, 2011
Henrico Citizen (Henrico County)	March 17, 2011
New Kent Charles City Chronicle (New Kent and Charles City Counties)	March 9 and 16, 2011
Newport News Daily Press (Hampton Roads)	March 7 and 14, 2011
Virginia Gazette (City of Willimasburg)	March 9 and 16, 2011
Hampton Roads Voice (Hampton Roads)	March 10 and 17, 2011

The open house format for these Citizen Information Meetings included a repeating slide presentation and accompanying display boards depicting general information on I-64, the study schedule,

and the purpose of the study. A handout was also provided containing project information presented at the meeting. FHWA and VDOT representatives were available to discuss the study and answer questions at the Citizen Information Meetings.

Scoping comments were provided in the following formats:

- Verbal comments made at the scoping meetings.
- Comment forms available at the scoping meetings.
- Comment forms available on the project website.
- Official responses to NEPA required scoping letters.
- Comments submitted via e-mail.

Most of the provided comments were from private citizens. Approximately 106 comments were submitted as part of the scoping and purpose and need review. This total included comments from 72 individuals (in the form of 61 comment sheets, three oral comments and 14 letters, with several individuals responding in multiple formats), approximately 32 from federal, state, regional and local agencies and two from interest groups. Comments were officially accepted until April 30, 2011. However, because scoping is continuous and on-going, FHWA and VDOT accepted scoping comments throughout the study period. The scoping comments were considered in the study.

B. Alternatives Development Meetings

Alternatives development involves the identification of the range of Alternatives to be considered for study. In accordance with NEPA, the Alternatives development process includes the general public as well as the appropriate federal, state, regional and local agencies.

Agency Alternatives Development Meeting

An Agency Alternatives Development Meeting was held on April 26, 2012, in Richmond, Virginia. The agencies and localities which were formally invited to and/or attended this meeting are listed in **Table IV.4**. This group was developed based on interest expressed during the scoping process. As detailed in this chapter, additional discussions and meetings regarding the project Alternatives were held with interested groups.

A total of 10 federal, state, regional and local agency representatives attended the meeting (as noted in **Table IV.4**). In addition to these attendees, representatives from the Virginia Department of Rail and Public Transportation, the City of Richmond, New Kent County and the Richmond Area

Metropolitan Planning Organization (MPO) also attended. The meeting consisted of an overview of conceptual Alternatives under consideration and information on the Base Conditions and design year 2040 traffic projections. Other issues discussed at the meeting included traffic concerns and questions on the inclusion of transit options. The materials to be reviewed at the Citizen Information Meetings for Alternatives development were also presented.

Citizen Information Meetings for Alternatives Development

Two Citizen Information Meetings for Alternatives development were held for the project in April 2012 at two locations along the study corridor, as listed in **Table IV.5**. As required by the Code of Virginia, the meetings were advertised in the local newspapers listed in **Table IV.6**.

Table IV.4: Agency Alternatives Development Meeting

Agency and Locality Name
Advisory Council on Historic Preservation
U.S. Environmental Protection Agency *
U.S. Army Corps of Engineers *
U.S. Coast Guard *
U.S. Department of Agriculture, Natural Resources Conservation Service, Chesapeake Office
U.S. Department of Commerce, National Oceanic and Atmospheric Administration
U.S. Department of Defense, Camp Peary
U.S. Department of Housing and Urban Development
U.S. Department of the Interior, Fish and Wildlife Service
U.S. Department of the Interior, National Park Service, Northeast Region
U.S. Department of the Interior, Office of Environmental Policy and Compliance
U.S. Department of the Navy
U.S. Department of Transportation, Federal Railroad Administration
U.S. Department of Transportation, Federal Transit Administration *
Virginia Department of Mines, Minerals and Energy
James City County
York County
Hampton Roads Transportation Planning Organization *

* Attended Agency Alternatives Development Meeting.

IV. PUBLIC COMMENTS AND AGENCY COORDINATION

Table IV.5: Citizen Information Meetings for Alternatives Development

Date	Location	Number of Attendees
April 25, 2012	City of Newport News	41
April 26, 2012	New Kent County	20
Total Attendees		61

Table IV.6: Advertisement Publications for the Citizen Information Meetings for Alternatives Development

Newspaper	Dates
Richmond Times-Dispatch (City of Richmond)	April 10 and 17, 2012
New Kent Charles City Chronicle (New Kent and Charles City Counties)	April 11 and 18, 2012
Urban News Weekly (City of Richmond)	April 10 and 17, 2012
Daily Press-Virginian Pilot (City of Norfolk)	April 10 and 17, 2012
Virginia Gazette (City of Williamsburg)	April 11 and 18, 2012
Hampton Roads Voice (Hampton Roads)	April 12 and 19, 2012

The Citizen Information Meetings utilized the open house format with display boards depicting Base Conditions traffic and design year 2040 traffic projections, the Alternatives under consideration and the study schedule. A handout was also provided containing project information presented at the meeting. FHWA and VDOT representatives were available to discuss the study and answer questions. In addition to Study Team members answering questions and taking comments, a court reporter was present at each meeting to record oral comments and comment sheets were available for written comments. Comment sheets could be submitted at the meetings or mailed to the Study Team after the meetings. Comments were officially accepted until May 31, 2012.

A total of 43 comments dated on or before the closing date for the formal comment period were received. Thirty-one comment sheets were submitted, two oral comments were recorded at the meetings and 10 letters were received.

C. Location Public Hearings

VDOT, in conjunction with FHWA, held three Location Public Hearings for the purpose of providing the public with the opportunity to review and comment on the **Draft EIS** and the Alternatives under consideration for the study. The Location Public Hearings were held in December 2012 at locations along the study corridor, as listed in **Table IV.7**. As required by the Code of Virginia, the meetings were advertised in local newspapers listed in **Table IV.8**.

Table IV.7: Location Public Hearings

Date	Location	Number of Attendees
December 11, 2012	City of Williamsburg Bruton High School, 185 East Rochambeau Drive	90
December 12, 2012	City of Newport News City Center Conference Room, Fountain Plaza II, 700 Town Center Drive	53
December 13, 2012	City of Richmond Virginia Department of Transportation, Central Office Auditorium, 1201 East Broad Street	83
Total Attendees		226

Table IV.8: Advertisement Publications for the Location Public Hearings

Newspaper	Dates
The Daily Press (Hampton Roads)	November 11, 2012 December 5, 2012
New Kent Charles City Chronicle (New Kent and Charles City Counties)	November 15, 2012 December 7, 2012
Daily Press-Virginian Pilot (City of Norfolk)	November 10, 2012 December 5, 2012
Hampton Roads Voice (Hampton Roads)	November 15, 2012 December 6, 2012
Richmond Voice (City of Richmond)	November 14, 2012 December 5, 2012
Richmond Times-Dispatch (City of Richmond)	November 10, 2012 December 5, 2012
Urban Views Weekly (City of Richmond)	November 10, 2012 December 5, 2012
Virginia Gazette (City of Williamsburg)	November 10, 2012 December 5, 2012

The Location Public Hearings utilized the open house format, which consisted of project specific displays and Study Team members available to address any questions and concerns and to collect information. A handout provided pertinent project information including an insert with a Summary of Potential Impacts for each of the Build Alternatives under consideration. Comments could be submitted in the following formats:

- Comment Sheets.
- Oral Comments (recorded by a stenographer).
- Online (via VDOT's project website).
- Letters.
- E-mail.

IV. PUBLIC COMMENTS AND AGENCY COORDINATION

A summary of the type of and number of public comments received is shown in **Table IV.9**. Eighty-seven of these comments identified a preference for a specific Build Alternative, while 10 preferred the No-Build option. Thirty-nine public comments supported the use of tolls and 49 did not support tolling.

Table IV.9: Format and Number of Public Comments

Format	Number
Comment Sheets	39
Oral Comments	8
Online	39
Letters	8
E-mail	27
Total Comments	121

Comments were also provided on the **Draft EIS** by agencies and localities as shown in **Table IV.10**. Comments received on the **Draft EIS** are included in **Appendix H - Comments on the Draft EIS** of this **Final EIS**.

Table IV.10: Agencies and Localities Providing Comments

Agencies and Localities	Date
U.S. Army Corps of Engineers	January 5, 2013
U.S. Department of the Interior	December 11, 2012
U.S. Environmental Protection Agency	January 7, 2013
U.S. Navy Weapons Station Yorktown	January 2, 2013
Virginia Department of Game and Inland Fisheries	December 7, 2012
Virginia Department of Historic Resources	November 30, 2012
James City County	January 4, 2013
York County	January 2, 2013
City of Newport News	January 4, 2013
City of Richmond	February 13, 2013
Hampton Roads Transportation Planning Organization	December 19, 2013
Richmond Area Metropolitan Planning Organization	February 8, 2013

D. Additional Federal, State and Local Agency Coordination

In addition to the coordination previously discussed, numerous other meetings and coordination efforts were conducted with federal, state and local agencies throughout the study process.

U.S. Department of the Navy

A briefing was held with the U.S. Department of the Navy on January 12, 2012, at the Naval Weapons Station Yorktown. This meeting was held to share information on the study status. Attendees at this meeting included U.S. Navy staff, VDOT’s project manager and the study consultant.

Corps Norfolk District

On April 1, 2011, the Corps Norfolk District provided their initial comments in response to VDOT and FHWA’s notification that they had initiated the study. The Corps was also identified as a cooperating agency in the development of this study.

A briefing was held with the Corps on June 8, 2011, at the James City County Library. The purpose of this meeting was to discuss the goals and methodology for the stream and wetland assessment that would be conducted for this corridor. Attendees at this meeting included the Corps and the study consultants.

A site visit was also conducted with the Corps on August 17, 2011, to review the stream and wetland assessment. Attendees at this site visit included the Corps, VDOT and the study consultants.

State Historic Preservation Office, Virginia Department of Historic Resources

On February 17, 2011, the State Historic Preservation Office (SHPO) was notified that VDOT, along with FHWA, had initiated a study of the I-64 corridor from Interstate 95 in the City of Richmond to Interstate 664 (I-664) in the City of Hampton. The purpose of this letter was to initiate Section 106 consultation in accordance with 36 CFR 800.3. Continued coordination has taken place during the development of the conceptual Alternatives.

On May 21, 2012, VDOT provided the SHPO with copies of two reports, *A Phase I Archaeological Survey of Selected Areas within the Interstate 64 Peninsula Study from Interstate 664 in Hampton to Interstate 95 in Richmond Virginia* and *Archaeological Potential Assessment of the Interstate 64 Peninsula Study from Interstate 664 in Hampton to Interstate 95 in Richmond Virginia*.

These reports were provided to give the SHPO an opportunity to concur with the methodology used for the survey and goals and objectives for identification of historic properties that may be affected by the undertaking in accordance with Section 106 of the National Historic Preservation Act of 1966 and 36 CFR 800.

On July 25, 2012, VDOT provided the SHPO with descriptions of 10 Civil War battlefields that are present along the I-64 study corridor. VDOT requested concurrence with acceptance and use of the American Battlefield Protection Program’s (ABPP) proposed National Register recommendations for the battlefields. VDOT also requested that neither the Big Bethel Battlefield (Virginia Department of Historic Resources (VDHR) No. 114-5297) nor the Oak Grove Battlefield (VDHR No. 043-5079) should be considered historic properties.

United States National Park Service

On April 10, 2012, VDOT and the USNPS met at the Richmond National Battlefield Park to discuss the project. This meeting focused on Civil War battlefields and the ABPP proposed National Register boundaries. The USNPS was also provided an overview of the study, which included the Alternatives, a study schedule and current status.

On April 11, 2012, VDOT and the USNPS met at the Colonial National Historical Park to discuss this project. This meeting also focused on Civil War battlefields, and the ABPP proposed National Register boundaries. The USNPS was also provided an overview of the study, including the Alternatives, a study schedule and current status.

On May 7, 2013, VDOT and the USNPS met at the Colonial National Historical Park to discuss the treatment of the Colonial Parkway and archaeological sites on the USNPS property. The Programmatic Agreement is included in **Appendix K – Programmatic Agreement**.

Commonwealth Transportation Board

On February 20, 2013, VDOT presented a briefing to the Commonwealth Transportation Board (CTB) at their monthly workshop to provide an update on the project and schedule for remaining activities, including the **Final EIS** and a **Record of Decision (ROD)**. The CTB delayed identifying a Preferred Alternative on this project to allow the Hampton Roads Transportation Planning Organization (TPO) and the Richmond Area MPO to identify locally preferred alternatives.

IV. PUBLIC COMMENTS AND AGENCY COORDINATION

At its March 6, 2013 meeting, the Hampton Roads TPO Transportation Technical Advisory Committee recommended Alternative 1A as its locally preferred alternative, with the caveat that Context Sensitive Design be applied, as well as a phased approach (built in fundable segments) for construction of the project.

On April 4, 2013, the Richmond Area MPO passed a resolution identifying Alternative 1B in the **Draft EIS** as its locally preferred alternative, subject to conditions relating to right of way acquisition and design.

On April 17, 2013, the CTB endorsed Alternative 1, General Purpose Widening, as the Preferred Alternative. The CTB, the Hampton Roads TPO, and the Richmond Area MPO resolutions are included in **Appendix J – Resolutions** of this **Final EIS**.

Partnering Meetings

In Virginia, a formal process is in place whereby all EIS and complex Environmental Assessment projects sponsored by FHWA and VDOT are coordinated through a series of Partnering Meetings with federal resource and regulatory agencies. Through this process, federal agencies are afforded an opportunity to provide early and continued input on scoping, purpose and need and concept development. This study was presented to the federal agencies at the following two Partnering Meetings.

August 31, 2010, Partnering Meeting

The purpose of the August 31, 2010, Partnering Meeting was to introduce the study and solicit early input from the agencies. Attendees included representatives of FHWA, VDOT, the U.S. Environmental Protection Agency (USEPA), the Corps and the U.S. Fish and Wildlife Service (USFWS). Topics of discussion included the project schedule, design concepts, possible impacts along the study corridor and funding sources. Agencies had four weeks to provide comments in response to the meeting.

May 22, 2012, Partnering Meeting

The second Partnering Meeting was held on May 22, 2012, to brief the agencies on the status of the study and provide an update on the schedule for the remainder of the process.

Preferred Alternative Coordination with Cooperating Agencies

On June 28, 2013, FHWA and VDOT held a meeting with the I-64 Peninsula Study cooperating agencies to discuss the CTB Resolution; the Preferred Alternative, including the phasing approach; and the next steps for the project. Details from this

meeting can be found in **Appendix I - Coordination in Response to Comments on the Draft EIS** of this **Final EIS**.

Additional Local Agency Coordination Meetings

A project briefing meeting was held on March 26, 2012, to share information on the study status with the interested stakeholders located in and around the eastern section of the study area from the City of Williamsburg to the Exit 264 (I-664) interchange.

Attendees at this meeting included:

- Naval Weapons Station Yorktown and Cheatham Annex.
- City of Hampton.
- City of Newport News.
- City of Poquoson.
- City of Williamsburg.
- James City County.
- York County.
- Hampton Roads TPO.
- VDOT/Study Team.

A project status meeting was held on April 6, 2011, with the Hampton Roads TPO. An additional project meeting was held with the CTB on April 21, 2011. A project status briefing was also held on June 14, 2012, with the Richmond Area MPO.

Following the issuance of the **Draft EIS**, extensive coordination was conducted with the Hampton Roads TPO and the Richmond Area MPO to address their questions and comments. This coordination is included in **Appendix I - Coordination in Response to Comments on the Draft EIS**.

Cooperating Agencies

On February 10, 2011, FHWA invited the following agencies to be cooperating agencies on the study:

- Corps.
- USCG.
- USEPA.
- USFWS.
- USNPS.

All of these agencies are considered cooperating agencies.

Data Requests

Federal, state and local agencies were contacted during the scoping process to gain baseline information on resources within the I-64 study area. Letters were sent to the localities adjacent to the

corridor requesting available data on environmental conditions, park and recreational resources, adjacent projects, planning studies and any other available Geographic Information Systems data. Communication with these agencies continued beyond the scoping process, as needed.

E. Other Public Outreach

Mailing List

A project mailing list was developed following the first Citizen Information Meeting in March 2011. This list included citizens who requested to be notified of future public meetings. This list was updated following the second Citizen Information Meeting and the Location Public Hearing.

Website

Information for the study, including the **Draft EIS** and this **Final EIS**, is made available to the public through the following VDOT's website: http://www.virginiadot.org/projects/hamptonroads/i-64_peninsula_study.asp. Following the initial project introduction, the study information was updated prior to each of the Citizen Information Meetings and the Location Public Hearing. The information provided on the website includes general information regarding the study area corridor and prior to each meeting the website offered specific information presented at the meetings, as well as a comment sheet that could be filled out and sent to the Study Team. The website also includes contact information for VDOT's Project Manager.

Print and Broadcast Media

In addition to specific media markets listed in **Sections A, B and C** of this Chapter, news releases were also issued to additional media markets outside of the study area prior to meetings. These media outlets included:

- Amelia Bulletin Monitor.
- Associated Press-Richmond.
- Brunswick Times Gazette.
- Central Virginia Gazette.
- Chesterfield Observer.
- Colonial Heights Patriot.
- Community Weekly.
- Cox Radio Richmond.
- Crewe-Burkeville Journal.

IV. PUBLIC COMMENTS AND AGENCY COORDINATION

- Dinwiddie Monitor.
- Downtown Short Pump.
- Goochland Courier.
- Goochland Gazette.
- Henrico Citizen.
- Williamsburg-Yorktown Daily.
- South Hill Enterprise.
- Style Weekly.
- Village News.
- Gloucester Gazette.
- Virginia Gazette.
- The Daily Press.
- The Virginian-Pilot.
- Herald Progress.
- Hopewell News.
- K95 Country.
- Kenbridge-Victoria Dispatch.
- Mechanicsville Local.
- Mecklenburg Sun.
- Metro Traffic.
- New Kent Charles City Chronicle.
- Powhatan Today.
- Prince George Journal.
- Prince George Patriot.
- Progress-Index.
- Richmond Free Press.
- Richmond Times-Dispatch.
- Richmond Voice.
- Richmond.com.
- RVAnews.com.
- WTKR-News Channel 3.
- WVEC-TV 13.
- WAVY-TV 10.
- WCVE-National Public Radio.
- WRIC-TV 8.
- WRIR-FM.
- WRVA-AM.
- WTVR-TV 6.
- WWBT-TV 12.

Agency Coordination and Public Involvement During Phased Implementation

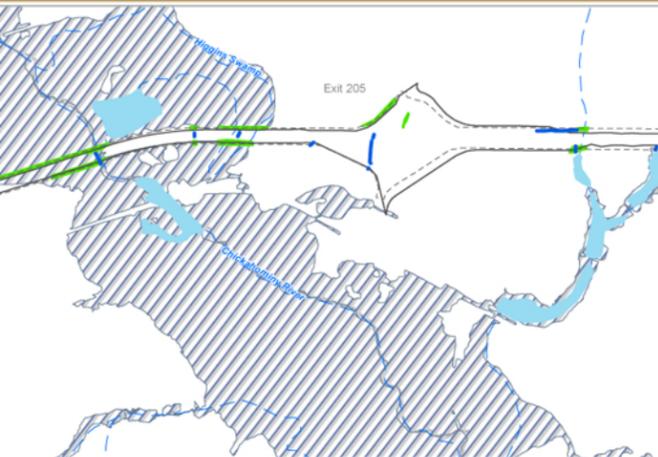
As discussed previously in this chapter, the Preferred Alternative would be implemented via operationally independent sections, utilizing the phased implementation process. Throughout the phased approach, public involvement opportunities would follow the most up-to-date FHWA and VDOT regulations and policies. Currently, FHWA regulations (23 CFR 771.111(h)(3)) state that “...based on the reevaluation of project environmental documents required by CFR 771.129, the FHWA and the State highway agency will determine whether changes in the project or new information warrant additional public involvement.” As an operationally independent section was analyzed in preparation for the issuance of a **ROD**, public involvement opportunities could include: the necessary property notifications needed for any additional field activities; information coordinated through representatives of the Hampton Roads TPO and Richmond Area MPO; and NEPA documentation being made available for public review. During the final engineering design phase, public involvement opportunities could include: citizen information meetings, community meetings, special purpose meetings, and notices for design public hearings or the willingness to hold a design public hearing prior to design approval. In addition, any additional right of way needed would require meetings with individual property owners. During the construction phase, public opportunities could include: community, special purpose and individual meetings, and the use of variable message signs to alert drivers of construction activities. Throughout the development and implementation of phases, project information would be posted on VDOT’s website.

Further coordination would also continue with the cooperating and participating agencies, resource and regulatory agencies, local planning agencies and consulting parties, as necessary, throughout the phased approach for implementing operationally independent sections. Details of this process are outlined in **Appendix L - Phased Approach for Implementation - NEPA Process**.

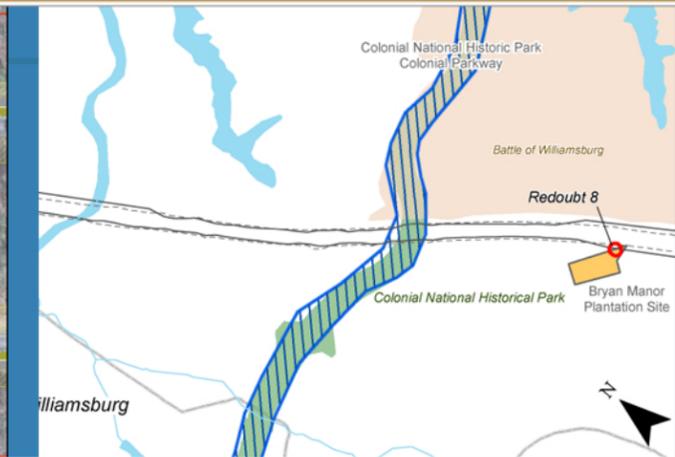


INTERSTATE 64 PENINSULA STUDY

V. COMPARISON of ALTERNATIVES



Category	Resource/Element Assessed
Right of Way and Relocations	Rural (number of parcels)
	Residential/Suburban Low Density (number of parcels)
	Outlying Business/Suburban High Density (number of parcels)
	Central Business District (number of parcels)
Socioeconomic and Environmental Justice	Disproportionate Impacts to Minority and Low Income Populations
	Estimated Lost Tax Revenue (dollars)
	Wetlands Crossed – Tidal (acres within the limits of disturbance)
	Wetlands Crossed – Non-Tidal (acres within the limits of disturbance)
	Other Waters of the US Crossed – Tidal (linear feet within the limits of disturbance)



V. COMPARISON OF ALTERNATIVES

This chapter summarizes the potential impacts to identified resources for each Alternative carried forward for further study for the *Interstate 64 (I-64) Peninsula Study*. As described in **Chapter III - Environmental Resources, Impacts and Mitigation**, detailed analyses were performed for the resources identified along the I-64 project corridor. In addition to the identification of resources, these analyses included addressing the anticipated impacts and mitigation for those impacts for the No-Build Alternative and Build Alternatives.

Table V.1 provides a summary of the impacts per resource for each Alternative included in this **Final Environmental Impact Statement (EIS)**. Impacts were determined based on the potential limits of disturbance footprint from the conceptual design for each of the Build Alternatives. The impacts identified for each of the Build Alternatives provide for the best available estimate of what impacts may result based on the current stage of project development and the level of conceptual engineering investigations.

The studies completed for this 75 mile interstate corridor were conducted at a level appropriate for this stage of project development. The engineering designs for the Alternatives, along with the impact analyses, were completed at a level of detail to allow for comparison between Alternatives and to inform the public, decision-makers, and other stakeholders reviewing the **Draft EIS** and this **Final EIS**. For operationally independent sections, the environmental analysis in this **Final EIS** would be updated as necessary and, provided that the section has met the transportation planning and air quality requirements, the Federal Highway Administration would issue a **Record of Decision** for that section. A detailed description of the phased approach can be found in **Appendix L – Phased Approach for Implementation - NEPA Process** of this **Final EIS**.

As described in **Chapter II – Alternatives Considered, Section D** of this **Final EIS**, Alternative 1 has been identified as the Preferred Alternative. Alternative 1 is within the range of options provided by Alternatives 1A and 1B. Alternative 1 allows the option to widen to the outside of the existing road corridor or within the median of the existing road corridor. The decision on whether to widen to the outside or the inside of the roadway would be made on a section-by-section basis, and the development of these operationally independent sections would be closely coordinated

with the Richmond Area Metropolitan Planning Organization, the Hampton Roads Transportation Planning Organization and other state and federal resource and regulatory agencies.

For this **EIS** analysis, the overall number of lanes that are proposed to be added to the I-64 mainline under Alternative 1 (Preferred Alternative), along with typical sections, is the same as proposed under Alternative 1A and Alternative 1B. Like Alternatives 1A and 1B, Alternative 1 (Preferred Alternative) is designed to keep the proposed improvements within the existing right of way to the greatest extent practicable. As discussed for Alternatives 1A and 1B, confining future improvements to the existing right of way would not always be possible. For the purpose of the impact analysis in this **Final EIS**, Alternative 1 (Preferred Alternative) is assumed to have the same footprint as Alternative 1A. Since Alternative 1A widens to the outside of the existing roadway, this assumption provides the most conservative assessment of environmental impacts in this **Final EIS**.

Once the design phase has been initiated, any widening within the median may also require improvements (such as stormwater management facilities) resulting in potential impacts to resources to the outside of the existing lanes. Conversely, any widening to the outside of the existing lanes may require these same facilities, and potential impacts, within the median.

Additional detail, data and information can be found in **Chapter III - Environmental Resources, Impacts and Mitigation** of this **Final EIS** and in the following technical memorandums and documentation completed for this study:

- *Air Quality Technical Memorandum.*
- *Alternatives Development Technical Memorandum.*
- *Historic Properties Documentation.*
- *Indirect and Cumulative Effects Technical Memorandum.*
- *Natural Resources Technical Memorandum.*
- *Noise Technical Memorandum.*
- *Purpose and Need Technical Memorandum.*
- *Right of Way Technical Memorandum.*
- *Socioeconomic and Land Use Technical Memorandum.*
- *Traffic and Transportation Technical Memorandum.*

V. COMPARISON OF ALTERNATIVES

Table V.1: Summary of Impacts

Category	Resource/Element Assessed	No-Build Alternative	Build Alternatives					
			Alternative 1* General Purpose Widening	Alternative 1A General Purpose Lanes Outside Widening	Alternative 1B General Purpose Lanes Median Widening	Alternative 2A Full Toll Lanes Outside Widening	Alternative 2B Full Toll Lanes Median Widening	Alternative 3 Managed Lanes with General Purpose Lanes
Right of Way and Relocations	Rural (number of parcels)	0	106	106	81	106	81	106
	Residential/Suburban Low Density (number of parcels)	0	418	418	410	418	410	413
	Outlying Business/Suburban High Density (number of parcels)	0	213	213	201	213	201	208
	Central Business District (number of parcels)	0	52	52	51	52	51	52
Socioeconomic and Environmental Justice	Disproportionate Impacts to Minority and Low Income Populations	0	No	No	No	No	No	No
	Estimated Lost Tax Revenue (dollars)	0	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Natural Resources	Wetlands Crossed – Tidal (acres within the limits of disturbance)	0	28	28	28	28	28	28
	Wetlands Crossed – Non-Tidal (acres within the limits of disturbance)	0	38	38	37	38	37	39
	Other Waters of the US Crossed – Tidal (linear feet within the limits of disturbance)	0	3,012	3,012	2,932	3,012	2,932	2,936
	Other Waters of the US Crossed – Non-Tidal (linear feet within the limits of disturbance)	0	109,225	109,225	110,612	109,225	110,612	109,580
	VDEQ 2010 Impaired Waters Crossed (number)	0	9	9	9	9	9	9
	100-Year Floodplains Crossed (acres within the limits of disturbance)	0	21	21	18	21	18	21
	Public Reservoirs Crossed, Including Tributaries (number)	0	5	5	5	5	5	5
	Threatened and Endangered Species Habitat/Populations (number of species with potential habitat within the limits of disturbance)	0	3	3	3	3	3	3
Farmlands	Prime Farmlands (acres)	0	65	65	65	65	65	65
	Farmlands of Statewide Importance (acres)	0	37	37	37	37	37	37
	Agricultural/Forestal Districts (acres)	0	1	1	<1	1	<1	1
Public Parklands	Park Facilities Affected (number)	0	2	2	2	2	2	2
	Use of Park Facilities (acres)	0	34	34	34	34	34	34
Historic Properties	Historic Sites/Districts Affected (number)	0	2	2	2	2	2	2
	Archaeological Sites Affected (number)	0	6	6	6	6	6	6
	Battlefields Affected (number)	0	8	8	8	8	8	8
Air Quality	Conforms to National Ambient Air Quality Standards	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Noise	Common Noise Environments (number)	66	66	66	66	66	66	66
	Residences Impacted (number)	1,262	1,262	1,262	1,190	1,262	1,190	1,156
	Churches/Parks/Schools/Athletic Fields Impacted (number)	5	5	5	5	5	5	4
	Proposed Noise Barriers (number/linear feet)	0	39,376	39,376	39,376	39,376	39,376	37,321
Contaminated Sites	Sites Identified for Further Investigation (number)	0	13	13	13	13	13	13
Visual	Adversely Affected Visually Sensitive Areas	0	0	0	0	0	0	0
Capital Cost**	Cost in Billions (average expressed in year 2017 dollars)	0	\$4.7 - \$7.3	\$4.7 - \$7.3	\$4.7 - \$7.2	\$4.8 - \$7.3	\$4.8 - \$7.3	\$4.7 - \$7.3

*The Preferred Alternative has been identified as Alternative 1. To provide for the most conservative assessment of impacts, Alternative 1 is assumed to have the same footprint as Alternative 1A.