



INTERSTATE 64 PENINSULA STUDY

INDIRECT AND CUMULATIVE EFFECTS MEMORANDUM



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ACRONYMS

BMP	Best Management Practice
CAA	Clean Air Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CEQ	Council on Environmental Quality
CMAQ	Congestion Mitigation & Air Quality Improvement
Corps	United States Army Corps of Engineers
CWA	Clean Water Act
DLPR	Division of Land Protection and Revitalization
EBL	Express Bus Lane
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EJ	Environmental Justice
ESA	Endangered Species Act
ETL	Express Toll Lane
FBFM	Flood Boundary and Floodway Map
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Maps
GIS	Geographic Information System
HAPC	Habitat Area of Particular Concern
HOT	High Occupancy/Toll
HOV	High Occupancy Vehicle
HUC	Hydrologic Unit Code
ICE	Indirect and Cumulative Effects
I-64	Interstate 64
I-664	Interstate 664
I-95	Interstate 95
ISTEA	Intermodal Surface Transportation Efficiency Act
LAFB	Langley Air Force Base
LOS	Level of Service
LWIA	Local Workforce Investment Area
MBT	Migratory Bird Treaty Act
MPO	Metropolitan Planning Organization
NCHRP	National Cooperative Highway Research Program
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NHS	National Highway System
NOAA	National Oceanic and Atmospheric Administration
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
RPA	Resource Protection Area
STRAHNET	Strategic Highway Network
SYIP	Six-Year Improvement Program
TMDL	Total Maximum Daily Load
TPO	Transportation Planning Organization
USFWS	United States Fish and Wildlife Service
VDCR	Virginia Department of Conservation and Recreation
VDGIF	Virginia Department of Game and Inland Fisheries
VDH	Virginia Department of Health

VDOT Virginia Department of Transportation
VDRPT Virginia Department of Rail and Public Transportation
VEC Virginia Employment Commission
VFWIS Virginia Fish and Wildlife Information Service
VWPP Virginia Water Protection Permit

INDIRECT AND CUMULATIVE EFFECTS TECHNICAL MEMORANDUM

The purpose of this assessment is to assess the potential for indirect and cumulative effects that may result from construction of proposed improvements to the Interstate 64 (I-64) study corridor between the City of Richmond and the City of Hampton, Virginia. 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 this *Indirect and Cumulative Effects Technical Memorandum* 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 this memorandum and/or in other technical memorandums and documents prepared for the **I-64 Peninsula Study Environmental Impact Statement (EIS)**. 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.

Future Analysis Updates

This *Indirect and Cumulative Effects Technical Memorandum* evaluates the effects of the No-Build and Build Alternatives analyzed in the **I-64 Final EIS**. The **Final EIS** identifies Alternative 1 as the Preferred Alternative. 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* identified in **Chapter I – Purpose and Need** of the **Final EIS**. An operationally independent section can be built and function as a viable transportation facility even if the rest of the work described in the **Final EIS** is never built, as further discussed in **Appendix L - Phased Approach for Implementation - NEPA Process** of the **Final EIS**. 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 **Record of Decision (ROD)**.

Prior to the issuance of a **ROD** for operationally independent section, the systematic processes utilized for both the indirect effects analysis and the cumulative effects analysis will be reviewed and updated for the particular section in order to quantitatively identify indirect and cumulative effects to the extent practicable. Included in this review and update will be the identification of indirect and cumulative effects as described in **Section I - Analysis of Indirect Effects, Subsection F, Step 5 – Identify Potentially Significant Indirect Effects for Analysis** and in **Section II - Analysis of Cumulative Effects**.

Impacts to the following notable features and resources identified and evaluated in this indirect and cumulative effects assessment will be reviewed and updated as described below:

- **Socioeconomic and Land Use** - Neighborhoods and Community Facilities and Environmental Justice Populations;
- **Natural Resources** - Waters of the United States, Including Wetlands, Water Quality, Floodplains and Threatened and Endangered Species; and
- **Section 4(f) Resources**.

The updated analysis will utilize current data, field conditions and designs, along with engaging in the necessary coordination with the appropriate localities and resource and regulatory agencies. The updated analysis will also adhere to the current federal and state regulations governing these resources.

The efforts for updating the notable socioeconomic and land use elements will include a review of current land use patterns and plans along with a review of current development and available local planning documents. The inventory of neighborhoods and housing communities found in the vicinity of an operationally independent section of the I-64 corridor will be reviewed and updated based on current conditions. Current available census data and American Community Survey data will also be utilized to identify environmental justice populations. The necessary coordination will occur with the appropriate localities and resource and regulatory agencies in updating these efforts. The indirect and cumulative impacts to these elements will then be analyzed and reported before FHWA would issue a **ROD** for that section.

The efforts for updating the notable natural resources elements will include a review of current conditions for Waters of the United States including rivers, streams and tributaries along with area lakes and

reservoirs within the I-64 corridor. Current information will also be obtained for tidal and non-tidal wetland areas prior to the issuance of the required permits for the disturbance of these areas. Current water quality data will also be reviewed for any affected water body along with current available data from the Federal Emergency Management Agency on 100-year floodplains. Current data on any federal and state threatened and/or endangered species or their habitat located within a two-mile radius of an operationally independent section will be reviewed and then the adverse indirect and cumulative effects to these species will be analyzed and reported. Coordination with the resource and regulatory agencies such as, but not limited to, the U.S. Army Corps of Engineers, the United States Environmental Protection Agency, the United States Fish and Wildlife Service, the United States Coast Guard, the National Marine Fisheries Service, the Virginia Department of Environmental Quality, the Virginia Department of Game and Inland Fisheries, the Virginia Department of Conservation and Recreation, Virginia Department of Health, the Virginia Marine Resources Commission, and the Virginia Department of Historic Resources may occur, depending on the natural resources involved in a particular operationally independent section.

Once a **ROD** is issued for an operationally independent section, that section of the *I-64 Peninsula Study* would move into the final engineering design phase. It is during this phase that design details, including the precise disturbance limits, the specific right of way required, the placement of new pavement, and certifications and permits would be prepared and obtained. Certifications and permits would be obtained for items such as: Waters of the United States, including wetlands; navigable waters; coastal zone management areas; and stormwater/erosion and sediment control. Resource and regulatory agencies involved in the certification and permit processes include all of the agencies listed in previous paragraph. Any necessary mitigation measures for direct, indirect, and cumulative effects also would be finalized through coordination with the appropriate agencies, and the NEPA documentation will then be reevaluated to take into account the final impacts and mitigation measures.

Information on Section 4(f) resources will be reviewed, and updated as necessary, in relation to indirect and cumulative effects. As part of this update, the appropriate coordination with the officials with jurisdiction over Section 4(f) resources will be completed and the necessary documentation will be prepared prior to the issuance of a **ROD** for an operationally independent section.

I. Analysis of 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.

A. Methodology

The indirect impact analysis was conducted in accordance with the *Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects*, (National Cooperative Highway Research Program (NCHRP), Report 466, 2002). This report specifies an eight-step process for determining indirect effects, which was used as a guide to assess the potential for indirect effects for the *I-64 Peninsula Study*. The eight steps followed are listed in **Table 1**.

Table 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)

**B. Step 1 - Initial Scoping
Study Area Boundaries**

The first step in the indirect effects analysis includes the initial scoping activities, an assessment of effort required and the identification of the study area in order to set the stage for the remaining steps. As part of the initial scoping process, the study areas for each resource/feature were proposed in order to analyze a full range of potential direct and also indirect effects. Descriptions of the Scoping Process and the Scoping Meetings that were held with the resource and regulatory agencies along with the public can be found in **Chapter IV – Public Comments and Agency Coordination** of the **Final EIS**. In addition, in accordance with the Coordination Plan, participating agencies were given the opportunity to comment on the impact methodologies during the scoping process and none of them submitted any comments on the indirect or cumulative effect analysis.

The geographic limits for the indirect effects analysis were determined to allow for flexibility in the development of the Build Alternatives and to go beyond those used for the direct impact analysis. Therefore, the geographic limits for the analysis for indirect effects reach beyond the defined project study area. Multiple boundaries such as political/geographic boundaries (i.e., planning corridor districts and Census Tracts or Block Groups), commuter shed, and growth boundaries/service area limits were reviewed to determine the appropriate areas for the indirect effects analysis. As described in **Chapter III – Environmental Resources, Impacts and Mitigation of the Final EIS**; the *Socioeconomic/Land Use Technical Memorandum*; the *Natural Resource Technical Memorandum*; the *Air Quality Technical Memorandum*; the *Historic Properties Documentation*; the *Noise Technical Memorandum*; and the *Right of Way Technical Memorandum*, study area boundaries for each resource were individually determined based on study requirements and available data. The study areas for the resources and socioeconomic features for the indirect impact analysis are described as follows.

Resources Study Areas

Multiple resource boundaries were reviewed to assess the effects of each resource for the proposed project. Based on readily available data from federal, state and local sources, the resources were mapped using Geographic Information System (GIS) mapping techniques, and analyzed to determine the potential for indirect effects created by the proposed study alternatives. The resources include: Waters of the United States including wetlands; surface and groundwater supply; floodplains, threatened and endangered species; wildlife and habitat; historic properties; and Section 4(f) resources that include publicly owned parks, recreational areas, wildlife and waterfowl refuges along with historic sites of national, state or local significance.

Socioeconomic Study Areas

Socioeconomic study areas were established to analyze neighborhoods and community facilities; environmental justice; displacements and relocations; economic activity; land use; and parks, recreation areas and open space within the I-64 Peninsula area. The socioeconomic study area for this project is made up of the 72 Census Block Groups that border the I-64 between the Cities of Richmond and Hampton. Census areas, community facilities, Agricultural/Forestral Districts, Prime Farmlands and Farmlands of Statewide Importance were also analyzed.

C. Step 2 – Identify Study Area Direction and Goals

This second step in the indirect effects analysis focuses on assembling information regarding general trends and goals within the study area. The trends and goals in question are independent of the proposed transportation project and typically concern social, economic, ecological, and/or growth-related issues.

According to the NCHRP Report 466, evidence indicates that transportation investments result in major land use changes only in the presence of other factors. These factors include supportive local land use policies, local development incentives, availability of developable land, and a good investment climate. An understanding, therefore, of community goals, combined with a thorough knowledge of demographic, economic, social, and ecological trends is essential in understanding the dynamics of project-influenced changes in development location. Later in the 8-step process, it will also be important to compare study area goals with potential impacts. Conflict between impacts and goals is a key determinant of impact significance and an indicator of effects that merit further analysis. The following sections describe the I-64 corridor along with the existing and planned land use in the immediate areas in order to provide insight as to the direction and goals for the area.

1. The I-64 Corridor

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 is an east-west route through the middle of Virginia, connecting the Norfolk/Hampton Roads and Richmond metropolitan areas in the study corridor. In addition to being a link between urban areas, I-64 serves as:

- A daily commuting for residents and business trips,
- Access to tourist attractions throughout the region,
- Access to, from and between military facilities,
- A route for freight in and out of the Port of Virginia, and
- An emergency evacuation route, particularly during hurricane events affecting the Hampton Roads region.

Within the study corridor, there are 25 interchanges and 109 major bridge structures on or over the Interstate. There are several park and ride lots near interchanges in the study 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 and 205. The study corridor is also paralleled by a CSX railroad, which supports two daily round-trip Amtrak passenger rail operations between Richmond and Newport News.

2. Demographic and Employment Patterns

Population

Table 2 provides a detailed summary of the historic population changes in the socioeconomic study area and the surrounding jurisdictions. Henrico County, New Kent County, James City County and York County all experienced population growth of over 40% between 1990 and 2010. The Cities of Richmond, Newport News, and Hampton saw much smaller increases in population (below 7%) during the same time period. This trend reveals that the more rural areas are growing more quickly than the urban areas, which are more densely developed already.

Due to changes in Census boundaries in the last couple of decades, an accurate comparison of population in the socioeconomic study area cannot be provided. The 2010 population of 128,964 represents new Census Tracts and Block Groups; the 2000 Census Block Group boundaries included less area. Boundaries would have been even more different in 1990. Therefore, the percentage growth was calculated between 2000 and 2010 not 1990 to 2010. If you compare the annual rate of population growth between the socioeconomic study area (approximately 5.2%) and the other areas (ranging from nearly 0% to 3.3%), it is evident that the I-64 corridor has grown more quickly than the region as a whole.

Though the design year is 2040, The Virginia Employment Commission (VEC) currently only projects population to 2030. The VEC projects that all localities, except the City of Richmond, would experience an increase in population through the year 2030. Compared to the entire State of Virginia, with a 22.8% increase in population from the year 2010 to the year 2030, the counties would see considerably more growth in population as compared to the cities. This is most likely because the Cities of Richmond, Newport News and Hampton are urbanized, particularly near the interstates. **Table 3** includes a summary of the projected populations for the surrounding cities and counties.

Table 2: Historic Population Trends, 1990-2010

Area	1990	2000	2010	Percent Change from 1990 to 2010
Richmond City	203,056	197,790	204,214	0.6%
Henrico County	217,881	262,300	306,935	40.9%
New Kent County	10,445	13,462	18,429	76.4%
James City County	34,859	48,102	67,009	92.2%
York County	42,422	56,297	65,464	54.3%
Newport News City	170,045	180,697	180,719	6.3%
Hampton City	133,793	146,437	137,436	2.7%
Socioeconomic Study Area	N/A	*77,919	*128,964	*65.5%
Virginia	6,187,358	7,079,030	8,001,024	29.3%
United States	248,709,873	281,421,906	308,745,538	24.1%

*Note: Census boundary changes from 2000 to 2010 do not allow for accurate comparison of data for the study area. The 2010 study area population numbers reflect new tracts and block groups, and a shorter time frame.

Source: Virginia Employment Commission, U.S. Census Bureau (socioeconomic study area)

After evaluating the population projection changes between 2010 and 2030, all areas except for Richmond are expected to increase in population. Additionally, the population growth anticipated in Newport News and Hampton is lower than in the other areas. Since the projections seem to mirror the historic trends to a certain degree, it is reasonable to assume that population growth would continue in a similar manner (for each area) from 2030 to 2040, with most of the growth occurring in Henrico, New Kent, James City and York Counties. Less growth would be expected at the termini (cities).

Table 3: Projected Population, 2010-2030

Area	2010	2020	2030	Percent Change from 2010 to 2030
Richmond City	204,214	187,066	187,066	-8.4%
Henrico County	306,935	339,703	379,041	23.5%
New Kent County	18,429	23,671	29,496	60.1%
James City County	67,009	82,781	100,294	49.7%
York County	65,464	76,376	86,823	32.6%
Newport News City	180,719	182,415	183,372	1.5%
Hampton City	137,436	144,655	144,650	5.3%
Socioeconomic Study Area	128,964	N/A	N/A	N/A
Virginia	8,001,024	8,917,396	9,825,019	22.8%
United States	308,745,538	341,387,000	373,504,000	21.0%

Source: Virginia Employment Commission

The Newport News area’s main industries include shipbuilding, military and aerospace. Newport News’ location, along with its rail network has provided advantages for the City. The City houses two industrial parks, which enable manufacturing and distribution to take root in the City. As technology-oriented companies thrived in the 1990s, Newport News became a regional center for technology companies.

Employment

The greater Richmond area is a magnet for labor, drawing workers from more than 40 localities. The diverse employment includes 11 Fortune 1000 company headquarters, Fifth District Federal Reserve, Fourth Circuit U.S. Court of Appeals, Virginia State Capital, financial and information technology services, and higher education.

The City of Hampton is included in the Hampton Roads area of Virginia and its economic base is largely port-related, including shipbuilding, ship repair, naval installations and manufacturing. The harbor of Hampton Roads is an important highway of commerce, especially for the City of Norfolk, Hampton, Portsmouth and Newport News. The City of Hampton is also home to NASA Langley Research Center, and the country’s largest naval facility is located in the Hampton Roads area.

The large military presence in Hampton Roads and throughout the Tidewater area, with each branch of the armed forces represented, contributes over 11 billion dollars into the local economy annually. Located at the eastern end of the I-64 study corridor, the Hampton Roads area has the world's largest naval facility. The Navy owns 36,000 acres and more than 6,750 buildings in the area. The Hampton Roads area has been divided into five sub-areas; Norfolk, Little Creek, Portsmouth, Newport News and Yorktown. These installations serve as homeports for approximately 127 ships and 29 aircraft squadrons. Together they comprise the Navy in Hampton Roads.

There are a number of naval commands in the Hampton Roads area, including the Naval Station Norfolk; Norfolk Naval Shipyard, Portsmouth; Fleet Combat Training Center Atlantic, Dam Neck; Naval

Amphibious Base, Little Creek; and Naval Weapons Station, Yorktown; Naval Air Station, Norfolk; Naval Air Station, Oceana. Located at these installations are hundreds of commands, large and small, afloat and ashore. Other military facilities within the corridor include Langley Air Force Base, Fort Eustis Military Reservation and Camp Peary Naval Reservation.

Overall, there are some 108,000 Navy and Marine Corps personnel currently stationed in the area, and the Navy employs more than 41,000 civilians. There are more than 23,000 retired Navy men and women living in Hampton Roads, and approximately 118,300 dependents of active duty, and civilian personnel. The total Hampton Roads Navy community numbers some 318,000 people, which is about 20% of the region's population.

Table 4 presents the employment trends for the surrounding areas of the project between 2000 and 2010. Similar to population trends, employment trends show increases of more than 16% in the counties (Henrico, New Kent, James City and York) and smaller increases of less than 9% within the cities (Richmond, Newport News and Hampton). New Kent County and James City County saw the most increase in employment at 30.8% and 38.8%, respectively.

The VEC divides the State of Virginia up into Local Workforce Investment Areas (LWIA) for demographic analysis. The study corridor crosses through LWIA IX and LWIA XIV. Local Workforce Investment Area IX includes the counties of Hanover, New Kent, Henrico, Charles City, Chesterfield, Powhatan, Goochland and the City of Richmond. Local Workforce Investment Area XIV includes the counties of James City and York and the cities of Williamsburg, Hampton and Newport News. The VEC projects employment data through 2018 for each of the LWIAs. Projections are not available beyond 2018. It is essential to analyze the projections in these areas in order to understand future employment trends in the project area. **Table 5** presents employment projection for 2018.

Table 4: Employment, 2000 and 2010

Area	Number in Labor Force			Percent in Labor Force		
	2000	2010	Percent Change	2000	2010	Percent Change
Richmond City	99,009	108,481	9.6%	62.4	65.2	2.8%
Henrico County	143,197	166,888	16.5%	70.0	71.0	1.0%
New Kent County	7,282	9,526	30.8%	69.6	67.2	-2.4%
James City County	23,128	32,091	38.8%	60.5	61.7	1.2%
York County	29,669	34,815	17.3%	70.9	69.5	-1.4%
Newport News City	92,586	100,378	8.4%	68.3	70.7	2.4%
Hampton City	71,790	73,527	2.4%	62.4	66.4	4.0%
Virginia	3,694,663	4,256,506	15.2%	66.8	66.7	-0.1%
United States	138,820,935	156,966,769	13.1%	63.9	64.4	0.5%

Source: U.S. Census Bureau

Both LWIAs are expected to have an increase in employment between 2008 and 2018. The LWIA IX is estimated to see a 13.5% increase and the LWIA XIV is projected to experience a 12.2% increase overall. Both LWIAs are expected to see the highest increases in employment in the healthcare, professional/technical, and educational service industries. Based on this data, we can reasonably assume that employment in the EIS corridor would continue to increase through 2018 and most likely beyond.

Table 5: Employment Projections, 2008-2018

LWIA	Employment		
	2008	2018	Percent Change
Local Workforce Investment Area IX	568,779	645,506	13.5%
Local Workforce Investment Area XIV	254,560	285,522	12.2%

Source: Virginia Employment Commission

3. Land Use Patterns and Plans

The *I-64 Peninsula Study* corridor is made up of a variety of land use types. From the urban areas surrounding the Cities of Richmond, Williamsburg, Newport News and Hampton to the more suburban and rural areas of New Kent, York and James City Counties, there are numerous opportunities for economic development. These opportunities occur in vacant lands along with the re-use of existing developed areas adjacent to the I-64 corridor, in and around the 25 interchange locations and throughout the region.

One measure of the potential for growth and future development is the availability of community sewer and water service areas, which was evaluated during the preparation of the *Socioeconomic/Land Use Technical Memorandum*. The majority the I-64 corridor (if not all) between the Cities of Richmond and Hampton is served by water and sewer. A general search did not reveal any issues with water capacity or sewer capacity, suggesting that there is capacity available for future development.

Water and sewer facilities in the vicinity of the proposed project corridor are owned and operated by various utility departments. The City of Richmond provides water and sewer service within the City, and provides water to Henrico County under a wholesale contract. Henrico County provides water and sewer in portions of the County. Similarly, New Kent County provides water and sewer service to prime economic development areas, including the four interchange areas of I-64 in the County. The James City Service Authority and Newport News Waterworks supply water within James City County (including the I-64 interchange areas), and the Hampton Roads Sanitation District provides sewer treatment to James City County. The Newport News Waterworks is a regional water supplier that also provides water to York County, Newport News and Hampton. York County is extending the sewer system, but the Hampton Roads Sanitation District provides sewer treatment for York County (including along I-64), Newport News and Hampton.

As Virginia’s overall population has grown, numerous developments along the I-64 corridor and within the region have continued to add more traffic to the roadways and interstates in the area. In addition, economic development occurring as a result of the proposed Port growth throughout the Tidewater area, along with growth to the numerous tourist attractions and destinations within the I-64 corridor and the region, have continued to attract visitors to this part of Virginia serviced by I-64.

As described below, each local government within the area has established plans and visions for future development to help manage their growth and focus future development into areas that can support new development or are in need of redevelopment and away from areas that cannot support new growth. By focusing future growth and supporting alternatives, the region would be able to grow in a manner that promotes continued access and mobility and that enhances the quality of life for residents and employees.

City of Richmond

According to the *Richmond Master Plan (2000-2010)*, Richmond is almost completely developed, with 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 numerous 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* Comprehensive Plan 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. 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 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 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 important corridors. A goal for Henrico is to prevent vacant retail structures and encourage redevelopment. Civic uses include locations for new and existing government facilities, schools, churches, hospitals and the like.

New Kent County

Land use in New Kent County is clustered, with commercial centers, government and institutional uses all centered around residential areas. 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 and environmental buffers.

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 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. 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. 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. 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; plan for efficient growth; balanced and sustainable mixes of land use; efficient land use patterns; and revitalize historic Downtown Newport News.

City of Hampton

The Hampton *Community Plan* discusses existing and future land use for the City. Hampton has experienced a substantial amount of population growth and land development since the consolidation of Hampton, Elizabeth City County, and the town of Phoebus in 1952. The City is nearly fully developed. Infill development, redevelopment, and revitalization of existing developed areas would be the main source of growth and change within Hampton. 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. Two military bases occupy 14% of the City's land: 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 of the city close to the Base to ensure Langley's continued existence in the City. Hampton's low inventory of vacant, developable land would continue to have important implications for revenue growth, service requirements, and future community development strategies. It is expected that infill, redevelopment, and revitalization of existing development would be the main source of growth and change within the City. The City'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.

4. Environmental Regulations

Growth is a necessary process that contributes to the economic vitality of communities. However, growth and resulting development can present challenges to protection of the environment that the community depends on. Federal, state and local governments have come to recognize the connection between livability, economic vitality and environmental protection. As a result, plans, ordinances and regulations have been implemented that help provide direction for growth without undermining the quality of our

environment. The following is a summary of key plans, ordinance and regulations that have been put in place to specifically address the effects that growth and development may have on environmental resources.

Federal

There are many federal regulations intended to protect, enhance, and rehabilitate the natural and human environments. Below is a listing of some of those regulations, following by a brief summary of those that are most pertinent to this analysis:

General Environmental Statutes

- National Environmental Policy Act,
- Section 4(f), DOT Act,
- Economic, Social and Environmental Effects,
- Uniform Act (Acquisition and Relocation),
- Title VI, Civil Rights,
- Executive Order - Environmental Justice, and
- Historic Bridges.

Health

- Safe Drinking Water Act, and
- Solid Waste Disposal Act.
- Historical and Archeological Preservation
- Section 106, National Historic Preservation Act,
- Section 110, National Historic Preservation Act,
- Archeological and Historic Preservation Act,
- Archeological Resources Protection Act,
- Preservation of American Antiquities,
- American Indian Religious Freedom Act, and
- Native American Grave Protection and Repatriation Act.

Land and Water Usage

- Wilderness Act,
- Wild and Scenic Rivers,
- Land and Water Conservation Fund Act (Sec 6(f)),
- Executive Order 11990 Protection of Wetlands,
- Emergency Wetlands Resources Act of 1986,
- National Trails Systems Act,
- National Recreation Trails (ISTEA),
- Rivers and Harbors Act (Sec. 9 and Sec. 10),
- Federal Water Pollution Control Act (Sec. 404),
- Executive Order 11988 - Floodplain Management,
- National Flood Insurance,
- Marine Protection Research and Sanctuaries Act,
- Coastal Zone Management Act,
- Coastal Barrier Resources Act,
- Farmland Protection Policy Act,
- Resource Conservation & Recovery Act (Hazardous Waste),
- Superfund (Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)),

- Endangered Species Act,
- Fish and Wildlife Coordination Act, and
- Migratory Bird Treaty Act.

Air Quality

- Clean Air Act (Conformity),
- Clean Air Act (Sanctions), and
- Congestion Mitigation & Air Quality Improvement.

Section 404, Clean Water Act: Section 404 of the CWA regulates the discharge of dredged, excavated, or fill material in wetlands, streams, rivers, and other U.S. waters. The United States Army Corps of Engineers (Corps) is the federal agency authorized to issue Section 404 Permits for certain activities conducted in wetlands or other U.S. waters. Depending on the scope of the project and method of construction, certain activities may require this permit. This permit would require the discussion of the measures employed throughout planning and design in order to avoid/minimize effects to “waters of the U.S.” The Section 404 permit application would also include a compensatory mitigation proposal, which outlines the plan to provide compensation to offset permanent losses of Waters of the U.S.

Executive Order 11990: Protection of Wetlands: This Executive Order implements avoidance of direct or indirect support of new construction in wetlands wherever there is a practicable alternative. It requires that all impacts be thoroughly evaluated that impacts be mitigated.

Federal Emergency Management Agency (FEMA) No-Rise Certification: Any project in a floodway must be reviewed to determine if the project would increase flood heights. An engineering analysis would be conducted and a permit would be applied for if required. The community's permit file would record the results of this analysis, which can be in the form of a No-Rise Certification. The supporting technical data would be based on the standard step-backwater computer model used to develop the 100-year floodway shown on the Flood Insurance Rate Map (FIRM) or Flood Boundary and Floodway Map (FBFM). Any proposed projects that would result in effects to a designated floodplain would be required to meet FEMA requirements. A No-Rise Certification would be obtained if it is determined that the proposed project would not cause an increase in flood elevations at these locations. Coordination and approval with the Local Floodplain Administrator would also be required as part of this process.

Coastal Zone Management Act: This act preserves, protects, develops, and (where possible) restores and enhances resources of the coastal zone. It is applicable to all projects significantly affecting areas under the control of the State Coastal Zone Management Agency for which a plan is approved. Projects must comply with federal consistency regulations, management measures, and the appropriate approved state plan for Coastal Zone Management Programs.

Safe Drinking Water Act: Ensures public health and welfare through safe drinking water. The Safe Drinking Water Act regulates actions which may have a significant impact on an aquifer or wellhead protection area which is the sole or principal drinking water.

National Historic Preservation Act: Section 106 of the National Historic Preservation Act is intended to protect, rehabilitate, restore, and reuse districts, sites, buildings, structures, and objects significant in American architecture, archeology, and culture. It directs that impacts to such facilities be avoided or that damages be mitigated to the greatest extent possible.

Farmland Protection Policy Act: The Farmland Protection Policy Act was implemented to minimize impacts on farmland and maximize compatibility with state and local farmland programs and policies. It requires coordination with the state offices of the Natural Resources Conservation Service.

State

The State of Virginia has a series of rigorous environmental plans that are implemented at both the state and local levels, including:

- Virginia Waste Management Act,
- Virginia Air Pollution Control Law,
- Virginia Stormwater Management Program,
- Chesapeake Bay Preservation Act, and
- Chesapeake Bay 2000 Agreement.

A few of these environmental plans are elaborated on as follows.

Waste Management: The Division of Land Protection and Revitalization (DLPR) is responsible for implementing the Virginia Waste Management Act, as well as meeting Virginia's Resource Conservation and Recovery Act (RCRA) and CERCLA obligations as mandated by federal policy. Under these directives, the DLPR regulates solid and hazardous waste; oversees cleanup of contaminated sites; facilitates revitalization of environmentally distressed properties; monitors groundwater resources; conducts inspections of aboveground and underground storage tank systems; etc.

Air Pollution: The Department of Environmental Quality's Air Division oversees implementation of the Virginia Air Pollution Control Law, as well as ensuring federal obligations of the Clean Air Act are met. These two regulations ensure that projects conform to state and federal requirements, covering things such as industrial facilities and mobile sources (vehicle emissions). The Air Division: develops and implements programs to ensure that Virginia meets air quality standards; regulates the emission of air pollutants from facilities; monitors air quality; and develops rules to govern air quality standards.

Stormwater Management: Virginia's Stormwater Management Program requires that erosion and sediment control, as well as stormwater, be controlled during land disturbing activities and that appropriate permits be acquired. While the State provides oversight, erosion and sediment control permits are typically administered by the local municipality, and stormwater permits are administered by the Virginia Department of Conservation and Recreation (VDCR).

Water Quality: The Chesapeake Bay is a significant regional water resource and the State of Virginia realizes that it is necessary for all counties and municipalities within the Tidewater to cooperatively protect it. As such, the Chesapeake Bay Protection Act was enacted to effectively balance development and water quality protection. Through the act, all counties and municipalities are required to incorporate general water quality protection measures into their respective comprehensive plans and zoning ordinances.

Land Conservation: The Chesapeake Bay 2000 Agreement established a land conservation goal of protecting 20% of the Chesapeake Bay Watershed by 2010. As part of that, the VDCR maintains a database of Virginia Conservation Lands, including state, federal, private and locally managed lands and conservation easements. Of the total estimated land area of Virginia, approximately 15% is currently (2010) protected. Within the Chesapeake Bay watershed, Virginia is currently (2010) protecting over 2 million acres, or approximately 19%, of lands in the watershed.

Local

Each of the local municipalities/counties within the project corridor also has thorough environmental plans. For example:

City of Richmond: As the largest city within the project corridor, the City of Richmond has robust environmental plans. Recognizing that the James River is vital to the City of Richmond and taking much pride in this resource, the City of Richmond has developed several programs by which to protect and improve it. One of these is the James River Park Conservation Easement, established in 2009. This easement permanently conserves nearly 300 acres of property in the James River Park System from future development. Additionally, the City of Richmond is acquiring green space along the river for public access and recreational opportunities. The James River and other natural resources have also been key elements of the Downtown Master Plan. The City of Richmond is in the process of developing the Richmond Riverfront Plan; and a key goal of this plan is to promote a sustainable riverfront along the James River. Also through the Downtown Master Plan, the City has developed the Urban Tree Canopy, which the City is working on to reinvigorate with tree programs such as adopt-a-tree. The Urban Forestry Commission was also established to improve the City's urban forestry resources, protecting them through policy, development and education. Protecting the existing tree canopy, as well as increasing it would help to improve water quality, air quality, provide wildlife habitat and provide aesthetic benefits.

To control and direct development and redevelopment the City of Richmond has taken proactive measures in that regard as well, including the Richmond Zoning Ordinance, which is intended, among other things, to:

- Lessen congestion in streets,
- Promote health, sanitation and general welfare,
- Provide for adequate light, air and convenience of access,
- Prevent the overcrowding of land,
- Avoid undue concentration of population,
- Facilitate the creation of a convenient, attractive and harmonious community, and
- Protect against destruction of or encroachment upon historic areas.

Henrico County: Henrico County, where Richmond (described above) is the county seat, also has many environmental programs and policies that complement and supplement those found in the City of Richmond, as well as surrounding towns and cities. Some of these programs and policies include:

- Erosion and sediment control,
- Best Management Practices,
- Chesapeake Bay Preservation Program,
- Wetland protection,
- Stormwater management,
- Watershed management, and
- Septic System management.

Land in Henrico County drains to two major watersheds; namely, the Chickahominy and the James River watersheds. As such, Henrico County has established Resource Protection Areas (RPAs), which are corridors that lie alongside or near the shorelines of streams, rivers and other waterways. RPAs are important to protecting water quality as they filter pollutants, reduce stormwater runoff, and prevent erosion. All land disturbing activities in Henrico County must comply with the provisions of the County's Erosion and Sediment Control Program. It is a locally implemented program that focuses primarily on construction activities, namely building houses, subdivisions, shopping centers and roads; and is required

by the State of Virginia's Erosion and Sediment Control Law. Henrico County's Erosion and Sediment control policies are intended to minimize sediment, reducing water pollution, flooding, stream channel degradation, groundwater impacts, slope failures and damages to downstream properties. To that end, they take measures to preserve existing vegetation and minimize the amount of land disturbance; as well as implementing measures such as silt fencing, sediment basins, temporary and permanent seeding, etc.

To capture a broader area than just specific projects, Henrico County also adopted a watershed management approach intended to improve water quality and address water quality requirements for the watersheds located in the county. This program includes stream restoration, channel protection, buffer establishment, regional stormwater controls and educational programs. Streams within Henrico County have been categorized as "good", "fair", or "poor"; and the county has been divided into four watershed management areas for preservation, enhancement, restoration and urban management.

New Kent County: New Kent County has several divisions/departments dedicated to environmental protection and land use planning. Two of them are the New Kent County Environmental Division and the New Kent County Planning Division. The Environmental Division promotes collaboration between the built, natural and human environments. The division is responsible for several programs, including:

Chesapeake Bay Preservation, a local implementation of Virginia's Chesapeake Bay Preservation Act, Enforcement of rules and regulations mandate to New Kent County by the VDCR, Virginia Department of Environmental Quality, Virginia Marine Resource Commission, and the Corps, and Erosion and Sediment Control, including inspection of commercial and residential sites; issuing commercial and residential land disturbance permits; local implementation of the State of Virginia's Erosion and Sediment Control Program; and reviewing plans for erosion and sediment controls. The Planning Division is responsible for developing and recommending growth management strategies and ensuring that growth in New Kent County occurs through constructive land use development practices. The Planning Division:

- Assists in preparing New Kent County's Capital Improvement Program,
- Develops, reviews and updates New Kent County's comprehensive plan and development ordinances,
- Processes and reviews rezoning applications, conditional use permits, variances, site plans, etc.,
- Provides demographic and economic data and projections, and
- Provides recommendations on land use matters presented to the planning commission and Board of Supervisors.

James City County: With its rich history, desirable coastal location, and job opportunities, James City County remains a popular place for growth and economic development. To that end James City County has several avenues by which land use and environmental controls are implemented. For example, James City County's Engineering and Resource Protection Division oversees the implementation of Best Management Practices, erosion and sediment control requirements, drainage standards, stormwater criteria, etc. Likewise, the James City County Planning Division reviews rezoning, special use permits, and the like; and makes planning-related policy recommendations to the Planning Commissions.

York County: The responsibilities of York County are similar to those of the counties/cities described previously in this section. Key duties include, but are not limited to:

- Managing the Chesapeake Bay Act program for the county,
- Managing the erosion and sediment control program,
- Managing the floodplain program,

- Reviewing and approving site and development plans,
- Reviewing permits for zoning code compliance, and
- Issuing building construction permits.

As evidenced by the above-list, water quality and land development are a strong focus of York County. One of the key requirements of the Chesapeake Bay Act is a 100 foot vegetated buffer along streams and wetlands within the County, intended to protect and enhance the water quality of Chesapeake Bay.

City of Newport News: The City of Newport News developed a long range plan, *Framework for the Future 2030*, designed to guide growth and development over the next two decades. Among its many charges, the comprehensive plan sets goals for development and future land uses in the City of Newport News. It strives to:

- Organize the City's land use plan and zoning regulations to ensure compatible development,
- Address traffic congestion,
- Protect the environment,
- Protect the reservoir watershed,
- Provide parks and recreation,
- Maintain a balanced, economically sustainable mix of land uses, and
- Create an efficient and organized land use pattern in the City.

To achieve these goals, the City of Newport News is improving the City's Zoning Ordinance; continually revising the City's Site Plan Ordinance; and protecting vacant sites remaining in the City for uses identified in the land use plan.

The comprehensive plan also includes many environmental goals, including to:

- Surpass federal air quality standards,
- Improve the water quality of the James River, its tributaries and ultimately the Chesapeake Bay,
- Redevelop the City in a manner that improves the water quality of the James River and its tributaries, and
- Preserve and protect the natural features and environment of Newport News that are intrinsic to water quality.

The City of Newport News has implemented several policies to achieve these goals. Relative to air quality, the comprehensive plan promotes the use of mass transit and car pools, and reducing the use of single occupancy vehicles. To improve the water quality of the James River, its tributaries and the Chesapeake Bay, the City of Newport News is using a regional approach for storm water management and is developing pollution prevention measures, BMP removal techniques and other measures to control the quantity and quality of stormwater discharge. Land development ordinances are carefully reviewed and revised when necessary to decrease the quantity and increase the quality of stormwater runoff. To achieve the requirements of the Chesapeake Bay Preservation Act, the City of Newport News continues to promote the minimization of impervious cover, retaining indigenous vegetation and allowing no more land to be disturbed than is necessary. Enforcement of the City of Newport News' Erosion and Sedimentation Control Ordinance and other ordinances are also keys to the success of the comprehensive plan.

City of Hampton: The City of Hampton's *Community Plan* includes elements key to responsible land development and environmental strategies. One of the top priorities is to preserve the water quality of the Chesapeake Bay and its tributaries. Like the other municipalities described herein, the City of Hampton

is held to the requirements of the Chesapeake Bay Preservation Act. As such, the City of Hampton requires that all development address the issue of water quality through thoughtful site planning and stormwater management. The City of Hampton's detailed Stormwater Management Ordinance assists in this by including guidance for completing stormwater management plans and water quality impact assessments; and includes guidance for Best Management Practices (BMP). Additionally, all new development must occur no closer than 100 feet from tidal waters; tidal wetlands; tributary streams; and nontidal wetlands that connect to tidal waters. The proposed Primary Sand Dune Ordinance would prohibit development along the dune of the Chesapeake Bay; and public land along the Chesapeake Bay shoreline may be acquired through easement or purchase for protection from further development.

D. Step 3 – Inventory Notable Features

The environmental screening conducted as part of the *I-64 Peninsula Study* can be used as a tool to identify notable features, or specific valued, vulnerable, or unique elements of the environment. The study corridor contains notable human and natural environment features that were inventoried and described in more detail throughout **Chapter 3 – Environmental Resources, Impacts and Mitigation of the Final EIS** and in the **Technical Memorandums** prepared for the I-64 Peninsula Study. The objective of this step of the process is to identify specific environmental issues within the indirect effects analysis study area against which the project may be assessed. The following are the notable features identified.

1. Socioeconomics and Land Use

Neighborhoods and Community Facilities

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, City of Newport News and 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 and Newport News and 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 6** includes facilities located within a 500 foot buffer of existing right of way on either side of I-64.

Environmental Justice

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.

2. Natural Resources

Waters of the United States, Including Wetlands

The *Natural Resources Technical Memorandum* is the source of information for the natural resources identified here and below. Major rivers along the study corridor include the Shockoe Creek,

Chickahominy River, Boar Swamp, Rumley Marsh, Diascund Creek, Beaverdam Creek, Wahrani Swamp, Queen Creek, and Newmarket Creek. Numerous smaller tributary drainages to these major systems cross the study corridor. Additionally, a number of wetlands and non-tidal and tidal surface water systems (including both wetlands and stream channels) are located along the study corridor. Many of these systems have already been altered/affected by the interstate.

Seven reservoirs are located in the vicinity of the study corridor. Diascund Creek Reservoir is located in New Kent County south of the study corridor, near Exit 220 (West Point). Little Creek Reservoir is located in James City County south of the study corridor, near Exit 231 (Croaker/Norge). Waller Mill Reservoir, which is surrounded by Waller Mill Park and is the City of Williamsburg’s major source of treated waters, is located in York County, south of the mainline, east of Exit 234 (Lightfoot). Skiffes Creek Reservoir is located in the City of Newport News, just south of the mainline near Exit 247 (Yorktown). The study corridor directly crosses the Lee Hall Reservoir (also referred to as the Newport News Reservoir) east of Mile Marker 294. The Harwoods Mill Reservoir is located in the City of Newport News north of the study corridor, near Exit 256 (Victory Boulevard). Big Bethel Reservoir is located in York County and the City of Newport News, north of the mainline, near Exit 258 (J Clyde Morris Boulevard).

Table 6: Community Facilities

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	2 nd Street and 4 th 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 N. 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 29 th Street	City of Richmond

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

A number of stream systems and other water bodies, including reservoirs, in the vicinity of and draining from the study corridor have been listed as impaired in the 2010 Integrated Report. Of those listed, nine surface waters that fall within the study corridor have been listed as impaired (Categories 4 and/or 5) waters. In addition, according to the 2010 Integrated Report, a number of the systems and tributaries both within and in the vicinity of the study corridor are under Virginia Department of Health (VDH) Fish Consumption Advisories. These advisories result from elevated levels above the state standards for the listed contaminant potentially associated with human health concerns.

Water Quality

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

Table III.E.6 of the **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 the **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.

Floodplains

The I-64 corridor crosses numerous stream systems within the Federal Emergency Management Association (FEMA) mapped 100-year floodplain. FEMA designated 100-year floodplains are located along the following waterways:

- Gillies Creek and an unnamed tributary,
- Boar Swamp and an unnamed tributary,
- 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,
- Kings Creek, and
- Blows Mill Run.

Threatened and Endangered Species

The *Natural Resources Technical Memorandum* identified ten federal and state threatened and/or endangered species or their habitat located within a two mile radius of the 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 Harger's fimbriatilis. 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 study corridor, in addition to the assessed potential habitat areas for small whorled pogonia conducted as part of the I-64 Peninsula Study.

3. Section 4(f) Resources

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. These resources include nine parks or recreational facilities including: the Colonial National Historic Park, Newport News Park, Bluebird Gap Farm, Criss Cross Park, Waller Mill Park, Skiffes Creek Park, Stoney Run Park, Beechlake Park and Sandy Bottom Park. In addition, eight historic battlefields, eight historic districts or architectural sites, and two archaeological sites were also identified.

E. Step 4 – Identify Impact-Causing Activities

Steps 2 and 3 of the indirect effects analysis have focused on the identification of trends, goals, and notable features. The next steps involve identification and assessment of impacts that may come into conflict with these goals and features. Gaining an understanding of project design features and the range of impacts they may cause is the first step toward the identification of indirect effects. Project impact-causing activities are relevant to two of the three types of indirect effects identified in the *Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects*, (NCHRP, Report 466, 2002):

1. Encroachment-Alteration Effects – Effects that alter the behavior and functioning of the physical environment are related to project design features but are indirect in nature because they can be separated from the project in time or distance.
2. Access-Alteration Effects (Project-Influenced Effect) – Changes in traffic patterns and the alteration of accessibility attributable to the design of the project can influence the location of residential and commercial growth in the study area.

Induced growth-related effects, the third type of indirect effect, are attributable to induced growth itself not project design features.

An assessment of known project design features and their impact-causing activities has been included in **Table 7**; additional features and activities may be identified and refined during final design. Future final design efforts are described in **Appendix L - Phased Approach for Implementation - NEPA Process of the Final EIS**.

Table 7: Project Impact-Causing Activities and Design Features

Project Impact-Causing Activities*	Project Design Features*	Present? (Yes/No/Unknown)	If Yes, General Types of Impacts
Modification of Regime	Introduction of Exotic Flora	No	
	Modification of Habitat	No	
	Alteration of Ground Cover	Yes	Groundcover within the existing I-64 corridor, including the areas within the interchange improvements, would be removed to accommodate the construction of the project. The precise areas and limits of removal would be determined in the final design phase of the project
	Alteration of Groundwater Hydrology	No	
	Alteration of Drainage	Yes	Additional impervious areas would be created due to the additional roadway/shoulder area and drainage patterns may be altered but would be designed in accordance with VDOT's Road and Bridge Specifications and VDOT's Erosion and Sediment Control Plan
	River Control and Flow Modification	No	
	Channelization	Yes	Channelization of water resources may be necessary to accommodate the project construction and would be designed in accordance with VDOT's Road and Bridge Specifications; mitigation would be approved by the resource and regulatory permitting agencies
	Noise and Vibration	Yes	Noise levels would be altered along the I-64 corridor and interchange areas as a result of new roadway and future traffic volumes. Noise assessment was conducted and preliminary abatement measures were evaluated as part of the EIS. A more detailed evaluation would be completed during final design in accordance with VDOT's Highway Traffic Noise Impact Analysis Guidance Manual

Project Impact-Causing Activities*	Project Design Features*	Present? (Yes/No/Unknown)	If Yes, General Types of Impacts
Land Transformation and Construction	New or Expanded Transportation Facility	Yes	The widening of the I-64 mainline and improvements to the 25 existing interchanges would be designed in accordance with VDOT's Road and Bridge Specifications
	Service or Support Sites and Buildings	No	
	New or Expanded Service or Frontage Roads	Yes	The determination of new or expanded ancillary roads would be completed during the final design phase and designed in accordance with VDOT's Road and Bridge Specifications
	Ancillary Transmission Lines, Pipelines and Corridors	No	
	Barriers, Including Fencing	Yes	Barriers and fencing such as limited access fencing and noise abatement barriers would be placed where necessary and would not limit or interfere with the safety of the traveling public
	Channel Dredging and Straightening	No	
	Channel Revetments	No	
	Canals	No	
	Bulkheads or Seawalls	No	
	Cut and Fill	Yes	Cut and fill activities would occur along the I-64 corridor and interchange areas as a result of new roadway. A more detailed evaluation would be completed during final design in accordance with VDOT's Road and Bridge Specifications and VDOT's Erosion and Sediment Control Plan
Resource Extraction	Surface Excavation	Yes	Excavations would be conducted in accordance with VDOT's Road and Bridge Specifications
	Subsurface Excavation	Yes	Excavations would be conducted in accordance with VDOT's Road and Bridge Specifications
	Dredging	No	
Processing	Product Storage	No	
Land Alteration	Erosion Control and Terracing	Yes	Erosion control would be designed in accordance with VDOT's Road and Bridge Specifications and VDOT's Erosion and Sediment Control Plan

Project Impact-Causing Activities*	Project Design Features*	Present? (Yes/No/Unknown)	If Yes, General Types of Impacts
Land Alteration (cont.)	Mine Sealing and Waste Control	No	
	Landscaping	Yes	Landscaping would be designed and implemented in accordance with VDOT's Road and Bridge Specification and would serve to reduce runoff and improve aesthetics along the I-64 corridor
	Wetland or Open Water Fill and Drainage	Yes	Wetland impacts would occur as a result of project construction within the I-64 corridor and interchange areas. Impacts would be avoided and minimized as much as possible during the final design phase. Mitigation would be approved by the resource and regulatory permitting agencies.
	Harbor Dredging	No	
Resource Renewal	Reforestation	No	
	Groundwater Recharge	No	
	Waste Recycling	No	
	Site Remediation	No	
Changes in Traffic (including adjoining facilities)	Railroad	No	
	Transit (Bus)	No	
	Transit (Fixed Guideway)	No	
	Automobile	Yes	As an existing interstate highway, automobile travel would continue within the existing I-64 corridor. The project would result in improved travel times and automobile movements within the I-64 mainline and at the interchanges
	Trucking	Yes	As an existing interstate highway, truck travel would continue within the existing I-64 corridor. The project would result in improved travel times and truck movements within the I-64 mainline and at the interchanges
	Aircraft	No	
	River and Canal Traffic	No	
	Pleasure Boating	No	
Communication	No		
Operational or Service Charge	No		

Project Impact-Causing Activities*	Project Design Features*	Present? (Yes/No/Unknown)	If Yes, General Types of Impacts
Waste Emplacement and Treatment	Landfill	No	
	Emplacement of Spoil and Overburden	Yes	In cut and fill areas with borrow and spoil, there may be changes to the existing topography and natural environment, which would be assessed during the permitting process
	Underground Storage	No	
	Sanitary Waste Discharge	No	
	Septic Tanks	No	
	Stack and Exhaust Emission	No	
Chemical Treatment	Fertilization	Yes	Proper Erosion and Sediment Controls would be utilized in accordance with VDOT's Road and Bridge Specifications in order to minimize runoff of chemicals
	Chemical Deicing	No	
	Chemical Soil Stabilization	Yes	Proper Erosion and Sediment Controls would be utilized in accordance with VDOT's Road and Bridge Specifications in order to minimize runoff of chemicals
	Weed Control	Yes	Proper weed control measures would be utilized in accordance with VDOT's Road and Bridge Specifications in order to minimize runoff of chemicals
	Pest Control	No	
Access Alteration	New or Expanded Access to Activity Center	No	
	New or Expanded Access to Undeveloped Land	No	
	Alter Travel Circulation Patterns	No	
	Alter Travel Times between Major Trip Productions and Attractions	Yes	Improved travel times would benefit the region and the economy by encouraging travel and tourism
	Alter Travel Costs between Major Trip Productions and Attractions	Yes	Improved travel times would decrease the travel costs, therefore benefiting the region and the economy by encouraging travel and tourism

* The terms included in these columns come from similar listings in the *Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects*, (NCHRP, Report 466, 2002)

F. Step 5 – Identify Potentially Significant Indirect Effects for Analysis

The objective of this step is to compare the list of project impact-causing actions with the lists of goals and notable features to explore potential cause-effect relationships and establish which effects are potentially significant and merit subsequent detailed analysis (or, conversely, which effects are not potentially significant and require no further assessment).

The following describes the potential indirect effects of the No-Build and Build Alternatives on the notable resources/features identified through the previous steps of this analysis.

1. 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 & 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.

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.

2. 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.

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 (BMP) 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 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** 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.

3. 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 presented in the analysis completed for Step 5, 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**.

Overall, based on this analysis, including literature reviews, resource and regulatory agency coordination and public involvement, the indirect effects are not considered potentially significant.

G. Step 6 – Analyze Indirect Effects

The objective of this step is to analyze potentially significant effects identified in Step 5 by determining magnitude, probability of occurrence, timing and duration, and degree to which the effect can be controlled or mitigated. As noted in Step 5, no potentially significant effects were identified. Notwithstanding, qualitative techniques were employed to estimate the magnitude of the effects identified in Step 5 and describe future conditions with and without the proposed transportation improvement. Descriptions of future conditions are included in Step 5, as well as throughout **Chapter III - Environmental Resources, Impacts and Mitigation of the Final EIS**.

As previously described in Step 5, the potential for growth and land use changes as a result of the proposed project was analyzed. Overall, most of the I-64 corridor is urban or suburban in nature, and the proposed project is not likely to cause a substantial change in type or intensity of land use. 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. More growth anticipated in the less developed sections of the corridor (Henrico, New Kent, James City and York Counties) and less growth is anticipated in the urbanized cities of Richmond, Newport News and Hampton. The proposed project is not likely to influence if growth would occur in the I-64 corridor, but rather where and when the growth would occur.

Typically, since I-64 is an Interstate and a controlled access facility, future growth would primarily in the areas at and around the 25 interchange areas along the 75 mile long corridor. With any of the Build Alternatives studied, improvements would be made to the interchanges along the corridor. However no new interchanges or access points are being proposed, thus limiting potential indirect effects related to land use. Additionally, the interchange options do not vary by alternative, so the same effects would be expected for all of the Build Alternatives. The interchanges which would be most apt to change are those in Henrico County, New Kent County, James City County, and York County, since they have the most available land and population/employment projections suggest that these areas would experience more growth than the more urban areas.

As described in Step 5, the indirect effects to natural resources, specifically Waters of the United States, including wetlands; water quality; floodplains; and threatened and endangered species 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 to the socioeconomic and natural resources, indirect impacts were also considered for Section 4(f) resources. As a result of the Section 4(f) analysis and coordination with the officials with jurisdiction, *de minimis* impact findings are likely for each of the four Section 4(f) uses, indicating that the magnitude of the impact would be minimal on each of these resources.

H. Step 7 – Evaluate Analysis Results

Assessing the magnitude of indirect effects, which was the goal of the previous two steps, involved making several types of assumptions regarding the nature of the impact-causing activities, the nature of the cause-effect relationships, and how the environment would be affected by the impacts. The objective of Step 7 is to evaluate the potential for uncertainty in these assumptions in order to better understand the indirect effects.

However, since no potentially significant indirect effects were anticipated in Step 6, according to NCHRP Report 466, it is not necessary to apply more detailed sensitivity or risk analysis techniques suggested for Step 7, even if detailed techniques have been used in other steps in the analysis. The key criteria in assessing the need for detailed evaluation are (1) whether the analysts or stakeholders believe that there is any level of uncertainty regarding the underlying assumptions used to estimate the indirect, and (2) whether changes in the underlying assumptions can be expected to result in significant changes in the findings.

Based on this analysis which included coordination with resource and regulatory agencies along with the public, there is minimal uncertainty regarding the assumptions made, and the likelihood of variation in the assumptions is unlikely to significantly alter the findings. However, 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**.

I. Step 8 – Assess Consequences and Develop Mitigation

The purpose of estimating indirect effects of proposed transportation projects is to contribute to the body of information that will support a decision about whether to proceed with the plan or project, as proposed; to formulate a revised plan or project; or to otherwise mitigate adverse indirect effects associated with the proposed plan or project. The objective of this step is to assess the consequences of the analyzed indirect effects in the context of the full range of effects and to develop strategies to address unacceptable indirect effects.

As part of the I-64 agency and public coordination process 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. However, direct and indirect impacts on resources protected by other environmental laws 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**.

II. Analysis of Cumulative Effects

In accordance with 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.

Methodology

In determining cumulative effects for the *I-64 Peninsula Study*, the analysis followed the five-part evaluation process outlined in *Fritiofson v. Alexander*, 772 F.2d 1225 (5th Cir. 1985), as described 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>):

1. What is the geographic area affected by the project?
2. What are the resources affected by the project?
3. What are the other past, present, and reasonably foreseeable actions that have impacted these resources?
4. What were those impacts?
5. What is the overall impact on these various resources from the accumulation of the actions?

Each of these parts of the evaluation process is outlined below.

1. Geographic Area

Study Area Boundaries

The geographic limits for the cumulative effects analysis were determined to allow for flexibility in the development of the Build Alternatives and to go beyond those used for the direct impact analysis. Therefore, the geographic limits for the analysis for cumulative effects reach beyond the defined project study area. Multiple boundaries such as political/geographic boundaries (i.e., planning corridor districts and Census Tracts or Block Groups), commuter shed, and growth boundaries/service area limits were reviewed to determine the appropriate areas for the cumulative effects analysis. As described in **Chapter III – Environmental Resources, Impacts and Mitigation of the Final EIS**; the *Socioeconomic/Land Use Technical Memorandum*; the *Natural Resource Technical Memorandum*; the *Air Quality Technical Memorandum*; the *Historic Properties Documentation*; the *Noise Technical Memorandum*; and the *Right of Way Technical Memorandum*, study area boundaries for each resource were individually determined based on study requirements and available data. The study areas for the resources and socioeconomic features as well as the temporal boundaries for the timeframe of the cumulative impact analysis are described as follows.

Resources Study Areas

Multiple resource boundaries were reviewed to assess the effects of each resource for the proposed project. Based on readily available data from federal, state and local sources, the resources were mapped using GIS mapping techniques, and analyzed to determine the potential for cumulative effects created by the proposed study alternatives. The resources include: Waters of the United States including wetlands; surface and groundwater supply; floodplains, threatened and endangered species; wildlife and habitat; historic properties; and Section 4(f) resources that include publicly owned parks, recreational areas, wildlife and waterfowl refuges and historic sites of national state or local significance.

Socioeconomic Study Area

Socioeconomic study areas were established to analyze neighborhoods and community facilities; environmental justice; displacements and relocations; economic activity; land use; and parks, recreation areas and open space within the I-64 Peninsula area. The socioeconomic study area for this project is made up of the 72 Census Block Groups that border the I-64 between the Cities of Richmond and

Hampton. Census areas, community facilities, Agricultural/Forestal Districts, Prime Farmlands and Farmlands of Statewide Importance were also analyzed.

Timeframe for Analysis

The analysis of cumulative effects must consider past, present, and reasonably foreseeable future actions. The temporal boundary used for the time frame for this cumulative effects assessment spans from the 1960s, when construction of I-64 within the study corridor began, to 2040 which is the modeled design year for the I-64 EIS.

2. Affected Resources

During the indirect effects analysis, an inventory and assessment of notable features and/or resources was performed. These resources were reviewed for potential cumulative effects. Existing conditions information for these resources is contained in **Section II.D – Step 3 – Inventory Notable Features** of this technical memorandum; **Chapter III – Environmental Resources, Impacts and Mitigation** of the **Final EIS**; **Socioeconomic/Land Use Technical Memorandum**; and the **Natural Resource Technical Memorandum**. Other affected resources that were not notable and therefore were not included in the cumulative effects analysis can be found described in the **Air Quality Technical Memorandum**; **Historic Properties Documentation**; **Noise Technical Memorandum**; and **Right of Way Technical Memorandum**.

3. Past, Present, and Reasonably Foreseeable Actions

As previously mentioned in **Section II.E. – Step 4 – Identify Impact-Causing Activities** of this technical memorandum, there are a number of development activities and actions that have occurred and/or are planned to occur that could contribute to cumulative effects on resources affected by the project. In addition to those previously mentioned a number of others are described below.

Past Actions - Traditional development patterns have generally followed a relatively sprawling land use pattern. Low-density residential uses have developed in isolation from employment centers and shopping. Office parks, shopping centers, apartments and single-family subdivisions generally creep further and further from urban areas into the more suburban or rural areas of the corridor.

In addition to these actions, **Table 8** lists past transportation improvement projects to the mainline of I-64 along with the interchanges. These projects have occurred along the 75 mile long study corridor from I-95 in the City of Richmond to I-664 in the City of Hampton since the construction of I-64 was initiated in the early 1960s. Since then, a number of studies and improvement projects have been completed along the corridor, including:

- A Major Investment Study (June 1999),
- Widening projects (various projects between 1979 and 2006),
- Interchange upgrades (various projects between 1981 and 2001),
- Addition of HOV lanes in the Hampton Roads area (2001), and
- A contraflow lane reversal system from Interstate 295 (I-295) to Route 60 east of the Hampton Roads Bridge Tunnel (2006).

Over the last 30 years, 24 of the major bridge structures on or over the 75 mile long study section of I-64 have been reconstructed beginning in 1977 with the Route 641 (Penniman Road) bridge in York County and ending with the most recent in 2006 at Meadow Road in Henrico County. A few of the major improvement projects on I-64 or on roads, which cross the study corridor, include:

- The 6.5 mile long section of I-64 in Hampton, roughly between Route 134 (Magruder Boulevard) and 143 (Mallory Street), was widened from four lanes to six lanes and built in sections from

- 1979 to 1988,
- The I-64/I-664 interchange and 1.2 miles of I-664 in Hampton opened in 1981, and the first widening project on I-64 (approximately one mile) in the I-664 interchange area was part of that project,
- The 4.0 mile section of I-64 from Route 17 (J Clyde Morris Boulevard) to east of Hampton Roads Center Parkway, was widened from four lanes to six lanes in two projects from 1990 to 1995,
- A new fly-over ramp from I-295 southbound to I-64 eastbound opened in 2001,
- The new Exit 243 interchange for the entrance to Busch Gardens near Williamsburg was completed in 2002, and
- The Bland Boulevard eight-lane widening project was completed in 2006, along a 10.7 mile stretch of I-64 from 0.5 mile west of Bland Boulevard in Newport News, to the I-664/I-64 interchange in Hampton.

Table 8: 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)

Approximate Location	Approximate Date	Project Description
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

Present and Reasonably Foreseeable Future Activities and Actions – Numerous state agencies, planning organizations, and localities in the region have implemented their own land use policies and plans to change past trends and focus future development into growth corridors and activity centers. The following planning documents and studies were researched to identify potential present and future projects and improvements that may contribute to the cumulative effects on resources within the I-64 Peninsula project corridor:

- *2035 Long-Range Transportation Plan* (Richmond Area Metropolitan Planning Organization).
- *2034 Long-Range Transportation Plan* (Hampton Roads Transportation Planning Organization).
- *2035 Rural Long-Range Transportation Plan* (Hampton Roads TPO).
- *VTrans 2025*.
- *VTrans 2035*.
- *Virginia Statewide Multimodal Freight Study* (2011).
- Locality Comprehensive Plans:
 - City of Richmond, *Master Plan* and associated documents (2001).
 - Henrico County, *2026 Comprehensive Plan* (2009).
 - New Kent County Comprehensive Plan, *Vision 2020* (2003).
 - James City County, *Comprehensive Plan* (2009).
 - York County, *Charting the Course to 2025* (various dates).
 - City of Williamsburg, *2006 Williamsburg Comprehensive Plan* (2006).

- City of Newport News, *Framework for the Future 2030* (2008).
- City of Hampton, *Community Plan* (2006).
- *I-64 Major Investment Study* (June 1999).
- *Richmond/Hampton Roads Passenger Rail Tier I Draft Environmental Impact Statement* (2010).
- *Hampton Roads Military Transportation Needs Study* (Hampton Roads TPO, September 2011).

Table 9 lists the reasonably foreseeable projects through the design year 2040 planning horizon including projects and development assumptions contained in the Tidewater Super-Regional Travel Model used for the *I-64 Peninsula Study*. Although all of the projects in **Table 9** are not funded for construction, it is reasonable to include them as part of the cumulative effects analysis since they are part of the super-regional model.

Table 9: 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

In addition to the projects identified in VDOT's Fiscal Year 2013 – 2018 SYIP and outlined in the No-Build Alternative for the 75 mile long project corridor, there are also a number of other major actions and proposals throughout and adjacent to the study corridor being pursued by governmental agencies. As of the time of this document other actions identified include, but are not limited to, the following:

- The Virginia Department of Rail and Public Transportation's (VDRPT) Richmond/Hampton Roads Passenger Rail Study for enhanced passenger rail service between the City of Richmond and the Hampton Roads area. The Record of Decision (ROD) on the Tier I Final EIS is pending.
- Hampton Roads Vision Plan - provided high level recommendations for regional transit in Hampton Roads. 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 initiated an Environmental Impact Statement for potential improvements to the Hampton Roads Bridge Tunnel. The Draft Environmental Impact Statement was signed on December 12, 2012.

In addition, although it is outside of the project study area, the proposed expansion of the Panama Canal is expected to increase the demand at the Port of Virginia, which is the only east coast port with channels deep enough for the larger ships expected to be able to travel through the Panama Canal after 2014. This additional port traffic would directly contribute to the growth of the region and have a cumulative effect on the area's resources and features such as: Waters of the United States, including wetlands; floodplains, water quality, threatened and endangered species and habitat; air quality; land use; neighborhoods and community facilities; population and housing; economic activities and tax base as a result of future development.

4. Impacts

The potential cumulative impacts as a result of the No-Build and Build Alternatives on any 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/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, City of Newport News and 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 the **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***.

Table 6 of this 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 the Displacements and Relocations section of **Chapter III - Environmental Resources, Impacts and Mitigation** of the **Final EIS**.

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/Land Use Technical Memorandum and Chapter III – Environmental Resources, Impacts and Mitigation*** of the **Final EIS**, 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 the **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

Waters 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 Chapter III – Environmental Resources, Impacts and Mitigation*** of the **Final EIS**, 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 VDEQ and the 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 **Chapter III – Environmental Resources, Impacts and Mitigation** of the **Final EIS**, 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 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. For more information regarding water quality issues along the project corridor, refer to the *Natural Resources Technical Memorandum*.

Table III.E.6 of the **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 the **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 **Chapter III – Environmental Resources, Impacts and Mitigation** 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 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 previously mentioned in **Section II.D.2** of this memorandum and further described in the *Natural Resource Technical Memorandum* and **Chapter III – Environmental Resources, Impacts and Mitigation** of the **Final EIS**, 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 the **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.

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 **Chapter III – Environmental Resources, Impacts and Mitigation** of the **Final EIS**, 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 Harger’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 **Chapter III – Environmental Resources, Impacts and Mitigation** of the **Final EIS**, 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 the 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.

5. Overall Impact

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.

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*. Previous sections of this Technical Memorandum present the results of these investigations.

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.

Table 10: Anticipated Cumulative Effects

Resource	Effects of Past Actions	Effects of Present and Future Actions
Socioeconomic and Land Use	Increased regional mobility and accessibility.	Increased regional mobility and accessibility; diversity of transportation options within the region
	Increased employment and tax revenues.	Planned development and economic stability through increased employment and tax revenues
	Development of agricultural and forested land to residential, commercial and transportation uses.	Loss of additional undeveloped land and re-use of developed land.
Neighborhoods and Community Facilities	Impacts to residential parcels for development needs.	Loss of residential parcels due to development.

Resource	Effects of Past Actions	Effects of Present and Future Actions
	Development of community facilities to provide for development.	Planning in place to minimize impacts to neighborhoods and community facilities.
		Increased regional mobility and accessibility to neighborhoods and community facilities.
Environmental Justice	Impacts to minority and low income populations.	Regulations in place to avoid or minimize disproportionately high and adverse effects to these populations.
		Increased mobility, access to transit, and greater employment opportunities through development.
Waters of the United States including Wetlands	Loss of resource areas due to draining, ditching or filling by development.	Regulations in place to avoid or minimize effects to these resources.
Water Quality	Deterioration of water quality.	Regulations in place to avoid or minimize effects to water quality.
Floodplains	Loss of areas due to development.	Regulations in place to govern fill and construction in these areas.
Threatened and Endangered Species	Unknown.	Potential for habitat loss due to land use conversion.
Section 4(f) Resources	Impacts to various resources, particularly battlefields.	Increased accessibility to public parks.
		Loss of historic properties and archaeological resources; impacts to historic districts and battlefields due to development.

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 10**. 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.

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