

1. INTRODUCTION

1.1 Project Description

The Virginia Department of Transportation (VDOT), in cooperation with the Federal Highway Administration (FHWA), is studying the environmental consequences of transportation alternatives along Interstate 64 (I-64) and the Hampton Roads Bridge-Tunnel (HRBT). The study area is a one-mile-wide corridor along I-64 from the I-664 interchange in the City of Hampton to the I-564 interchange in the City of Norfolk, a distance of approximately 12 miles, including the 3.5-mile-long HRBT.

The purpose of this Technical Memorandum is to identify potential indirect and cumulative impacts that could result from implementation of the Retained Build Alternatives. Information in this memorandum supports discussions presented in the Environmental Impact Statement (EIS).

- **Section 1** provides an overview of the study and outlines the methods used to assess indirect and cumulative impacts.
- **Section 2** discusses past, present, and future development in the study area.
- **Section 3** discusses the potential indirect impacts associated with the project.
- **Section 4** discusses the potential cumulative impacts associated with the project.

Details regarding all alternatives, including potential limits of disturbance, are included in the *Alternatives Technical Report*. Three Retained Build Alternatives, each representing a set of improvements that form a stand-alone solution to the identified needs within the study area, have been retained for detailed evaluation in the EIS, as discussed in this Technical Memorandum:

- The **Build-8 Alternative** would provide four continuous mainline lanes in each direction of I-64 throughout the study area. Through the Hampton section of the study area, this alternative would require one lane of widening in each direction of I-64. Through the Norfolk section, this alternative would require the addition of two lanes in each direction of I-64. A concrete traffic barrier would separate the eastbound and westbound directions. The total pavement width of the Build-8 Alternative mainline would be approximately 150 feet. Through the Willoughby Spit, widening would occur on the south side of the existing roadway only. The eastbound approach bridge would be modified to carry two westbound lanes, and a new four-lane bridge would be constructed approximately 200 feet to the west of the existing bridges to carry the eastbound lanes. A new four-lane tunnel would be constructed approximately 200 feet west of the existing tunnel.
- The **Build-8 Managed Alternative** mainline, bridges, and tunnels would be similar to the Build-8 Alternative, providing four continuous mainline lanes in each direction of I-64 with a new bridge structure and tunnel. However, some or all of the travel lanes would be managed using tolls and/or vehicle occupancy restrictions. The typical section also would include an approximate four-foot buffer separation between the general purpose lanes and any managed lanes, resulting in a total mainline pavement width of approximately 160 feet. The managed lanes would tie to the high occupancy vehicle (HOV) lanes on I-64 on both ends of the study area.
- The **Build-10 Alternative** would provide five continuous mainline lanes in each direction of I-64 throughout the study area, with a concrete traffic barrier separating the eastbound and westbound directions. Throughout the Hampton section of the study area, this alternative

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would require widening both directions of I-64 by two lanes. In the Norfolk section of the study area, this alternative would require widening both directions of I-64 by three lanes. The total width of the mainline pavement would be approximately 170 feet. The approach bridges and tunnel would be similar to the Build-8 Alternative; however, the new bridge-tunnel would include one westbound lane and five eastbound lanes for the bridge and the tunnel.

The No-Build Alternative also has been retained to serve as a baseline for comparison of alternatives and their potential effects. Under the No-Build Alternative, I-64 would remain predominantly three lanes per direction within the Hampton section of the study area. The 3.5-mile HRBT would continue with current operations. Within the Norfolk section of the study area, I-64 would remain two lanes per direction, including the I-64 bridges across Willoughby Bay.

1.2 Methods

The regulations of the federal Council on Environmental Quality (CEQ) implementing the procedural provisions of the National Environmental Policy Act, set forth at 40 CFR Part 1500-1508, require federal agencies to consider the environmental consequences of their actions, including not only direct effects, but also indirect and cumulative effects. In some guidance, the terms “secondary effects” and “indirect effects” are used interchangeably.

Indirect effects are defined as those effects “which are caused by the action and are later in time or farther removed in distance [than direct effects], but are still reasonably foreseeable” (40 CFR 1508.8(b)). Indirect effects also are 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 may also occur if the action changes the extent, pace, and/or location of development and if this change affects environmental resources. These effects may include growth induced effects or other effects on the natural, social, or physical environments due to changes in land use or population growth. In the case of this study, growth induced effects within the study area are controlled by the cities of Hampton and Norfolk through zoning regulations and land use plans.

Cumulative impacts are 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...[and] can result from individually minor but collectively significant actions taking place over a period of time” (40 CFR 1508.7). The Council on Environmental Quality has written guidance documents for identifying and assessing these impacts, particularly through an eleven step analytical process (CEQ, 1997). The understanding of what are past, present, and reasonably foreseeable future actions is key to the assessment of these impacts. The affected environment or existing conditions in the study area is the collected impacts of all past actions, e.g., the growth and development of Hampton and Norfolk surrounding the Hampton Roads and the associated impacts. Present impacts include an assessment of the Retained Build Alternatives, as well as currently ongoing construction of any projects in the area, public or private. Reasonably foreseeable future actions are other planned and programmed transportation projects and other planned development that is likely to occur in the immediate area. These impacts are important to this assessment if they impact the same resources as those affected by this study.

A review of development patterns within the study area and vicinity was used as a foundation upon which to conduct an assessment of the study’s potential indirect and cumulative effects. The development pattern was analyzed to determine the potential indirect and/or cumulative effects to each environmental resource that would potentially be directly affected by implementation of the

Retained Build Alternatives. The boundary developed for the study extends approximately one mile in each direction from the I-64 corridor (**Figure 1**). The timeframe for cumulative impacts extends until 2040, which is the design year.

2. DEVELOPMENT ACTIVITIES

2.1 Existing Land Use

The land use (built environment) and land cover (natural environment) in the study area are typical of a developed urban and suburban setting. The cities of Hampton and Norfolk had their beginnings in the 1600s with European settlement. Both cities are a part of the Hampton Roads region. The body of water known as Hampton Roads (the mouths of the James, Elizabeth, and Nansemond Rivers) separates the two cities. Aerial photography, field inspections, and local planning information confirm that both cities are highly developed and include residential, commercial, industrial, military, open space, and public uses (**Table 1**). In both cities, the highest proportion of land use in the study area is residential.

Table 1. Existing Land Use

Land Use/Land Cover Classification	Acres within Study Area	Percent of Total
Commercial	329	7%
Industrial	82	2%
Institutional	928	21%
Military	539	12%
Mixed-Use	108	3%
Parks, Open Space, and Greenways	203	5%
Residential	1,881	42%
Vacant	415	9%
TOTAL	4,485	100%

Sources: City of Hampton and City of Norfolk Land Use GIS databases.

Note: Acreage in this table does not include water features.

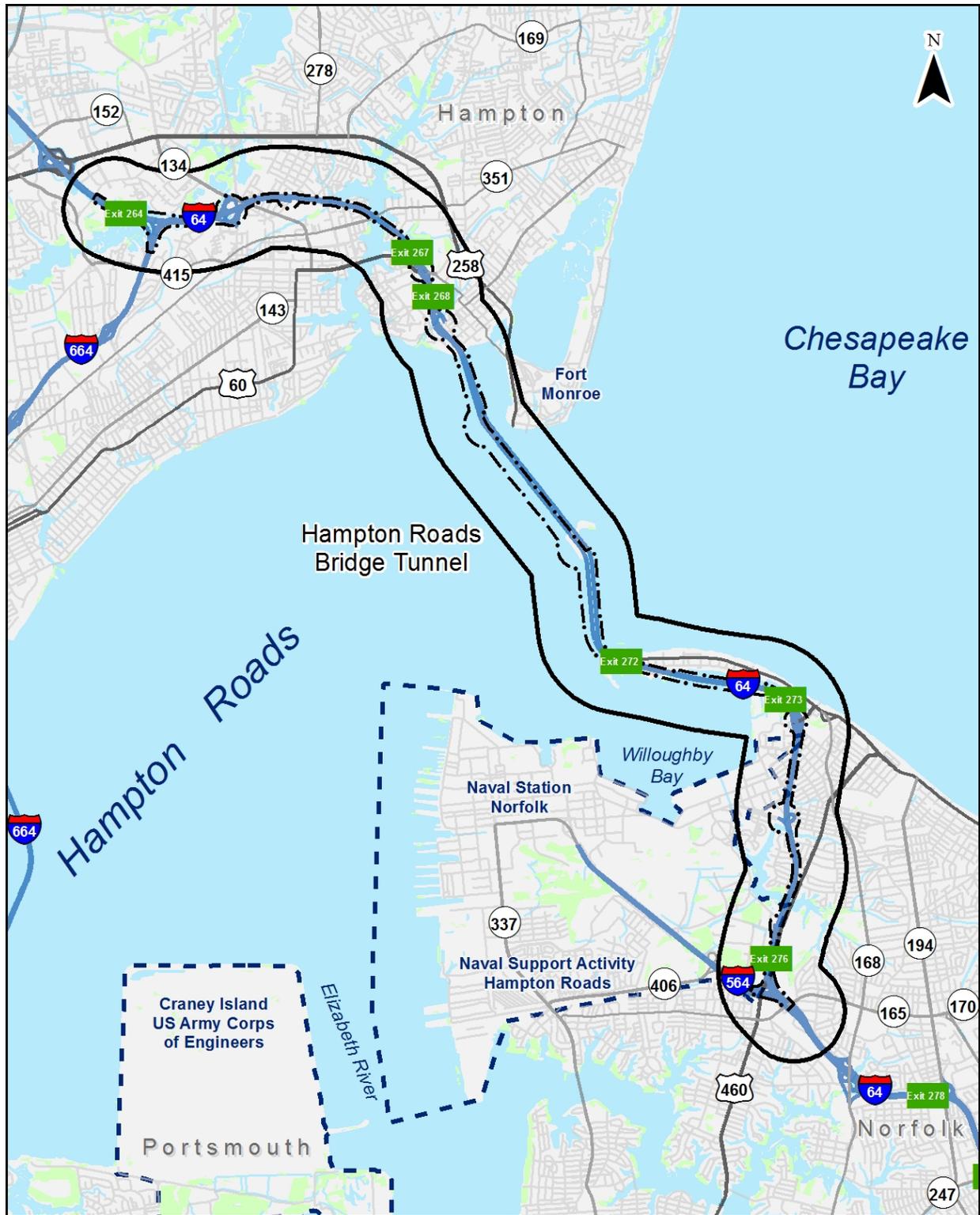
2.2 Status of Local Planning

The current City of Hampton comprehensive plan, the *Hampton Community Plan* (Community Plan), was adopted in 2006. The 2011 Community Plan Update was endorsed in fall 2011 as the completed five-year review of the 2006 Community Plan. The Hampton Planning Commission also has adopted plans for distinct parts of the city, including the following plans that address land use within the study area:

- Downtown Hampton Master Plan (2004; amended 2006)
- Newmarket Creek Park & Trail System Master Plan (2007)
- Coliseum Central Master Plan (2004)
- North King Street Master Plan (2007)
- Phoebus Master Plan (2007)

The 2006 Community Plan notes that both I-64 and I-664 should continue to be supported as the major routes to the city. The transportation section in the 2006 plan states that as “the main artery of moving traffic in and out of Hampton, the health and efficiency of Interstate 64 is vital” (City of Hampton, 2006a). The 2011 Update includes a re-examination of the vision for the city as well as an update to city data. It notes that regionalism has risen in importance in many aspects of planning. The plan update specifically mentions support for “the development of new transportation options that address regional needs as well as those of Hampton businesses and citizens” (City of Hampton, 2012).

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- Legend**
- Study Area
 - Build 10 Approximate Limits of Disturbance



Study Location



Figure 1

The *General Plan of Norfolk* was adopted in 1992. The draft *plaNorfolk 2030* is the most recent update to the comprehensive plan, revised based on public review and comment. A City Council public hearing regarding the updated plan is expected in the winter of 2013. In 2004, the City Department of Planning and Community Development also promulgated the Greater Wards Corner Comprehensive Plan, a plan for a distinct part of the city that addresses land within the study area. The *General Plan* notes that water and waterways are the primary influence on many aspects of the city: the shape of the city, economic development, the Downtown core, neighborhood identity, the “organizing feature” of parks and recreation, and on the transportation network. The transportation network and “citywide circulation” rely “on a few, rather than many, arterial corridors which provide access across the water barriers” (City of Norfolk, 1992). The existing HRBT is one of these few corridors that provide access to the city. The *General Plan* also states that increasing capacity at the HRBT is a top priority to improve access into the City and that a main goal for 2020 is to pursue the expansion and development of existing crossings (City of Norfolk, 1992). The goals and issues identified in the draft *PlaNorfolk 2030* are similar to and natural continuations of the *General Plan* of 1992. A key economic vitality issue identified in the plan is “Improving and expanding regional transportation linkages, including highway, bridge and tunnel infrastructure, as well as multi-modal connections” (City of Norfolk, 2011). The key transportation issue identified is to address “roadway congestion, particularly at water crossing facilities” (City of Norfolk, 2011). Two other water crossings, the Midtown Tunnel and Patriot’s Crossing, are the highest future priorities for the city. The widening of the Midtown Tunnel is currently under construction and the Patriot’s Crossing is undergoing an update to the NEPA process.

2.3 Development Trends / Future Land Use

The Retained Build Alternatives occur in an area where medium and high density development already exist and are projected to continue in both cities. Development demand is regulated and controlled by the individual jurisdictions through their zoning and land use and comprehensive plans. In both cities the existing and future land use varies somewhat throughout the study area. A large portion of the land use in both cities is residential of medium to high density, with commercial uses occurring closer to the interchanges with I-64. There are also large public (military and institutional) and open space/park uses throughout the study area. Due to the limited amount of vacant land in both of these mature cities, future land use is projected to be virtually the same as current land uses, with primarily infill development of similar land uses occurring.

Limited future changes in land uses and development are already planned in the cities as described below and are expected to occur with or without the construction of one of the Retained Build Alternatives. Construction of one of the Retained Build Alternatives would not encourage or accelerate any changes in land use that are not already expected by either city.

The Hampton 2010 Comprehensive Plan links specific land uses with transportation planning in the city-wide transportation recommendations. For example, residential development should ideally have access to the roadway network only via local roads (City of Hampton, 1989). The Community Plan notes that the city “is over 90% built out”, meaning that most land use changes will occur as conversion of one type of land use to another, not primarily vacant land to a new land use. The Community Plan further states that “In-fill development, redevelopment, and revitalization of existing developed areas will be the main source of growth and change within Hampton” (City of Hampton, 2006a). The plan for future land use is to “protect residential neighborhoods, encourage commercial investment in established centers and districts, promote revitalization in strategic areas of the city, and protect environmentally sensitive areas” (City of Hampton, 2006a).

The Norfolk 1992 *General Plan* used the year 2000 as its short-term horizon year; because of the developed nature of the city, the land use pattern proposed in the year 2000 was a refinement of the land use pattern in 1992. In a manner similar to the City of Hampton, the *General Plan* states that due

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to the highly developed nature of the city (95% built), any new development “will take the form of redevelopment or revitalization” (City of Norfolk, 1992). *PlaNorfolk 2030* echoes this in its land use chapter noting that because Norfolk is a mature, developed city, only 3.1% of the land in the city is vacant. New development in Norfolk is expected to be “either the result of redevelopment or infill (City of Norfolk, 2011). The key issue identified for land use in Norfolk is “complementing the existing built and natural environment or facilitating land use change in specific areas “ (City of Norfolk, 2011).

The cities’ comprehensive plans and other planning documents set forth a variety of development and transportation projects (**Table 2**) that illustrate development trends in and around the study area. In terms of land use, implementation of the Retained Build Alternatives also would be compatible with these planned projects.

Other planned projects that would occur outside but potentially impact land use within the study area include: the completion of Phase I of the Craney Island Marine Terminal by 2020 and complete build out by 2034, and the continued presence of the US Navy at Naval Station Norfolk. Specific future plans by the US Navy are not identified. Based on existing base realignment and/or closure plans, the US Navy will continue to be a key presence in the study area. Transportation projects outside but potentially affecting future land use within the study area include the Patriot’s Crossing project (currently undergoing a NEPA update) which is part of the Third Crossing of Hampton Roads project, and the I-564 Intermodal Connector, which would extend from the existing I-564 to the Norfolk International Terminals and Naval Station Norfolk.

Table 2. Planned Projects in the Study Area

Project Name	Description	General Location	Timeframe/ Status
Coliseum Central Master Plan	Straighten roads and create pedestrian-friendly districts and recreational facilities	Approximately 0.3 mile west of 64/664 interchange	Project timeframe 10-20 years
Coliseum Drive/ Mercury Boulevard	Flyover removal and intersection improvements	Approx. 0.3 mile west of 64/664 interchange	Project timeframe 2005-2025
Coliseum Mall Redevelopment	Road extensions on mall property	Approx. 0.3 mile west of 64/664 interchange	Project timeframe 2005-2025
Newmarket Creek Park and Trail system Master Plan	Construct a trail along Coliseum Lake, Lake Hampton, and Newmarket Creek; create pocket parks, waterfront redevelopment, canoe/kayak launch, fishing pier	Approx. 0.3 mile west of 64/664 interchange	Plan adopted 2004, amended 2006; project timeframe uncertain
Commerce Drive	Extension from Convention Drive to Cunningham Drive	Approx. 0.3 mile west of 64/664 interchange	Project timeframe 2005-2025
Power Plant Parkway	Upgrade from Briarfield Road to Pine Chapel Road	0.2 miles south of 64/Pine Chapel Road	Project timeframe 2005-2025
North King Street Master Plan projects	Roadway improvements; provide open space amenities and community access along Newmarket Creek (Y.H. Thomas Park area)	Within 0.2 miles of 64	Plan adopted in 2007; project timeframe uncertain
Downtown Hampton Master Plan projects	Connect to Pasture Point through Eaton street as a park; construct a waterfront park; roadway improvements; redevelop industrial land as residential communities	Approx. 0.2 miles south of N. King Street	Plan adopted 2004, amended 2006; project timeframe uncertain
Fort Monroe Development projects	Renovate structures; construct a pedestrian/bike trail around perimeter; improve roadways	Directly north of HRBT	Master Plan in development; project timeframe uncertain
Phoebus Master Plan projects	Create waterfront park on Mellen Street with a floating fish market and boating; general redevelopment in area	East of 64 before HRBT	Plan adopted 2007; project timeframe uncertain
Hampton Biomedical Center	Construct a 20,000 square-foot biomedical research center	427 and 519 E. Queen Street	Land Use Permit approved 2012

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Project Name	Description	General Location	Timeframe/ Status
General Plan 1992/PlaNorfolk 2030 projects	- Wards Corner- Acquire and demolish properties in blighted areas; encourage construction of higher end housing; redevelop commercial properties in critical areas; improve road access to commercial areas; improve pedestrian facilities - West Ocean View- mixed-use zoning; establish a park setting west of Mason Creek Road; improve entrances to parks - Willoughby- renovate traditional cottages; revise regulations to restrict building height; roadway improvements	Along I-64	Newest plan not yet adopted; project timeframe 20 years
Greater Wards Corner Comprehensive Plan projects	Revitalize and create an “uptown”; eliminate blight through redevelopment; construct higher-quality housing and a mix of local retail, improve local roads	Runs through 64/564 interchange	Project timeframe 11-15 years
Wards Corner Retail Renovation	Demolition of Suburban Park Shopping Center underway, with plans to redevelop; demolition of old K&W cafeteria in Southern Shopping Center and exterior renovations at Midtown Shopping Center	Directly south of 64/564 interchange	Ongoing
The Tide (light rail) Extension	Extend the existing light rail system to Naval Base Norfolk; all three options being considered would enter the study area	Extending into the study area near the I-564/I-64 interchange	Project timeframe uncertain.

Sources: *Coliseum Central Master Plan: Hampton, Virginia (2004)*; *City of Hampton Community Plan (2006)*; *Downtown Hampton Master Plan: Hampton, Virginia (2006)*; *Newmarket Creek Park & Trail System Master Plan (2007)*; *Phoebus Master Plan: Hampton, Virginia (2007)*; *North King Street Master Plan: Hampton, Virginia (2007)*; *plaNorfolk 2030 (2012)*; *Greater Wards Corner Comprehensive Plan (2004)*; *Fiscal Years 2013-2017 Capital Improvement Plan for the City of Hampton, Virginia (ND)*; *Fort Monroe Master Plan website(ND)*; *Hampton City Council Land Use Permit No. 1077-2011: Hampton Biomedical Center (2012)*

3. INDIRECT IMPACTS

Indirect impacts due to the implementation of the No Build Alternative or the Retained Build Alternatives would be minimal in nature. This section focuses on the resources and issues in the study area that would be indirectly impacted by implementation of the Retained Build Alternatives. Because each has similar limits of disturbance and direct impacts to environmental resources, the Retained Build Alternatives would result in similar indirect impacts.

3.1 Land Use

Indirect effects often hinge on induced development leading to land use changes. The No-Build Alternative does not convert any land to a different land use.

Implementation of the Retained Build Alternatives would be consistent with local land use plans and would occur in an area where medium and high density development already exist and are anticipated to continue. The Retained Build Alternatives do not propose any new interchanges on I-64, thus access to I-64 would not change. Any developable land that may exist in the study area already has access to the existing transportation system and, as such, can presently be developed consistent with existing land use plans. Limited future changes in land uses and infill development are planned in the cities and are expected to occur regardless of whether any of the Retained Build Alternatives are constructed. Because I-64 already traverses the study area, the Retained Build Alternatives would not provide new access to developable lands in the study area, be a catalyst for inducing development, or introduce a substantial change to local or regional travel patterns. Also, construction of one of the Retained Build Alternatives is not expected to either encourage or accelerate any changes in land use that are not

already planned by either city. As a result, indirect effects from the Retained Build Alternatives would be minor.

3.2 Parks and Recreational Facilities

No indirect effects on parklands are anticipated with the No-Build Alternative. Implementation of the Retained Build Alternatives would not be expected to induce conversion of parklands. However, there could be a change in patronage to facilities in the area due to the elimination or reduction of park areas. For example, both River Street Park and Willoughby Boat Ramp currently offer dedicated public access to the water for residents of Hampton and Norfolk, respectively, and would be directly impacted by the Retained Build Alternatives. Similar facilities such as Sunset Creek Boat Ramp (Hampton), Ridgeway Park (Hampton), and Haven Creek Boat Ramp (Norfolk) would serve patrons who now use River Street Park and Willoughby Boat Ramp. The resulting potential increase in patronage would be an indirect effect of the Retained Build Alternatives. The increased usage of other facilities, however, is anticipated to be minimal.

3.3 Economics

The No-Build Alternative could have potential indirect effects on the economy of the individual cities and the region. Under the no-build condition, traffic volumes are anticipated to increase by 2040. The existing (2011) volumes on I-64 within the study limits range from 87,900 to 115,700 vehicles per day (vpd). The 2040 forecasted volumes on I-64 within the study limits range from 88,600 to 130,000 vpd. Travel time delay and congestion both negatively affect commuters, freight, tourists, and local daily travel. In the long-term, businesses could decide to relocate to avoid the congestion at the HRBT, both for their employees and for freight movement. In addition, some businesses may avoid locating in the area due to the travel time delays and congestion. Intensified congestion, particularly at the HRBT itself, could also influence commuters to move closer to places of employment or change their employment to closer locations, thereby resulting in changes to regional economic patterns. The likelihood of this indirect effect, however, is anticipated to be small.

With implementation of the Retained Build Alternatives, more reliable travel times and less congestion would improve travel for commuters, freight, and tourists, thus providing indirect effects that are beneficial to the local and regional economy. These benefits could include an increase in patronage to the area, potentially resulting in an increase in or demand for additional commercial and residential development in the area. Since this also is supported by city planning documents, this indirect effect would be anticipated to have an overall minor effect on economic conditions.

3.4 Water Quality

No indirect effects on water quality are anticipated with the No-Build Alternative. The potential indirect effects on water quality due to the Retained Build Alternatives could include downstream effects of runoff into study area waterways and groundwater. These effects would be minimized by incorporating appropriate erosion and sediment control measures and stormwater best management practices during design and construction, thereby removing pollutants from runoff before it is discharged into receiving bodies of water such as the Hampton River, Hampton Roads, or Mason Creek. Because of these minimization measures, indirect impacts on water quality downstream of the Retained Build Alternatives are expected to be minimal compared to existing conditions.

3.5 Wildlife and Habitat

No adverse indirect effects to wildlife and habitat are anticipated under the No-Build Alternative. Indirect impacts of the Retained Build Alternatives potentially would be comprised of degradation of

aquatic habitat downstream of the study area, resulting from runoff into study area waterways. These impacts would be minimized by incorporating appropriate erosion and sediment control measures and stormwater best management practices during design and construction, thereby removing pollutants from runoff before it is discharged into receiving bodies of water such as the Hampton River, Hampton Roads, or Mason Creek. Because of these minimization measures, indirect impacts to aquatic wildlife and habitat downstream of the Retained Build Alternatives are expected to be minimal compared to existing conditions.

4. CUMULATIVE EFFECTS

Cumulative effects are assessed through review of the impacts caused by the action within the context of impacts to the same resource resulting from all past, present and reasonably foreseeable future actions. Thus, an action can only have a cumulative effect on an environmental resource if it has a direct or indirect effect on that same resource. Any resource that would not be impacted directly or indirectly by implementation of the Retained Build Alternatives likewise would not experience a cumulative effect as a result of such implementation. This section focuses on the prominent resources and issues in the study area that would experience a cumulative effect from the Retained Build Alternatives.

4.1 Land Use

A large portion of the land use in both cities is medium to high-density residential, with commercial uses occurring close to the interchanges with I-64. There are also large public (park, military and institutional) land uses throughout the study area. City plans propose increasing commercial, residential, and recreational development around the I-64 corridor. Due to the limited amount of vacant land in both of these mature cities, the future land use is anticipated to consist of infill development of similar land uses. The plans also include road rehabilitation, widening, and streetscaping efforts. Implementation of the Patriot's Crossing and the Intermodal Connector projects would also impact land use within the I-64 corridor.

Implementation of the No Build Alternative would not contribute to cumulative effects on land use. The cumulative effects associated with the Retained Build Alternatives include impacts caused by the transition of land uses to transportation use when considered with other development projects which result in land use changes. The Retained Build Alternatives would convert existing land uses to a new land use (transportation) as a direct effect. This conversion would be potentially comprise 281 acres under the Build-8 Alternative, 287 acres under the Build-8 Managed Alternative, and 304 acres under the Build-10 Alternative. Additional information on direct land use impacts of the Retained Build Alternatives is available in the *Land Use Technical Memorandum*.

Other than Patriot's Crossing, this study would have the largest contribution to cumulative impacts on land use. However, overall, changes in land use over time in the study area are expected to be minimal because of the built-out nature of the cities of Hampton and Norfolk, and because existing zoning regulations and land use plans mandate controls on land use changes. Furthermore, the Retained Build Alternatives would cause land use changes that are consistent with past land use changes in the study area which, over time, have resulted in the urbanized setting now present in both Hampton and Norfolk. Thus, although the implementation of the Retained Build Alternatives would result in a large contribution to cumulative impacts to land use, those impacts overall would be minor given the limited amount of space for new development, and would be reflective of past and existing land use trends.

4.2 Parks and Recreational Facilities

The following community plans propose increasing the amount of parkland or recreational facilities in the I-64 corridor:

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- Coliseum Central Master Plan
- Downtown Hampton Master Plan
- Fort Monroe Master Plan
- Greater Wards Corner Comprehensive Plan
- Hampton Community Plan
- Newmarket Creek Park and Trail System Master Plan
- North King Street Master Plan
- Phoebus Master Plan
- plaNorfolk 2030

For example, the Newmarket Creek Park and Trail System Master Plan specifically calls for the creation of new recreational facilities, pocket parks, canoeing and fishing opportunities, and trails in the Hampton Coliseum area; the other plans listed above call for the creation of smaller parks and recreational spaces. Other transportation projects may also impact a currently unknown amount of parkland in the study area, but given the scale of other identified projects, these impacts would likely be minimal compared to the impacts of the Retained Build Alternatives. Additional information regarding other planned projects in the study area is available in the *Land Use Technical Memorandum*.

The No-Build Alternative would not contribute to cumulative effects to parks and recreational facilities. The Retained Build Alternatives would have direct impacts on park properties resulting from conversion of parkland to transportation use. These impacts would total 18.3 acres, plus relocation of 750 linear feet of proposed trail. The Retained Build Alternatives also would result in potential cumulative effects when added to the effects of other transportation projects. The Retained Build Alternatives would likely be the largest contributor to adverse cumulative impacts on park and recreational facilities when compared with other planned projects in the study area. However, these cumulative impacts would be minimized by the increase in parkland which is also proposed in the study area.

4.3 Environmental Justice

City plans and proposed projects are focused on revitalizing areas around the I-64 corridor. Plans for both Hampton and Norfolk propose pedestrian-friendly districts and recreational facilities, replace industrial development with residential and commercial development, revitalize blighted areas, and construct high-quality housing. These plans could lead to the displacement or relocation of minority and low-income populations (as defined in Executive Order 12898 and Department of Transportation Order 5610.2a) while potentially improving the quality of life and housing values of minority and low-income populations that are not displaced or relocated. Implementation of the Retained Build Alternatives would be expected to contribute to both adverse and beneficial impacts to environmental justice populations because of residential and business property impacts and improvements to community mobility in the study area.

Impacts of the No-Build Alternative would include continued contribution to traffic congestion in the HRBT corridor and thus adverse effects to cumulative socioeconomic activity. These effects would be particularly adverse to the environmental justice populations that are located in the study area and rely on the HRBT for travel between Hampton and Norfolk. Since I-64 is a major access route into and out of the cities, the No-Build Alternative could also have a detrimental impact on city efforts to improve economic opportunities in the area.

Beneficial effects to minority and low-income populations are anticipated with any of the Retained Build Alternatives. Together with other transportation projects, each would contribute to decreased congestion in the environmental justice communities within the study area, thereby improving mobility.

The contribution of the Retained Build Alternatives to beneficial cumulative effects would be substantial given the importance of I-64 and the HRBT to mobility within communities in the study area.

Direct impacts of the Retained Build Alternatives to minority and low-income populations include right-of-way acquisition and relocations. Other development projects in the study area may also directly impact environmental justice populations and result in a change to surrounding land use, impacts to property, and/or relocations. Relative to other projects, the Retained Build Alternatives would present a large contribution to adverse cumulative effects on these communities due to the number of potential relocations involved. These effects would be minimized through adherence to statutes, regulations and policies governing relocations. Similar to other federal actions, the acquisition of right-of-way and the relocation of displacees from the Retained Build Alternatives would be in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended and Title VI of the Civil Rights Act of 1964.

4.4 Socioeconomics

City plans and proposed projects are focused on revitalizing areas around the I-64 corridor. Both Hampton and Norfolk plan to create pedestrian-friendly districts and recreational facilities, replace industrial development with residential and commercial development, revitalize blighted areas, and construct high-quality housing. These plans could lead to the displacement or relocation of residents while potentially improving the quality of life and housing values of residents that are not displaced or relocated. Other initiatives include the widening and realignment of select streets, improving traffic signaling, and attracting new businesses. These actions would ease congestion in the cities and increase economic opportunities.

The No-Build Alternative potentially would include continued traffic congestion throughout the corridor and thus inadequate infrastructure for cumulative socioeconomic activity. Since I-64 is a major access route into and out of the cities, the No-Build Alternative could have a detrimental impact on city efforts to improve economic opportunities in the area. It is conceivable that a number of the planned future projects set forth in Table 2 also would increase congestion.

Beneficial effects to socioeconomic resources are anticipated with any of the Retained Build Alternatives. Each would result in more reliable travel times and less congestion, thereby improving travel for commuters, freight, and tourists and providing benefits to the local and regional economy. Other planned transportation infrastructure projects in the study area and its environs also would reduce congestion and thus have a beneficial impact on economics. The contribution of the Retained Build Alternatives to positive cumulative economic effects would be substantial given the importance of I-64 and the HRBT to the regional transportation network.

The Retained Build Alternatives would have direct adverse impacts to residences and businesses within the study area. Impacts would include right-of-way acquisition and relocations. Other development projects in the study area may also result in a change to surrounding land use, impacts to property, and/or relocations. The contribution of Retained Build Alternatives to cumulative socioeconomic impacts would be large in comparison to other planned projects due to the smaller scope of those projects. Socioeconomic impacts resulting from right-of-way acquisition and relocations would be minimized through adherence to statutes, regulations and policies governing relocations. Similar to other federal actions, the acquisition of right-of-way and the relocation of displacees from the Retained Build Alternatives would be in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended.

4.5 Wetlands and Waters of the US

City plans and present and future development projects include constructing trails, parks, and piers along various waterways in the I-64 corridor. Other potential impacts could arise from other proposed transportation projects and other development projects. The specific extent of impacts of reasonably foreseeable future projects to wetlands and Waters of the US is uncertain, however it is expected that the contribution of these projects to cumulative impacts would be small in comparison to that of the Retained Build Alternatives.

The No-Build Alternative would not have any direct or indirect impacts on wetlands and Waters of the US. The Retained Build Alternatives would have a direct impact on streams, wetlands, and floodplains within the study area. Past and present projects also have had substantial impacts on these resources, and it is anticipated that reasonably foreseeable future projects will do the same. Future construction projects are required to be implemented in accordance with the Virginia Erosion and Sediment Control Regulations and the Virginia Stormwater Management Law and regulations. These regulations minimize the cumulative effects of construction projects on water quality. Likewise, potential long-term effects on water quality from the Retained Build Alternatives would be minimized with implementation of stormwater best management practices, which would reduce or detain discharge volumes and remove pollutants and thus avoid substantial further degradation of impaired water bodies in the study area and its vicinity. Direct impacts of the Retained Build Alternative and other development projects to streams and wetlands also would be mitigated through compensation in coordination with the USACE, VDEQ, and VMRC during permitting. Therefore, though the Retained Build Alternatives may have a large contribution to cumulative impacts, the total cumulative impacts on wetlands and Waters of the US would be minimized through the application of local, state, and federal regulations and mitigation requirements.

4.6 Water Quality

Several waterways in the study area are identified as impaired. Most watersheds in the area, including Hampton River and Mason Creek, are currently dominated by urban land; typical urban pollutants such as sediment, hydrocarbons, pesticides, nutrients, heavy metals, and road salts contribute to the conditions in these waterways without the benefit of stormwater management features. The poor water quality of the system is indicative of the incremental impact of past actions within the study area. City plans and proposed projects include stormwater management upgrades, storm drain replacement, implementation to meet Chesapeake Bay Total Maximum Daily Load requirements, and beach stabilization and erosion control projects. These plans and projects could improve water quality in the I-64 corridor.

The No-Build Alternative would not have direct or indirect impacts on water quality, and would not contribute to cumulative impacts. The Retained Build Alternatives would impact water quality from increased impervious surfaces and roadway pollutants. All new development, including the Retained Build Alternatives, would be required to conform to current stormwater management regulations. Erosion and sediment controls must be implemented on most construction projects. Any new crossings of jurisdictional streams or wetlands also would require permits from the VMRC, the VDEQ, and the USACE. The review that is undertaken by these permitting agencies would ensure that all wetland and stream impacts are offset through mitigation, unless the project's impacts to streams are considered minimal (i.e., less than 300 feet or 0.1 acre). These permit programs are focused not only on minimizing future impacts, but also on restoring the physical, chemical, and biological quality of impaired streams. Therefore, though the Retained Build Alternatives may contribute substantially to adverse cumulative impacts, the total cumulative impacts on water quality would be minimized through implementation of local, state, and federal regulations and mitigation requirements.

4.7 Wildlife and Habitat

Existing conditions within the study area are characterized by urban development that has replaced much of the natural environment with the exception of narrow habitat corridors associated with streams and other aquatic environments within Hampton Roads. The majority of city plans and proposed projects would increase the amount of parkland in the I-64 corridor (refer to Section 4.2), creating potential habitat. Planned development projects as well as anticipated future infill development would convert habitat to other uses, but considering the limited amount of habitat available, the amount of conversion would be minimal. A substantial amount of aquatic habitat also is still present. City plans and development projects include constructing trails, parks, and piers along various waterways in the I-64 corridor which could affect riparian and aquatic habitat.

The No-Build Alternative would not have direct or indirect impacts on wildlife and habitat. The Retained Build Alternatives would result in direct impacts to Submerged Aquatic Vegetation. Other sensitive habitats that would be affected by the Retained Build Alternatives include water bird nesting habitat and the benthic communities of Hampton Roads, which support commercially important fish, shellfish, and anadromous species. Although these habitats would be subject to short-term construction-related adverse impacts, they also would experience long-term beneficial impacts resulting from the creation of increased habitat area associated with expanded tunnel portal islands.

The Retained Build Alternatives also could fragment or reduce upland and riparian habitat along the I-64 corridor. Aside from habitat, these species themselves potentially would be impacted. Other development projects, such as Patriot's Crossing, could have similar effects to wildlife and habitat. Thus, the Retained Build Alternatives would contribute to cumulative effects on these resources. However, implementation of required minimization strategies coordinated with the US Army Corps of Engineers, Virginia Department of Environmental Quality, Virginia Marine Resources Commission, and other regulatory agencies would reduce the cumulative impacts on sensitive habitats and the species that they support. These agencies also could require mitigation for the loss of specific habitat types. Therefore, though the Retained Build Alternatives may substantially contribute to detrimental cumulative impacts, the total cumulative impacts on wildlife and habitat would be minimized given local, state, and federal regulations and mitigation requirements.

4.8 Historic Properties

City plans and proposed projects could impact Hampton University, Fort Monroe, Phoebus, the Battle of Hampton Roads, and the Battle of Sewell's Point. The proposed development at Fort Monroe will convert the fort from a military installation to a National Monument. The development in Phoebus is planned to retain and support the historic buildings and character of the area. The Battle of Hampton Roads and the Battle of Sewell's Point would be impacted by other proposed development projects such as Patriot's Crossing. Since most projects are still in the development phase, the full extent of architectural or archaeological resource impacts is still uncertain.

The No-Build Alternative would have no direct or indirect impacts on historic properties and therefore would not contribute to cumulative impacts on these resources. The Retained Build Alternatives would impact architectural historic properties, including the Merrimack Landing Historic District, Forest Lawn Cemetery, the Battle of Sewell's Point, the Battle of Hampton Roads, and the Phoebus and Pasture Point Historic Districts. Past projects have substantially impacted these resources. However, reasonably foreseeable future projects are not expected to impact the same historic properties as the Retained Build Alternatives, with the exception of the naval battle sites. Thus, there would be minimal cumulative effects to these specific historic properties.

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Through implementation of minimization strategies coordinated with the Virginia Department of Historic Resources and Section 106 consulting parties the direct and therefore cumulative impacts on historic resources attributable to implementation of the Retained Build Alternatives would be reduced. Similar strategies may be developed for other projects that affect historic properties.

A previous archaeological survey conducted in 1999 recommended two sites located within the study window as potentially eligible for listing on the NRHP. However, the work associated with verifying this eligibility will not be conducted unless a Retained Build Alternative is selected. At that time, additional survey work to identify any other NRHP-eligible archaeological sites will be conducted. Therefore, the potential cumulative effects on archaeological resources are not currently known.

4.9 Noise Impact

Past, present and other reasonably foreseeable future actions have and will continue to increase noise levels throughout the study area. The No-Build and Retained Build Alternatives also would impact residential and recreational facilities by potentially increasing noise levels. The Retained Build Alternatives would impact approximately 200 additional receptors than the No-Build Alternative. Impacts to these receptors would be mitigated based on noise abatement measures described in the *Noise Technical Report*. Therefore, though the alternatives could result in detrimental direct impacts to noise sensitive receptors, their contribution to cumulative impacts to these receptors would be minimized through the use of mitigation techniques.

City plans and proposed projects are focused on revitalizing areas around the I-64 corridor. Both Hampton and Norfolk plan to create pedestrian-friendly districts and recreational facilities, replace industrial development with residential and commercial development, revitalize blighted areas, add streetscaping, widen or realign streets, and improve traffic signaling. These actions would minimize the noise impacts of existing roadways and other reasonably foreseeable future projects which cumulatively contribute to noise within the study area.

4.10 Visual Impacts

Past, present and other reasonably foreseeable future actions listed in **Table 2** have changed and will continue to change the visual character of the study area. Detrimental cumulative effects to visual resources include the impacts from the transition of other land uses to transportation use. As discussed under the land use section, city plans propose increasing commercial, residential, and recreational development around the HRBT corridor. The plans also include road rehabilitation, widening, and streetscaping efforts. These plans and projects would beautify the area and lead to a more positive viewer experience. Patriot's Crossing and the Intermodal Connector also would impact land use within the I-64 corridor, leading to a more developed viewshed, which could detrimentally affect viewer experience in the area.

The No-Build Alternative would have no direct impact to visual resources, and therefore would not contribute to cumulative visual impacts.

The Retained Build Alternatives would convert existing land uses to a new land use (transportation) as a direct effect. The visual changes resulting from that conversion of land use is consistent with past, present and future urbanization trends within the study area. While the Retained Build Alternatives would have a substantial contribution to cumulative impacts on land use, other reasonably foreseeable future projects would create and improve transportation and other infrastructure in the study area and thereby impact visual resources. Because of the extent of past and present development, the substantial amount of reasonably foreseeable future development, and the consistency of the Retained Build Alternatives with the visual changes that have occurred and will occur in the study area over time,

the Retained Build Alternatives would have only a minor contribution to cumulative impacts to visual resources.

4.11 Hazardous Materials

Past, present and reasonably foreseeable future actions have deposited or disturbed and will continue to disturb hazardous materials. Although the specific impacts to hazardous materials from other development projects is not known, the scale of potential impact is related to the scale of the development project.

The No-Build Alternative has no impact to any hazardous material sites. The Retained Build Alternatives each would directly impact 21 such sites. Because so little is currently known about the extent to which reasonably foreseeable future actions will impact hazardous materials sites, it is not possible to state with certainty the contribution that the Retained Build Alternatives would make to cumulative impacts. However, prior to the acquisition of right-of-way and construction, thorough site investigations would be conducted to determine whether any of the sites are actually contaminated, and, if so, the nature and extent of that contamination. Any additional hazardous material sites discovered during construction of a Build Alternative or demolition of existing structures will be removed and disposed of in compliance with all applicable federal, state, and local regulations. All necessary remediation would be conducted in compliance with applicable federal, state, and local environmental laws and would be coordinated with the EPA, DEQ, and other federal or state agencies as necessary. Thus, any contribution that the Retained Build Alternatives make to cumulative impacts to hazardous materials sites is expected to be minor.

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