I-64 HAMPTON ROADS BRIDGE TUNNEL

HRBT
Hampton Roads Bridge Tunnel EIS

NATURAL RESOURCES TECHNICAL REPORT

VDOT
Virginia Department of Transportation

U.S. Department of Transportation
Federal Highway Administration

November 16, 2012

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1. INTRODUCTION

1.1 Project Description

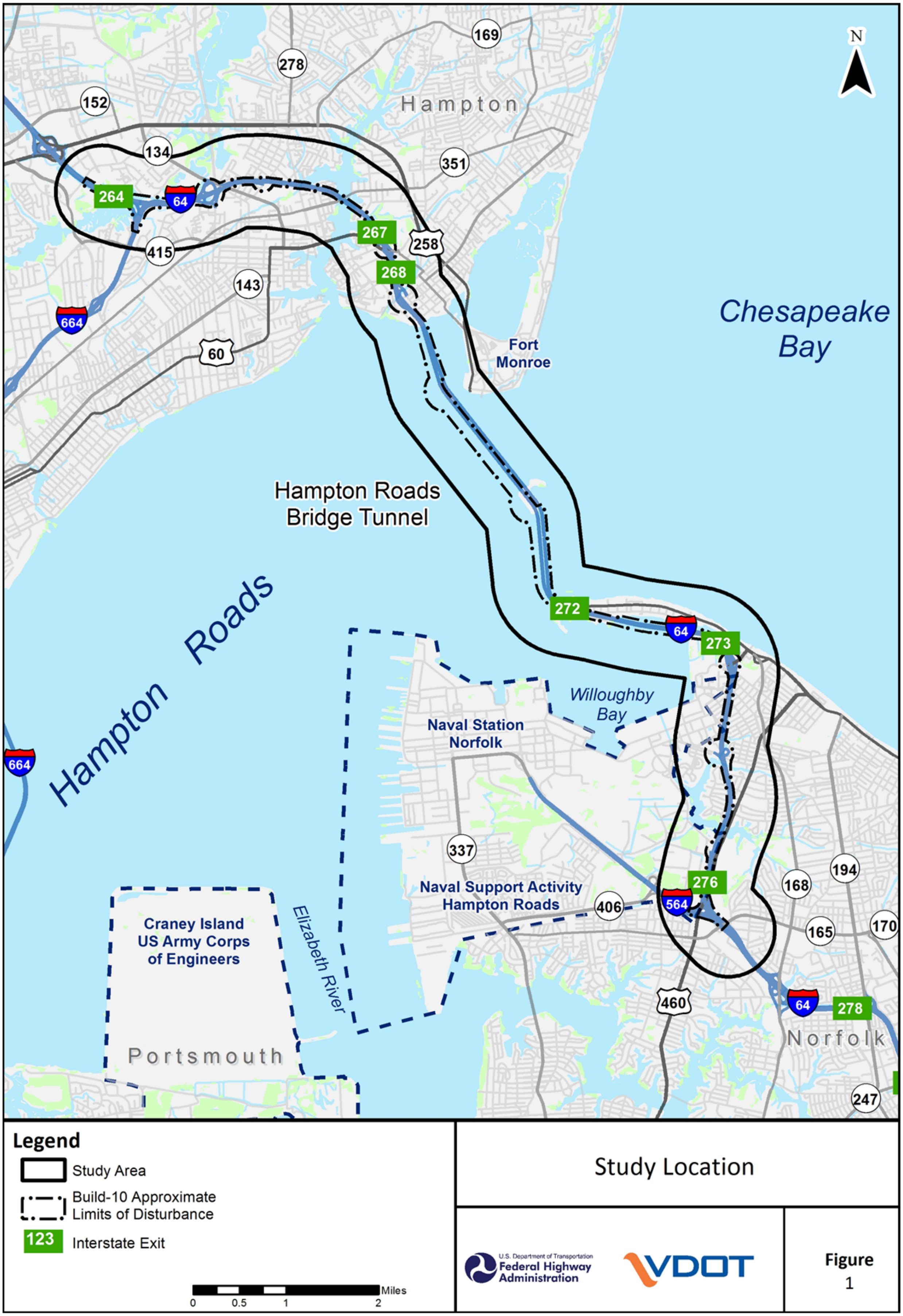
The Virginia Department of Transportation (VDOT), in cooperation with the Federal Highway Administration (FHWA), is considering a range of transportation alternatives along the I-64 Hampton Roads Bridge Tunnel (HRBT) corridor. As part of this process, VDOT and FHWA are studying the environmental consequences of the No-Build Alternative and three Retained Build Alternatives: the Build-8, Build-8 Managed, and Build-10 Alternatives. The study area, as shown in **Figure 1**, is a one-mile-wide corridor along I-64 from the interchange with I-664 in the City of Hampton to the interchange with I-564 in the City of Norfolk, a distance of approximately 12 miles, including the 3.5-mile-long HRBT. Information in this report supports discussions presented in the Draft Environmental Impact Statement (EIS).

The purpose of this Technical Report is to analyze existing natural resources in the study area and to identify potential impacts that could result from implementation of the Retained Build Alternatives. Information in this memorandum, described below, will support discussions presented in both the Draft and Final EIS.

- **Section 1** provides an overview of the study and outlines the methods used to assess impacts to natural resources.
- **Section 2** provides an overview of existing conditions (affected environment) and identifies natural resources located within the study area, including water resources, floodplains, wildlife and habitats, and threatened and endangered species.
- **Section 3** assesses potential impacts to natural resources from the No-Build Alternative and each of the Retained Build Alternatives and, if applicable, recommended mitigation.

Details regarding all alternatives, including potential limits of disturbance (LOD), are included in the *Alternatives Technical Report*. Each of the three Retained Build Alternatives retained for detailed evaluation in the Draft EIS represents a set of improvements that form a stand-alone solution to the identified needs of the study. These three alternatives form the basis for considering potential impacts to natural resources, 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. The eastbound and westbound directions would be separated by a concrete traffic barrier. The total pavement width of the Build-8 Alternative mainline would be approximately 150 feet. Through the Willoughby Spit portion of the Norfolk section, 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. Additionally, the typical section 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



Study Location

Figure 1

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. Throughout the Hampton section of the study area, this alternative 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 impacts. 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.

As the limits of disturbance for the Retained Build Alternatives are similar, the figures in this memorandum show the limits for the Build-10 Alternative only, which would have the largest disturbance area and therefore the largest potential impact. The text and tables discuss the potential impact of all Retained Build Alternatives in comparison to the No-Build Alternative.

1.2 Methods

Natural resources within a mile wide corridor along I-64 were identified based on agency input through the scoping process and participating agency meetings, review of existing available scientific literature, Geographic Information System (GIS) databases and mapping; and field reconnaissance of the study area conducted in September 2011. The following Federal, State, and local agencies were consulted for information regarding sensitive natural resources within the study area:

- National Marine Fisheries Service, Habitat Conservation Division (NMFS)
- Natural Resources Conservation Service (NRCS), Chesapeake Office
- United States Army Corps of Engineers (USACE), Norfolk District
- United States Coast Guard (USCG), Fifth Coast Guard District
- United States Environmental Protection Agency (EPA), Region III, Environmental Programs Branch
- United States Fish and Wildlife Service (USFWS)
- Virginia Department of Conservation and Recreation (VDCR)
- Virginia Department of Environmental Quality (VDEQ)
- Virginia Department of Game and Inland Fisheries (VDGIF)
- Virginia Marine Resources Commission (VMRC)

More specific information regarding data gathering sources and approach are presented within the discussion of each resource in Section 2, and references are listed in Section 4.

2. AFFECTED ENVIRONMENT

2.1 Water Resources

Water resources are regulated by the EPA and the USACE according to the Water Pollution Control Act of 1972 (Clean Water Act) and the Water Quality Act of 1987. Section 404 of the Clean Water Act regulates activities affecting Waters of the United States (WOUS). WOUS can be generally defined as all navigable waters and waters that have been or can be used for interstate or foreign commerce, their tributaries, and any waters that, if impacted, could affect the former. WOUS include surface waters (streams, lakes, bays, etc.) and their associated wetlands (inundated or saturated areas that support vegetation adapted for life in wet soils). The EPA, the USACE, the USCG, the VDEQ, and the VMRC all issue permits for various activities in, under, and over WOUS.

Streams, wetlands, and floodplains within a one-mile wide corridor along I-64 were identified by reviewing the aerial photographs and topographic maps, National Wetlands Inventory (NWI) maps from the USFWS, National Hydrography Dataset (NHD) maps from the United States Geological Survey (USGS), VDOT GIS data (VDOT, 2012), and Flood Insurance Rate Maps (FIRM) from the Federal Emergency Management Agency (FEMA). Field reconnaissance was then conducted in September 2011 to ground-truth the existence of potential streams, wetlands, and floodplains within the study corridor, and refine NHD and NWI mapping with conditions observed during general field investigations. A formal delineation of streams and wetlands was not conducted as a part of this and will be completed for the design phase of the project. These water resources are shown in Figure 2 and discussed in greater detail below. A more detailed display of the streams and wetlands mapping within the study areas on aerial photography is provided in Appendix A.

Estimated lengths of streams and areas of wetlands within the study corridor were calculated using GIS. This report uses an abbreviated version of the classification system developed by the USFWS, also known as the Cowardin System (Cowardin et. al, 1979), for identifying wetlands. Wetlands found in the study area include estuarine emergent (EEM), palustrine emergent (PEM), estuarine scrub-shrub (ESS), palustrine scrub-shrub (PSS), and palustrine forested (PFO) systems.

The study corridor crosses three 8-digit watersheds, or hydrologic unit code (HUC), units determined by the EPA, in addition to many wetland and stream resources:

- Lower Chesapeake Bay (HUC 02080101)
- Lynnhaven-Poquoson (HUC 02080108)
- Hampton Roads (HUC 02080208)

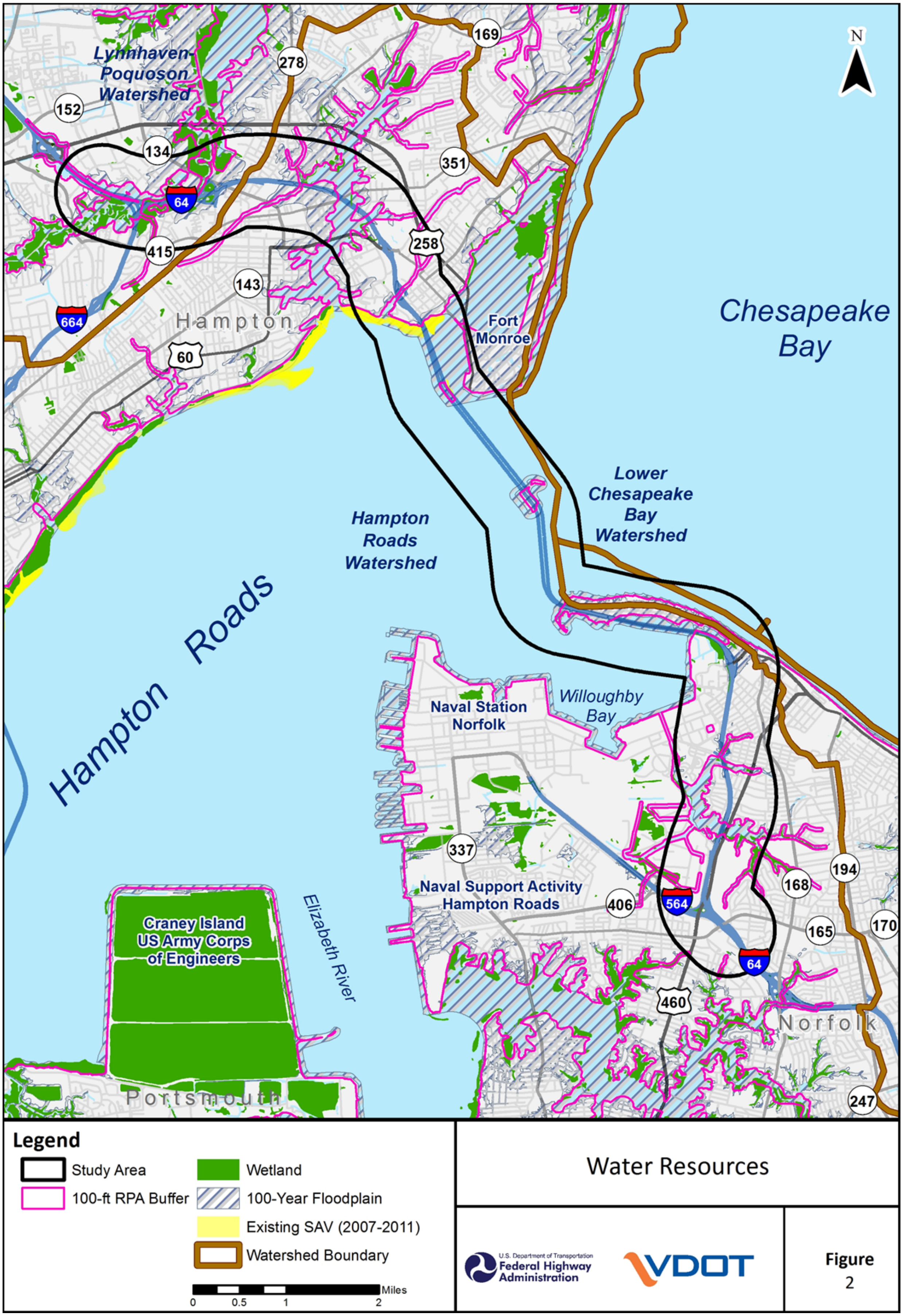
2.1.1 Streams and Navigable Waterways

The study location crosses 30 streams, most of which are small perennial or intermittent streams. Streams crossed by the corridor include:

- Mason Creek including 12 unnamed tributaries
- Oastes Creek including an unnamed tributary
- Mill Creek
- John's Creek
- Hampton River including 2 unnamed tributaries
- Brights Creek including 3 unnamed tributaries
- Newmarket Creek including 5 unnamed tributaries

In addition to these stream crossings, the study area traverses the James River where it meets the Chesapeake Bay (also referred to as Hampton Roads).

According to the USACE, all tidal waters and the entire length of the James River are considered to be navigable (USACE, 2010). The Port of Virginia, located just upstream of the study area, is a naturally deep harbor and the James River allows for access to this harbor and several deep water anchorages within and upstream of the study area (see Figure 3). According to the Virginia Port Authority,

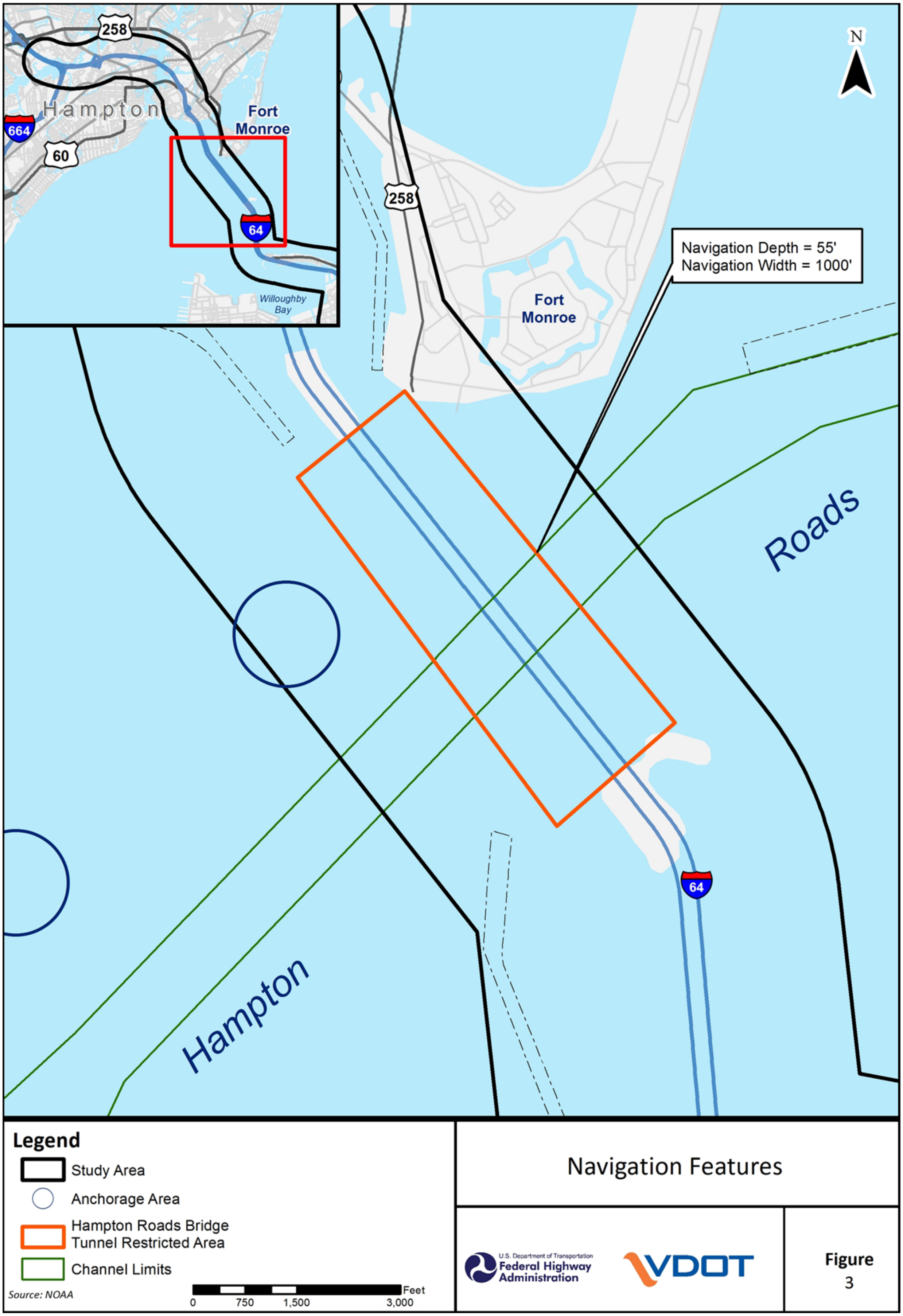


Water Resources

U.S. Department of Transportation Federal Highway Administration

VDOT

Figure
2



Navigation Features

Figure
3

conditions that must be maintained within this area include: James River channel conditions of a 55 foot depth at mean low water (MLW) with a width of 1,000 feet (top of tunnel would need to be a minimum of 60 to 65 feet below MLW), and the preservation of existing deep water anchorages. Table 1 below identifies which, if any, of the streams and navigable waterways have any special designations that would require further consideration.

Table 1. Special Designations of Streams and Navigable Waterways

Designation	Organization	Determination
State Scenic River	VDCR	There are no State Scenic Rivers in the study location.
Wild and Scenic Rivers	Bureau of Land Management, National Park Service (NPS), USFWS, U.S. Forest Service	There are no Federally listed Wild or Scenic Rivers in Virginia.
National Rivers Inventory	NPS	No listed rivers are located in the study location.
Essential Fish Habitat (EFH)	National Oceanic and Atmospheric Administration (NOAA)	The James River is listed as an EFH for: clearnose skate; little skate; windowpane flounder; and smooth dogfish in the study area; and an additional 18 species are located downstream. Further details included in Section 2.2.3
Habitat Areas of Particular Concern (HAPC)	NOAA	The James River is listed for the sandbar shark in the area crossed by the alignment. Further details included in Section 2.2.3.
Exceptional State Waters	VDEQ	No Exceptional State Waters are located in the study location.
Virginia Coastal Zone Management Areas	VDEQ	The entire project area is located within Virginia's coastal zone. Further details included in Section 2.1.8.
Chesapeake Bay Preservation Areas	VDCR	The one-mile wide study area includes 4,300 acres of Chesapeake Bay Resource Protection Areas (RPA). The remainder of the land located within the study location is considered to be Resource Management Area (RMA). Further details included in Section 2.1.7.
Fisheries Management Areas	VMRC	The study corridor crosses three fisheries management areas: Hampton Roads Shellfish Management Area, James River Government Management Area, and Virginia Blue Crab Sanctuary. The Hampton Flats Hard Clam Harvest Area lies upstream within the James River. Further details included in Section 2.2.2.
Shellfish Areas	VMRC	No commercial shellfish sites, Baylor Grounds (public oyster grounds), or State constructed oyster reef areas are located in the study area. Private oyster grounds leased from the State and private oyster gardening sites are located within the study corridor. Further details included in Section 2.2.2.
Marine Sanctuaries	NOAA	There are no National Marine Sanctuaries in the project location.

2.1.2 Wetlands

Wetlands provide valuable habitat for fish and wildlife; improve water quality; perform important hydrologic functions, such as regulating storm flow; maintain food chain and nutrient cycling functions; serve socioeconomic roles; and may support rare and endangered species. Executive Order 11990, Protection of Wetlands, mandates that each Federal agency take action to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance their natural values.

Wetlands are currently defined by the USACE (33 CFR 328.3[b]) and the EPA (40 CFR 230.3[t]) as:

> Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

Wetlands observed in the study area were generally associated with tidal waterways along riparian corridors. Their functions include: groundwater discharge, nutrient removal, sediment/toxin retention, and wildlife habitat. The majority of the wetlands include emergent systems that are mainly dominated by monocultures of cordgrass (*Spartina alterniflora*) and common reed (*Phragmites* spp.),with a few examples of aster, jewelweed (*Impatiens capensis)*, cattails (*Typha latifolia*), and sedges (*Cyperaceae*). Forested wetlands, along the slightly more inland fringes of the waterways, support vegetation including: poison ivy (*Toxicodendron radicans*), sweet gum (*Liquidambar styraciflua*), red oak (*Quercus rubra*), sassafras (*Sassafras albidum*), red maple (*Acer rubrum*), red mulberry (*Morus rubra*), and loblolly pine (*Pinus taeda*).

The one-mile wide study area includes approximately 220 acres of emergent wetland (EEM and PEM), 15 acres of scrub-shrub wetland (ESS and PSS), and 70 acres of palustrine forested wetland (PFO), for a total of 305 acres.

2.1.3 Water Quality

In compliance with Sections 303(d), 305(b), and 314 of the Federal Clean Water Act and the Safe Drinking Water Act, VDEQ has developed a prioritized list of water bodies that currently do not meet water quality standards. VDEQ monitors streams for a variety of water quality parameters, including temperature, dissolved oxygen, pH, fecal coliform, E. coli, enterococci, total phosphorus, chlorophyll a, benthic invertebrates, metals and toxics in the water column, sediments, and fish tissues. The 303(d) list includes those water bodies and watersheds that exhibit levels of impairment requiring investigation and restoration. Not all parameters are monitored at each of the ambient water quality monitoring stations. Citizen groups and Federal agencies also monitor some streams and provide their data to the VDEQ for compilation. As shown in Table 2**,** the study area crosses seven impaired water bodies included on the 303 (d) list.

2.1.4 Floodplains

Floodplains have a number of natural and beneficial values, including flood flow moderation, water quality maintenance, and wildlife habitat. The National Flood Insurance Act of 1968 established the National Flood Insurance Program, which the FEMA is responsible for administering. FEMA is required to identify and map the nation's flood-prone areas. According to FIRMs produced by FEMA, approximately 3,710 acres of 100-year floodplains are within the mile-wide corridor along I-64 between I-664 and I-564, as shown in Figure 2. One-hundred-year floodplains have a one percent chance of flooding in any given year. Mapped floodplains include those associated with:

- Mason Creek,

- Oastes Creek,
- James River,
- Mill Creek,
- John's Creek,
- Hampton River,
- Brights Creek, and
- Newmarket Creek.

Table 2. Impaired Water Bodies

Water body	Uses Supported	Impairment	Source
Chesapeake Bay	Public Water - N/A* Recreation - X ** Wildlife - X Aquatic Life - No SAV*** - No Shell Fishing - Yes Fish Consumption - No	PCB in Fish Tissue, Aquatic Plants (Macrophytes)	Atmospheric Deposition - Nitrogen, Industrial Point Source Discharge, Internal Nutrient Recycling, Loss of Riparian Habitat, Municipal Point Source Discharges, Wet Weather Discharges
Newmarket Creek - Upper	Public Water - N/A Recreation - No Wildlife - Yes Aquatic Life - No SAV - No Shell Fishing - Yes Fish Consumption - No	Enterococcus, Dissolved Oxygen, Fecal Coliform, PCB in Fish Tissue, Aquatic Plants (Macrophytes)	Atmospheric Deposition - Nitrogen, Discharges from Municipal Separate Storm Sewer Systems (MS4), Industrial Point Source Discharge, Internal Nutrient Recycling, Loss of Riparian Habitat, Municipal Point Source Discharges, Wet Weather Discharges
Newmarket Creek - Lower	Public Water - N/A Recreation - No Wildlife - Yes Aquatic Life - No SAV - No Shell Fishing - No Fish Consumption - No	Enterococcus, Dissolved Oxygen, Fecal Coliform, PCB in Fish Tissue, Aquatic Plants (Macrophytes)	Atmospheric Deposition - Nitrogen, Clean Sediments, Discharges from Municipal Separate Storm Sewer Systems (MS4), Industrial Point Source Discharge, Internal Nutrient Recycling, Loss of Riparian Habitat, Municipal Point Source Discharges, Wet Weather Discharges
Hampton River	Public Water - N/A Recreation - No Wildlife - Yes Aquatic Life - No SAV - Yes Shell Fishing - N/A Fish Consumption - No	Enterococcus, Dissolved Oxygen, PCB in Fish Tissue	Atmospheric Deposition - Nitrogen, Industrial Point Source Discharge, Internal Nutrient Recycling, Loss of Riparian Habitat, Municipal Point Source Discharges, Wet Weather Discharges
Willoughby Bay	Public Water - N/A Recreation - Yes Wildlife - X Aquatic Life - Insufficient Information SAV - Yes Shell Fishing - N/A Fish Consumption - No	PCB in Fish Tissue	Source Unknown

Table 2. Impaired Water Bodies

Water body	Uses Supported	Impairment	Source
Mill Creek	Public Water - N/A Recreation - X Wildlife - X Aquatic Life - Insufficient Information SAV - Yes Shell Fishing - N/A Fish Consumption - No	PCB in Fish Tissue	Source Unknown
James River at Hampton Roads Harbor	Public Water - N/A Recreation - Yes Wildlife - Yes Aquatic Life - No SAV - Yes Shell Fishing - N/A Fish Consumption - No	Chlorophyll-a, Nutrient/Eutro-phication Biological Indicators, PCB in Fish Tissue	Industrial Point Source Discharge, Municipal Point Source Discharges, Source Unknown, Non-Point Source

Source: VDOT GIS Layers - VDEQ, 2010. 2010 Water Quality Assessment 305(b)/303(d) Integrated Report.
**N/A – Not applicable*
*** X – Not assessed*
***SAV – Submerged Aquatic Vegetation

2.1.5 Hydrodynamics

A three-dimensional hydrodynamic-sedimentation model was developed in the late 1990's by the Virginia Institute of Marine Science (VIMS). This model was developed to model tides, currents, circulation, salinity, and sedimentation within Hampton Roads and nearby tributaries. Simulations produced by the model were verified by VIMS through field observations of tides and currents. The following summarizes the existing conditions used in the model. Additional details regarding the VIMS model are provided in Appendix B. Given that no significant changes have occurred along the Hampton Roads shoreline since the model results were published, the existing conditions provided in the model are assumed to remain valid and are discussed below.

Hampton Roads' tide ranges from approximately 0.5 meters below to 0.5 meters above mean water level. Surface currents near Newport News Point range from approximately -75 to 100 centimeters per second and bottom currents range from approximately -40 to 40 centimeters per second. Simulated currents south of the northern entrance/exit to the I-64 tunnel at mean tidal range and mean river inflow were -50 to 50 centimeters per second for surface flow and -15 to 15 centimeters per second for bottom flow.

The Elizabeth River, located southwest of the study corridor, is a semi-enclosed tidal basin that receives no freshwater or estuarine inflow from any source other than the James River. The river's tidal prism (volume of flood or ebb flow entering or leaving an enclosed region) was modeled to identify the volume of water entering and leaving the basin over the tidal cycle. Discharge flood volumes range from approximately 17.5 to 18.5 x 10^6 cubic meters and ebb volumes range from -18.7 to 18.1 x 10^6 cubic meters. A clockwise surface eddy appears at the entrance of the Elizabeth River near the northeast corner of Craney Island. The eddy only exists during apogean-neap tides (during the smallest tidal range).

Another large eddy (counterclockwise) appears in non-tidal surface currents at the southwest end of Hampton Flats, which is located in Hampton Roads at the mouth of the Hampton River. This eddy especially occurs during apogean-neap tides. During perigean-spring tide (during the largest tidal range), the surface eddy is weaker and shifts to the east away from Hampton Flats.

Salinity ranges from 23 to 30 parts per thousand during low river inflow, from 13 to 23 parts per thousand during mean river flow, and from 6 to 22 parts per thousand during high river inflow. An average salinity of 14 to 22 parts per thousand during apogean-neap tides and perigean spring tides exists near I-64.

Sedimentation patterns in the James River show that coarser sandy bottom sediments occur in the channel and northern flank near Hampton Flats and finer muddy bottom sediments occur in the southern flank near Craney Island. Areas of high sedimentation potential are located along the south shore of Hampton Roads with relatively little along the north shore.

2.1.6 Aquifers/Water Supply

In 1974, the Safe Drinking Water Act was passed by Congress to regulate the public drinking water supply. The 1986 and 1996 Amendments further protect the water supply by requiring actions that protect both drinking water and its sources. The 1996 Amendments mandate that states assess, delineate, and map protection areas for their public drinking water sources, and determine potential risks to those sources. Source water protection is not specifically mandated by the Safe Drinking Water Act; however, states, tribes, and communities are encouraged to use this information to protect the sources from pollution of major concern and may pass local regulations. Private wells serving fewer than 25 individuals are not regulated by the Safe Drinking Water Act (EPA, 2012).

No sole source aquifers, source protection areas, water supply reservoirs, or wells are located in the vicinity of the I-64 corridor.

2.1.7 Chesapeake Bay Preservation Act

The Chesapeake Bay Preservation Act was enacted by the Virginia General Assembly in 1988 to protect and manage Virginia's "coastal zone". The Act requires local governments to include water quality protection measures in their zoning and subdivision ordinances and in their comprehensive plans. President Obama's Executive Order in 2009 on the Chesapeake Bay included goals for restoring clean water by reducing nitrogen, phosphorus, sediment, and other pollutants; recovering habitat by restoring a network of land and water habitats to support priority species and other public benefits; sustaining fish and wildlife; and conserving land and increasing public access.

Resource Protection Areas (RPAs) include tidal wetlands, tidal shores, non-tidal wetlands connected by surface flow and contiguous to tidal wetlands or perennial water bodies, and highly erodible soils, as well as a 100-foot vegetated buffer area located adjacent to and landward of these features and along both sides of any water body with perennial flow within the Chesapeake Bay watershed. When preserved in their natural condition, RPAs protect water quality, filter and reduce the volume of runoff, prevent erosion, and perform other important biological and ecological functions. These areas are subject to local Chesapeake Bay Preservation Act requirements to minimize land disturbance, preserve indigenous vegetation, minimize impervious surfaces, control stormwater runoff, and implement erosion and sediment control plans for land disturbances. Activities within RPAs are further restricted to water dependent or redevelopment related activities. Public roads and their associated structures are conditionally exempt from regulation provided they are constructed in accordance with the Erosion and Sediment Control Law (§10.1-560 et seq. of the Code of Virginia) and the Stormwater Management Act (§10.1-603. 1 et seq of the Code of Virginia).

RPAs within the study corridor were mapped by placing a 100-foot buffer to the edge of perennial streams and adjacent wetlands. Approximately 4,300 acres of RPAs are present within the one-mile wide study corridor. All additional land within the study corridor is considered Resource Management Area (RMA). RMA includes all land outside the RPA which if improperly used or developed, has the potential to degrade water quality or diminish the functions of the RPA.

2.1.8 Virginia Coastal Zone Management Program (CZMP)

Federal actions occurring within, or with the likelihood to affect, any land or water use, or natural resource of a State's coastal zone, including cumulative and secondary impacts, must be consistent with a State's Federally approved Coastal Zone Management Program (CZMP) according to Section 307 of the Federal Coastal Zone Management Act of 1972, as amended, and National Oceanic and Atmospheric Administration (NOAA) regulations (15 CFR part 930); and require a consistency determination.

According to VDEQ, Virginia's coastal zone "encompasses the 29 counties, 17 cities, and 42 incorporated towns in 'Tidewater Virginia', as defined in the Code of Virginia 28.2-100" (VDEQ, 2011b). The entire study area is located within Virginia's coastal zone. As such, any development within this area must be consistent with the applicable Enforceable Regulatory Programs that comprise Virginia's CZMP presented in Table 3.

Table 3. Virginia Coastal Zone Management Program Enforceable Regulatory Programs

Regulatory Program	Resource	Virginia Code	Regulatory Agency	Notes
Fisheries Management	Conservation and enhancement of finfish and shellfish	28.2-200 to 28.2-713 29.1-100 to 29.1-570	VMRC VDGIF	
Subaqueous Lands Management	Establishes conditions for granting or denying permits to use State-owned bottomlands	28.2-1200 to 28.2-1213	VMRC	
Wetlands Management	Preserve wetlands and prevent their despoliation	28.2-1301 to 28.21320 621-44.15:5	VMRC VDEQ	Tidal Water Protection Permits tidal & nontidal
Dunes Management	Prevent destruction or alteration of primary dunes	28.2-1400 to 28.2-1420	VMRC	
Non-point Source Pollution	Reduce soil erosion and decrease inputs of chemicals and sediments	10.1-560 et. seq	VDCR	
Point Source Pollution Control	Regulates discharges into State waters through Virginia Pollutant Discharge Elimination System and Virginia Pollution Abatement permits	62.1-44.15	VDEQ	

Table 3. Virginia Coastal Zone Management Program Enforceable Regulatory Programs

Regulatory Program	Resource	Virginia Code	Regulatory Agency	Notes
Shoreline Sanitation	Septic tank placement	32.1-164 to 32.1-165	Dept. of Health	Contact may be required when determining relocations and removal of existing systems
Air Pollution	Attainment and maintenance of National Ambient Air Quality Standards	10-1.1300 to 10.1-1320	Air Pollution Control Board	
Coastal Lands Management		10.1-2100 to 10.1-2114 9 VAS 10-20 et. seq	VDCR	

2.2 Wildlife and Habitat

The project corridor is located in Ecoregion 63b of the EPA's Level IV Ecoregions (Woods, et al., 1999). The Chesapeake-Pamlico Lowlands and Tidal Marshes (part of the Middle Atlantic Coastal Plain), is characterized by nearly flat terrain, terraces, tidal marshes, ponds, and swampy streams. Brackish wetlands are common and serve as habitat for fish, shellfish, and wildfowl. Natural vegetation supported includes oak-hickory-pine forests, northern cordgrass prairie, and southern floodplain forest. Streams are usually low in gradient, sluggish, tidally influenced, poorly incised, and lack a defined channel with wide riparian wetlands. Extensive tidal marshes and salt estuarine bay marshes are found on the poorly drained soils of the silty low terraces (Woods, et al., 1999).

Table 4 summarizes the general habitat types along the mile-wide corridor. Although urban land uses dominate terrestrial portions of the corridor, there are small areas containing shrubs and patches of woods that harbor wildlife species adapted to urban and semi-urban conditions. Most of the terrestrial habitat is highly fragmented. Any areas that could be interpreted as "wildlife corridors" generally follow streams that traverse the area. Wooded areas generally are found along waterways. Urban fields include cemeteries, parks, and open undeveloped vegetated fields. Wildlife in developed areas includes species adapted to urban/suburban conditions, such as rabbits, whitetail deer, eastern grey squirrels, red fox, and a number of common bird species. Aquatic and shoreline environments within the study area vicinity may support rare, threatened, or endangered species as discussed below.

Table 4. Habitat within the Study Corridor

Habitat	Acres within Mile-Wide Corridor	Percent of Mile-Wide Corridor
Water	3,720	47%
Urban Field	502	6%
Urban Shrub Area	18	less than 1%
Urban Forest	420	5%
Developed Lands	3,222	41%
Total	**7,881**	**100%**

Sources: City of Hampton and City of Norfolk Land Use GIS databases, aerial imagery, and field verification.
Note: Acreage in this table does not include roads.

2.2.1 Water Bird Nesting

Water bird nesting colonies have been recorded along Rip Raps Island, which hosts Fort Wool, and the adjacent island that contains the tunnel portals for I-64 (see Figure 4). Species known to use this area as a nesting site include: herring gull, laughing gull, great black-backed gull, black skimmer, gull-billed tern, royal tern, common tern (VDOT, 2012). According to the VDCR Division of Natural Heritage, this area has been identified as a site of general significance (VDCR rank "B5") due to the presence of black skimmer (Baird, 2011). VDCR has also indicated that least terns have been documented "on the south shore within the project area" (Baird, 2011). A brief description of the population status and general nesting and foraging habits of each of the water bird species mapped by VDGIF (VDOT, 2012) as occurring within the study area vicinity is provided below.

Herring Gull (*Larus argentatus*) – Herring gulls nest in colonies near vegetation, rocks, or cliffs on the coast. They can also be found near rivers, marshes, and landfills. Their nests need to be in an area without predators, since they are usually on the ground. Herring gulls are not a species of concern; their population is growing. They are found throughout the Tidewater and Piedmont regions of Virginia. They feed on a wide variety of sea animals and will consume them either dead or alive. In addition, they consume garbage, insects, seeds, and berries. Herring gulls breed from May to August.

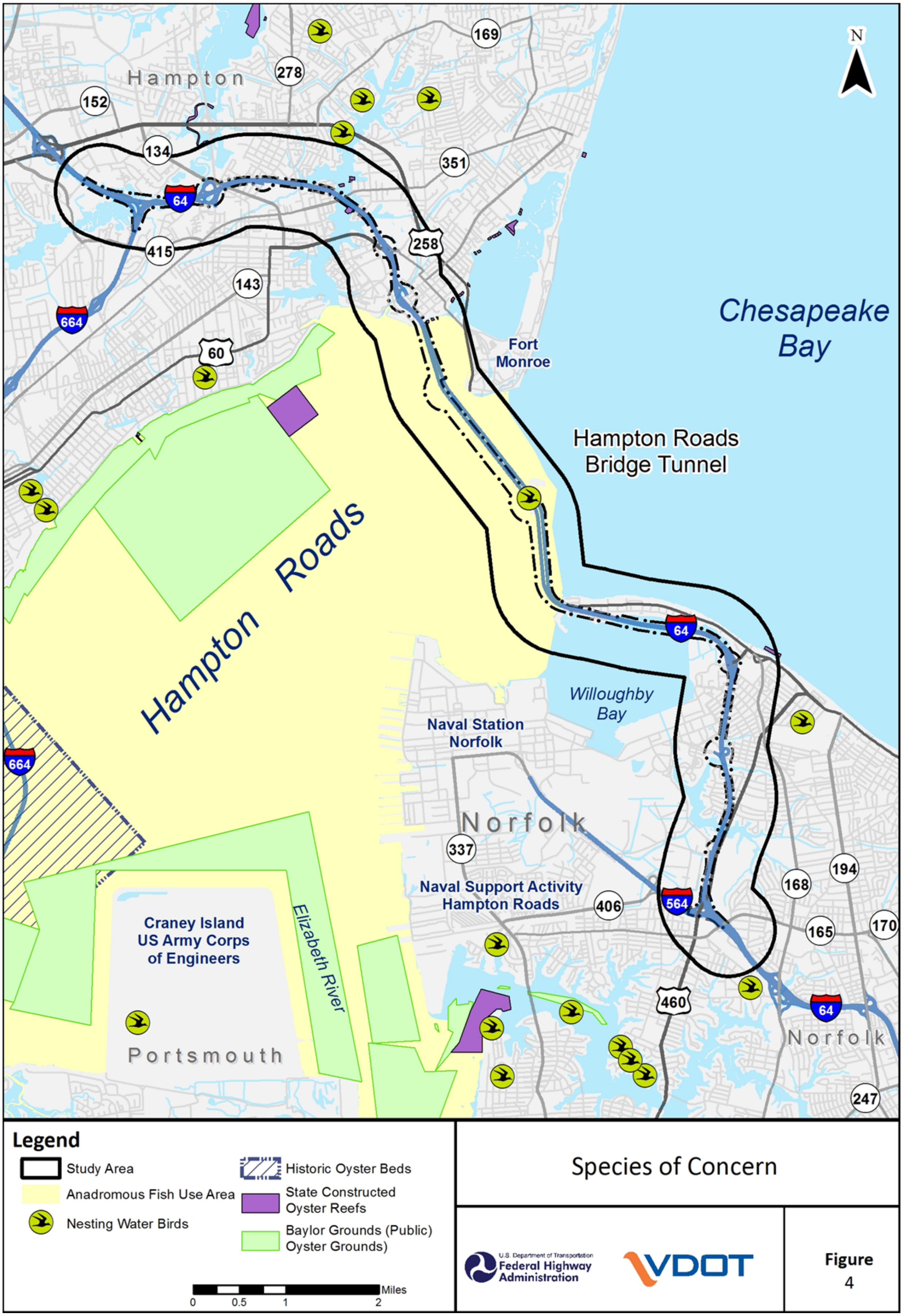
Laughing Gull (*Larus atricilla*) – Laughing gulls nest on coastal islands from Nova Scotia to Florida and as far west as Texas. Their nests are located in the open of islands of marshes and are made of grass and stems. Laughing gulls are common in the Tidewater region of Virginia during summer; they are coastal birds and do not usually travel to inland water bodies. Their diet includes a variety of small fish, crustaceans, large insects, and sometimes garbage. A large portion of their diet may be food taken from other birds. Their population is stable in Virginia, and they are not listed as a species of concern. Laughing gulls breed from late April to early August. Eggs are usually laid in May and June.

Great Black-Backed Gull (*Larus marinus*) – Great black-backed gulls are the largest gull species. They are typical transients and winter residents on Virginia's Eastern Shore and Tangier Island. They build their grass nests on the ground. They are not listed as a species of concern in Virginia. Diet is similar to other gulls, whereas they consume fish, insects, and garbage. Great black-backed gulls breed in June and July.

Black Skimmer (*Rynchops niger*) – The black skimmer is common to Virginia's Eastern Shore and lower Chesapeake Bay area during the summer. They are classified in the Virginia Wildlife Action Plan under Tier II as "Very High Conservation Need". Black skimmers eat an all-fish diet (mainly silversides and killifishes) with the exception of some crustaceans. They feed by skimming over the water surface. They need an undisturbed nesting area and typically build their nests in the sand. Black skimmers breed from mid-April to mid-May, and lay eggs from mid-May to early July.

Gull-Billed Tern (*Sterna nilotica*) – The gull-billed tern is listed as State Threatened and is also in Tier I of Virginia's Wildlife Action Plan as a species of "Critical Conservation Need". Their habitat will continue to decline with increasing threats to their habitat from human development, recreation, and boating. Gull-billed terns breed on Virginia's Eastern Shore. This species may be affected by pesticides, since their diet consists mostly of insects. Typical habitat is salt marshes or higher portions of beaches away from the tide. Gull-billed terns begin nesting at the end of April. Egg-laying begins mid-May and goes until July.

Royal Tern (*Sterna maxima maximus*) – The Royal tern is listed in Virginia's Wildlife Action Plan under Tier II as "Very High Conservation Need". Their nests are small indentations in the sand and the eggs are commonly taken as a food source by laughing gulls (*Larus atricilla*). Their nests are disturbed by high tides, since nests are located near the high tide water level. Royal Terns lay eggs from the middle of May to the end of June. Incubation lasts 30 to 31 days, and young take 28 to 35 days to fledge. They



Species of Concern

U.S. Department of Transportation Federal Highway Administration

VDOT

Figure
4

are common in the Chesapeake Bay during the summer. Royal terns normally eat small fish, which they dive to retrieve.

Common Tern (*Sterna hirundo*) – The common tern is classified on Virginia's Wildlife Action Plan under Tier III as "High Conservation Need". They are common on Virginia's Eastern Shore during breeding season and common in the Chesapeake Bay during the summer. They build nests near the high water mark on beaches. Common terns arrive at their breeding site from the middle of April to middle of May. They lay eggs from May to the middle of July. Incubation is 24 to 26 days, and young take 26 to 27 days to fledge. Common terns feed on silversides and killifish by diving for them.

Least Tern (*Sterna antillarum*) – The least tern is classified in the Virginia Wildlife Action Plan under Tier II for "Very High Conservation Need". The interior population of least tern has been listed as Federally endangered; however, in Virginia (along the coast) the populations are not listed. They are typically found in Virginia during the breeding season. Least terns build their nests by digging small holes in the sand near food sources. They lay their eggs from May to July and eggs incubate for 20 to22 days. Least terns hunt by skimming or diving and will eat prey immediately, while flying. Diet consists mostly of small fish and crustaceans; but may include worms, mollusks, sand eels, shrimp, and prawns.

2.2.2 Benthic Species

Benthic species are organisms that live at the bottom of water bodies like the Chesapeake Bay, and form an important part of the food web. Because most benthic creatures are stationary and feed upon primary producers (phytoplankton), they are good indicators of water quality and sediment conditions. Benthic organisms in the vicinity of the study corridor include commercially important shellfish, such as blue crab, hard clam, and oysters. There are approximately 3,150 acres of benthic habitat within the study area.

As indicated in Table 1, a number of fisheries/shellfish management areas have been established within or adjacent to the study area. VMRC manages these areas to protect and promote populations of commercially important benthic species and restricts harvesting within these areas in accordance with Section 28.2 of the *Code of Virginia*. For example, blue crabs cannot be taken from certain areas within the Virginia Blue Crab Sanctuary for commercial or recreational purposes between May 16 and September 15. In addition, as of 29 May 2012, the State Health Commission has designated the area between the Hampton Roads Bridge-Tunnel and Monitor Merrimac Memorial Bridge-Tunnel as a Condemned Shellfish Area. Removal of shellfish within this area requires a permit from VMRC. Seasons for shellfish removal within condemned areas are typically from April 1 through November 1 for private grounds and May 1 through August 15 from public grounds, however these dates are subject to change by VMRC.

The following are brief descriptions of the life histories and habitat associations for each of the three commercially important benthic species that occur within or adjacent to the study corridor.

Blue Crab (*Callinectes sapidus*) – Blue crabs use all of the Chesapeake Bay's habitats during the course of its life. They are abundant in shallow waters during warm weather, particularly among bay grass beds. They hibernate in the Bay's deep trenches in winter. Males range farther up into the fresher waters of the Bay and its rivers. Females tend to congregate in saltier waters. Blue crab females lay between 1.75 and 2 million eggs per spawning. The eggs are extruded onto the pleopods (swimming legs) and hatch 14 to 17 days afterwards. Their diet consists of zooplankton in the larval stages. Bivalves (hard clams and oysters), gastropods, xanthid crabs, and fish are eaten in the juvenile and adult stages.

Hard Clam (*Mercenaria mercenaria*) – Hard clams live in the muddy bottoms of estuaries and lagoons. They prefer shallows water from less than a meter up to 15 meters deep. Hard clams feed by filtering water through gill filaments, which have mucous sheets that trap phytoplankton. Females spawn 10 to 30 million eggs into the water. Eggs are fertilized externally. Predators of clams include crabs, whelks, and sea stars.

Oyster (*Crassostrea virginica*) – Oysters are typically found in shallow areas (up to 8 meters deep in the Chesapeake Bay) on a firm substrate such as rocks or shells of other oysters. The diet consists of algae, phytoplankton, and small detritus. Females lay 2 million to 115 million eggs during spawning. Spawning usually takes place during the summer in the mid-Atlantic range.

2.2.3 Essential Fish Habitat

Essential Fish Habitat (EFH) includes aquatic ecosystems required for important factors in a fish's life cycle: "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (NOAA, 2011b). NMFS works with the regional fishery management councils to identify the essential habitat for every life stage of each Federally managed species using the best available scientific information. NMFS, in coordination with the councils, also has identified Habitat Areas of Particular Concern (HAPC). These are considered high priority areas for conservation, management, or research because they are rare, sensitive, stressed by development, or important to ecosystem function.

NOAA maintains data on EFH and HAPC by mapping waters into 10-minute longitudinal by 10-minute latitudinal squares. The study area is located within the four 10 x 10 minute squares listed in Table 5. These four squares span a distance of approximately 10 miles to the east and west of the Hampton Roads Bridge Tunnel and include portions of the James River, Hampton Roads, the Elizabeth River, Willoughby Bay, and the Chesapeake Bay.

Table 5. Four 10 x 10 Minute Longitudinal/Latitudinal Squares within the Study Area

Square	North	East	South	West
1 = 37007620	37° 10.0' N	76° 20.0' W	37° 00.0' N	76° 30.0' W
2 = 37007610	37° 10.0' N	76° 10.0' W	37° 00.0' N	76° 20.0' W
3 = 36507620	37° 00.0' N	76° 20.0' W	36° 50.0' N	76° 30.0' W
4 = 36507610	37° 00.0' N	76° 10.0' W	36° 50.0' N	76° 20.0' W

NOAA lists species known to occur in each square by life cycle stage in a checklist form. Nine fish species, three skate species, and three shark species are listed as having EFH for various life stages within each of the 10 x 10 minute squares. HAPC is listed for one species, the sandbar shark (*Carcharhinus plumbeus*) within each square. Table 6 lists species that have EFH or HAPC located within those four 10-minute squares.

Table 6. Essential Fish Habitat and Habitat Areas of Particular Concern

Species	Scientific Name	Known to Occur in the Study Area Vicinity	
		HAPC	EFH
Atlantic Butterfish	*Peprilus triacanthus*	--	All Lifestages
Black Sea Bass	*Centropristis striata*	--	Juveniles, Adults
Bluefish	*Pomatomus saltatrix*	--	Juveniles, Adults
Clearnose Skate	*Raja eglanteria*	--	Juveniles*, Adults*
Cobia	*Rachycentron canadum*	--	All Lifestages
Dusky Shark	*Carcharhinus obscurus*	--	Larvae, Juveniles
Little Skate	*Raja erinacea*	--	Juveniles*, Adults*
King Mackerel	*Scomberomorus cavalla*	--	All Lifestages

Table 6. Essential Fish Habitat and Habitat Areas of Particular Concern

Species	Scientific Name	Known to Occur in the Study Area Vicinity	
		HAPC	EFH
Red Drum	*Sciaenops occelatus*	--	All Lifestages
Sandbar Shark	*Carcharhinus plumbeus*	Larvae, Juveniles, Adults	Larvae, Juveniles, Adults
Smooth Dogfish	*Mustelus canis*	--	All Lifestages**
Spanish Mackerel	*Scomberomus maculatus*	--	All Lifestages
Summer Flounder	*Paralichthys dentatus*	--	Larvae, Juveniles, Adults
Windowpane Flounder	*Scophthalmus aquosus*	--	Eggs, Juveniles, Adults
Winter Skate	*Raja ocellata*	--	Juveniles*, Adults*

Source: NOAA, 2012a.
** Skatemaps*
***Essential Fish Habitat Mapper*

Five of the above species are identified by NOAA as Species of Concern. Life history information for each of these species is provided below to provide background regarding habitat requirements of Federally managed species within EFH and HAPC.

Clearnose Skate (*Raja eglanteria)* – Clearnose skate lay single fertilized eggs in striated cases. Eggs incubate for around 3 months before hatching. Their diet is mainly polychaetes, a variety of crustaceans (shrimp, crabs, bivalves), and small fish like sole and weakfish. Sharks are regular predators of the clearnose skate. They are seen in the Chesapeake Bay from April to December.

Little Skate (*Leucoraja erinacea*) – Little skate females lay eggs which are enclosed in a leathery case, which is sometimes referred to as a "mermaid's purse". Each case holds one fertilized egg. The cases stick to the bottom floor via sticky filaments. Eggs require at least 5 to 6 months until hatching. Sea urchins and whelks prey on little skate eggs. Little skates' diet consists of crustaceans (amphipods and isopods) and sometimes includes bivalves and fish. They are most common in the lower Chesapeake Bay during the winter, and if they stay during the summer, they will move to deeper waters.

Sandbar Shark (*Carcharhinus plumbeus)* – Sandbar sharks are usually found in coastal waters near sand or mud flats. The adults are migratory and prefer tropical waters. Many juveniles live in the lower Chesapeake Bay and may spend winters near the Gulf Stream off of the North Carolina coast. The females birth pups in shallow estuaries and bays. Usually eight or nine pups are born, with a range of one to fourteen pups possible. Females alternate one year pregnant and one year nesting. Sandbar sharks are mainly bottom-feeders, eating small fish, mollusks, and crustaceans. The juveniles mostly prey on blue crabs and shrimp. Other sharks may hunt juvenile sandbar sharks.

Smooth Dogfish (*Mustelus canis)* – Smooth dogfish are typically found in inshore and intertidal waters up to 200 meters deep. They tend to stay on muddy or sandy bottoms. Smooth dogfish are the second most abundant shark in the Mid-Atlantic. Pups develop inside the females; gestation lasts about 10 months. Their diet is made up of crabs, lobsters, small bony fish, squid, bivalves, annelid worms, and occasionally garbage.

Windowpane Flounder *(Scophthalmus aquosus)* – Windowpane flounder usually live in shallow water with sand, silt or mud bottoms. Windowpane eggs are buoyant spheres that usually hatch eight days from spawning. Many juveniles are hunted by dogfish, skate, cod, sea bass, and summer flounder. Their diet is primarily shrimp and fish larvae; sometimes they may prey upon their own species' larvae.

2.2.4 Anadromous Fish and Trout Waters

Anadramous Fish Use Areas are migration pathways, spawning grounds, or nursery areas identified by VDGIF as having been used or have the potential to be used by anadromous fish. Confirmed Anadromous Fish Use Areas are those waters where anadromous fish species have been observed. The James River is a confirmed Anadromous Fish Use Area (see Figure 4) for: alewife (*Alosa pseudoharengus*), American shad (*Alosa sapidissima*), Atlantic sturgeon (*Acipenser oxyrhynchus*), striped bass (*Morone saxatilis*), blueback herring (*Alosa aestivalis*), yellow perch (*Perca flavescens*), and hickory shad (*Alosa mediocris*) (VDGIF, 2011a; Vaccaro, 2012). There are approximately 2,015 acres of Anadromous Fish Use Area within the study area.

Alewife (*Alosa pseudoharengus*) – Alewives are on the Virginia Wildlife Action Plan under Tier IV, "Moderate Conservation Need". Their main food sources are plankton, insects, and crustaceans. Many are now landlocked in the Great Lakes region, and there are several landlocked waters in Virginia containing alewives. Alewives stay in the pelagic zone during the day and move to the littoral zone at night. They have a strong physical resemblance to the blueback herring (*Alosa aestivalis*).

American Shad (*Alosa sapidissima*) – American shad are listed on Virginia's Wildlife Action Plan under Tier IV with "Moderate Conservation Need". They support sport and commercial fisheries. American shad spawn in tidal freshwater, near the mouths of creeks. When not spawning, they appear in schools on the continental shelf. Their diet consists of plankton, microcrustaceans, insects, worms, and small fish.

Atlantic Sturgeon (*Acipenser oxyrinchus*) – Atlantic sturgeon are anadromous, migratory fish with long, flat snouts. They spawn in the Chesapeake Bay in April and May and need a "solid substrate" to lay their eggs on. They are known to occur in Hampton Roads Channel. "Sturgeon stocks in Virginia probably can be rehabilitated by prohibiting sturgeon landings from coastal fisheries…and by hatchery culture and stocking". Atlantic sturgeon eat worms, crustaceans, aquatic insects, snails, and sand lances. The population is affected by overfishing, pollution, and dam construction, as well as gravel/stone removal, flow changes, and channelization.

Striped Bass (*Morone saxatilis*) – The Chesapeake striped bass is not a species of concern; however it is "beleaguered". Their diet consists of fish, mollusks, and crustaceans. They depend heavily on water quality within their habitat. The ideal range of total dissolved solids for striped bass is 100 to 900 ppm.

Blueback Herring (*Alosa aestivalis*) – Blueback herring are not endangered or threatened, and they are not a species of concern in Virginia. They are native to Virginia. Their diet consists of plankton, copepods, pelagic shrimp, small fish, and insects. Blueback herring very rarely spawn above the tidewater. They have a wide tolerance for different salinity levels.

Yellow Perch (*Perca flavescens*) – Yellow perch are recreational and commercial fish that are not a species of concern in Virginia. Younger yellow perches eat insects and plankton and the adults eat mainly fish and can even be cannibalistic. Other food sources include crustaceans, copepods, algae, amphipods, and chironomids. They usually live in still or slightly turbid lakes, reservoirs and rivers that are large and cool.

Hickory Shad (*Alosa mediocris*) – Hickory shad are a sport fish that is not a species of concern in Virginia. Their diet is made up mostly by small fish. Their live in marine waters close to land and in tidal rivers and tributaries during spawning.

Time of year restrictions depend on the type of work planned and its location relative to the water body in question. General restrictions for all instream work in Anadromous Fish Use Areas and their tributaries, recommended by VDGIF, are February 15 through June 30. Exact restrictions may vary depending on the species, type of work, and location.

According to the 2012 Catchable Trout Stocking Plan from the 2012 Virginia Fishing Regulations and the VDGIF Trout Fishing Guide Area Maps, no trout waters are located in the project vicinity (VDGIF, 2012a & 2012b).

2.2.5 Submerged Aquatic Vegetation

SAV are widely regarded as keystone species and primary indicators of water quality conditions in the Chesapeake Bay. According to the Virginia Administrative Code (VAC), 4 VAC 20-337-10 et seq. SAV Transplantation Guidelines, any removal of SAV from State bottom would require prior approval by VMRC (VMRC, 2000).

SAV includes any of a diverse assemblage of underwater plants found in the shoal areas of Chesapeake Bay, Virginia coastal bays and river tributaries, primarily eelgrass (*Zostera marina*) and widgeon grass (*Ruppia maritima*), and including, but not limited to: Eurasian watermilfoil (*Myriophyllum spicatum*), redhead grass (*Potamogeton perfoliatus*), wild celery (*Vallisneria americana*), common elodea (*Elodea canadensis*), water stargrass (*Heteranthera dubia*), coontail (*Ceratophyllum demersum*), water-weed (*Egeria densa*), muskgrass (*Najas minor*), pondweeds (*Potamogeton sp*.), and naiads (*Najas* sp.) (VMRC, 2000).

The VIMS has an on-line interactive mapper with downloadable GIS files which shows historic SAV beds in the Chesapeake going back to 1971. Since vegetation can change from year to year due to environmental factors, and annual fluctuations in nutrient levels and water clarity, documentation of the presence of SAV in any year within a period of five consecutive years is considered sufficient to constitute viable SAV habitat. For the purpose of this document, areas which had mapped populations in any year from 2007 to 2011 were considered to be 'existing beds', and are shown in Figure 2. Areas which have not had populations mapped in the last 5 years, yet have had SAV mapped prior to 2007 were considered to be 'historic beds.' Historic beds are important as they are potential mitigation and restoration sites and have the potential of supporting SAV beds naturally in the future. According to historic SAV mapping provided by the VIMS SAV monitoring program, approximately 67 acres of existing (2007 to 2011) SAV beds and an additional 7 acres of historic (1971 to 2006) SAV beds occur within the study area. According to historic SAV mapping provided by the VIMS SAV monitoring program, an eelgrass restoration area is located on the north shore of the James River approximately three miles upstream from the study area (VIMS, 1971-2011).

2.2.6 Invasive Species

Invasive species are non-native plant, animal, or microbial species that cause, or have the potential to cause, economic or ecological harm or harm to human health (Executive Order 13112, Invasive Species). State and local governments have also set up several laws and regulations to prevent the spread of noxious weeds and plants deemed to be detrimental to crops, surface waters, including lakes, or other desirable plants, livestock, land, or other property or to be injurious to public health or the economy. The study corridor is in an urban area where disturbed ground is subject to colonization by invasive species.

2.3 Threatened and Endangered Species

The USFWS and NMFS are responsible for listing, protecting, and managing Federally listed threatened and endangered species under the Endangered Species Act of 1973, as amended. VDCR and VDGIF are responsible for listing, protecting, and managing State listed threatened and endangered species. An endangered species is defined as one that is in danger of extinction throughout all or in a significant portion of its range. A threatened species is one that is likely to become endangered in the foreseeable future.

Eight Federally listed threatened or endangered species are reported to occur or potentially occur within the study area based on habitat requirements and information gathered from the USFWS, NOAA, VDOT, VDCR, and VDGIF (Table 7). An additional five State listed threatened or endangered species are listed as occurring in the vicinity of the study area. Brief, general descriptions of the 13 Federally and State listed threatened and endangered species that may occur within the study area and their habitat requirements are provided below.

Table 7. Federal and State Listed Threatened and Endangered Species that may occur within the Study Area and Vicinity

Scientific Name	Common Name	Status*
Dermochelys coriacea [1,4]	Turtle, leatherback sea	FE/SE
Lepidochelys kempii [1,4]	Turtle, Kemp's (= Atlantic) Ridley sea	FE/SE
Acipenser oxyrinchus [1,3,4]	Sturgeon, Atlantic	FE
Acipenser brevirostrum	Sturgeon, Shortnose	FE/SE
Eretmochelys imbricata [3]	Turtle, hawksbill (= carey) sea	FE/SE
Caretta caretta [1,4]	Turtle, loggerhead sea	FT/ST
Charadrius melodus [1,2,5]	Plover, piping	FT/ST
Chelonia mydas [1,4]	Turtle, green sea	FT/ST
Haliaeetus leucocephalus [1]	Eagle, bald	FS/ST
Crotalus horridus [1]	Rattlesnake, canebrake	SE
Falco peregrines [1]	Falcon, peregrine	ST
Sterna nilotica [1]	Tern, gull-billed	ST
Ambystoma mabeei [1]	Salamander, Mabee's	ST

[1] VDOT GIS layer - 2011 Known occurrences of Federal or State listed wildlife species in Virginia. Virginia Department of Game and Inland Fisheries (VDOT, 2012).
[2] VDCR listed Natural Heritage Species (VDCR, 2011)
[3] Virginia Fish and Wildlife Information Service (VaFWIS) Listed RTE Species (VDGIF, 2011a)
[4] NOAA species indicated (Vaccaro, 2012)
[5] USFWS, 2012
** FE=Federal Endangered; FT=Federal Threatened; SE=State Endangered; ST=State Threatened; FP=Federal Proposed; FC=Federal Candidate; FS=Federal Species of Concern; SC=State Species of Concern*

2.3.1 Federally Endangered (FE)

Leatherback Sea Turtle (*Dermochelys coriacea*) – The leatherback sea turtle is the world's largest sea turtles and the third most abundant turtle in Virginia's waters (VIMS, 2012). The leatherback sea turtle is the largest type of marine sea turtle and is also the only known endothermic sea turtle. They are the most “pelagic” sea turtle, as they prefer water depth greater than 15 feet. Sometimes they will roam near shore and into estuaries, but usually feed in coastal and offshore waters. Their main sources of food are jellyfish and sea nettle, but they can also eat squid, crustaceans, some fish, and seaweed. They are found in Virginia waters during warm months and remain longer than other sea turtles. They require sloping sandy beaches with vegetation for nesting. There is no information on their role in Virginia estuarine or ecological systems. Leatherbacks are predated by killer whales. Some birds, dogs, cats, mongoose, and pigs eat the Leatherback eggs. These predators, as well as fish and sharks, will prey upon the hatchlings. Leatherbacks have had known occurrences in the Cities of Hampton, Norfolk, and

Virginia Beach, and in the Lower and Middle Chesapeake Bay. There have been two "likely" occurrences of leatherbacks in the Cities of Newport News and Poquoson.

Kemp's Ridley Sea Turtle (*Lepidochelys kempii*) – Kemp's Ridley sea turtle is the second most common sea turtle in Chesapeake Bay. They are the smallest and rarest of all sea turtles and are listed as "endangered" throughout their range (VIMS, 2012). Kemp's Ridley sea turtles typically live in eelgrass meadows in the Chesapeake Bay. They do not nest in Virginia; breeding mainly occurs in Tamaulipas, Mexico. There have been known occurrences of Kemp's Ridley sea turtles in the Cities of Hampton, Newport News, Norfolk, Portsmouth, Suffolk, and Virginia Beach. They feed on portunid and brachyuran crabs, but mainly blue crabs (*Callinectes sapidus*) (which also live in near-shore, sea grass beds) in the Chesapeake Bay. Their eggs are eaten by various animals and humans. Many Kemp's Ridley sea turtles are killed by sharks.

Atlantic Sturgeon (*Acipenser oxyrinchus*) – See Section 2.2.4.

Shortnose Sturgeon (*Acipenser brevirostrum*) – Shortnose sturgeon live at the bottom of low salinity rivers, occasionally venturing into the Chesapeake Bay. Although there is a small breeding population in the James River and transient individuals may occasionally find their way to the project area, the salinity is high in this location and does not provide the normal habitat for this species.

Hawksbill Sea Turtles (*Eretmochelys imbricata*) – Only two of these species have been reported in Virginia, and they are considered to be "strays". This project is not likely to have any impact on hawksbill sea turtles (VIMS, 2012). Hawksbill sea turtles nest on tropical beaches and not in Virginia waters, but have been known to migrate as far as Massachusetts. They are omnivores that prefer to eat sponges and have been known to eat Portuguese men-of-war.

2.3.2 Federally Threatened (FT)

Loggerhead Sea Turtle (*Caretta caretta*) – The loggerhead sea turtles is the most common sea turtle in Chesapeake Bay (VIMS, 2012). When nesting, loggerheads need a high sand beach that is not affected by high tides or rising groundwater. They need a nesting area with few predators, particularly raccoons, which will eat the eggs. The hatchlings need Sargassum to float on until they are about 40 centimeters long. Loggerheads occur in the City of Virginia Beach during all seasons. They have known occurrences in the Cities of Hampton, Newport News, and Norfolk during the spring and winter. Loggerheads are mainly carnivorous, having a diet of jellyfish, mollusks, and crabs.

Piping Plover (*Charadrius melodus*) – The piping plover is a native to the Virginia barrier islands and about 100 pairs can be found there presently. The Piping Plover has been absent from typical nesting sites on Craney Island (Portsmouth) and Grandview Beach (Hampton) due to a number of predators and continued human interference. Piping plovers are uncommon in the lower Chesapeake Bay and have no record of nesting on the southern mainland beaches. On Virginia's Barrier Islands, the piping plover nests in dunes, where the geology includes pebbles, cobbles, and shells; and near marshes or vegetation, which provides protection from predators. They are carnivores whose diet consists of worms, larvae, beetles, crustaceans and mollusks. They forage in intertidal beaches or flats on the lagoon side of barrier beaches. Piping plovers are mostly preyed on by raccoons, foxes, and gulls. Human development of beaches has contributed to their population decline.

Green Sea Turtle (*Chelonia mydas*) – The green sea turtle is endangered in United States waters and is seen in the Chesapeake Bay during the late summer and early fall (VIMS, 2012). The green sea turtle is scarce in Virginia, and may be seen because of accidental migration. When not migrating, green turtles prefer sea grass flats which occur in shallow areas of the Chesapeake Bay (VDGIF, 2011a). Green sea turtles have known occurrences in Norfolk, Hampton, and Virginia Beach cities. The adults are well-known for long migrations and impressive navigation skills. This species forages in marine grasses; juveniles are omnivorous but adults mainly eat sea grass and algae. Green sea turtles have the ability to digest plants. They nest in tropical and subtropical regions and their young float in Sargassum.

2.3.3 State Endangered (SE)

Canebrake Rattlesnake (*Crotalus horridus*) – Canebrake rattlesnakes are State endangered and also listed on Tier II of the Virginia Wildlife Action Plan with “Very High Conservation Need”. Adults are 1.2 to 1.4 meters long. Females reproduce about every 4 years with litters of 7 to 16. Young are usually born in late August or early September. They are nocturnal in the summer and hibernate from mid-fall until spring. Their diet consists of squirrels, rats, mice, small rabbits, six-lined racerunners, skinks, and birds. Their typical habitat is hardwood forests with many logs and a layer of leaves and humus, but they may be found in swampy areas as well. They usually hibernate in bases of hollow trees or in stumps.

2.3.4 State Threatened Species (ST)

Bald Eagle (*Haliaeetus leucocephalus*) **–** The bald eagle is listed under Tier II of the Virginia Wildlife Action Plan for “Very High Conservation Need”. The James, Rappahannock, and Potomac rivers are where they are most commonly found in Virginia. Bald eagles build their nests in tall hardwood trees with open canopies in close proximity to water bodies where they forage. In Virginia, eggs are laid from January to March and incubated for 34 to 38 days. Bald eagles prey primarily on fish, but may also eat waterfowl, rabbits, and some turtles. Their eggs are preyed upon by bobcats, owls, and raccoons.

Peregrine Falcon (*Falco peregrinus*) – Peregrine falcons are State Threatened and listed on Tier I of the Virginia Wildlife Action Plan for “Critical Conservation Need”. They lay 3 to 4 eggs in March or April and the eggs incubate for 33 days. They nest on rocky cliffs near river gorges and will occasionally nest in trees. Their usually prey are pigeons and small birds such as blue jays, flickers, and meadowlarks. Coastal and aquatic areas are their main habitats. They winter in coastal estuaries or intertidal mudflats along the Pacific coast, Gulf coast, and southern Florida.

Gull-Billed Tern (*Sterna nilotica*) – See Section 2.2.1.

Mabee’s Salamander (*Ambystoma mabeei*) - Mabee’s salamander is State threatened and listed in Tier II of the Virginia Wildlife Action Plan for “Very High Conservation Need”. They breed from late fall to early spring and lay 2 to 6 eggs, which hatch in 9 to 14 days. The eggs stick to small twigs, leaves, or debris in shallow ponds. Larval young live in ponds until April or May, when they become juveniles. Mabee’s salamanders live in burrows on the perimeter of bogs or ponds. They are usually adjacent to water. This species forages for zooplankton, arthropods, crustaceans, and worms in the water and on land.

In addition to the species listed above, whales were mentioned by NOAA (Vaccaro, 2012) as species that do not normally occur in the project vicinity, however transient individuals can be found there from time to time. Whales migrate along the Atlantic Coast and are often sighted at the mouth of the Chesapeake Bay, which is rich with food due to the estuary. Occasionally individuals venture upstream and are sighted in the Chesapeake Bay.

3. ENVIRONMENTAL CONSEQUENCES

Impacts of the Retained Build Alternative have been quantified based on the resource mapping presented in Section 2 and the potential LOD for each retained Build Alternative. As with the mapping of resources, the LOD is a preliminary estimate that will be refined during final design and is provided herein to compare the impacts of each alternative. The LOD for each of the Retained Build Alternatives was estimated based on a worst-case footprint of disturbance for construction of the proposed improvements, and includes areas of temporary as well as permanent impacts. For example, large segments of the Retained Build Alternatives would include bridges or tunnels that have a very limited permanent impact footprint because of the use of bridge piers and submerging of tunnel tubes. The estimate of the area of impact within these segments includes the limited permanent impact footprint and the entire area below the bridge or above the tunnel within which construction equipment may require access and temporary disturbance may occur. A more detailed assessment of impacts and avoidance and minimization efforts would be performed during final design.

3.1 Water Resources

Water resources are regulated by the EPA and the USACE through Section 404 of the Clean Water Act and the Water Quality Act of 1987. Section 404 of the Clean Water Act regulates the discharge of dredge and fill materials into Waters of the United States. To comply with Section 404, it is necessary to avoid impacts to Waters of the United States wherever practicable, minimize impacts where unavoidable, and compensate for impacts as required.

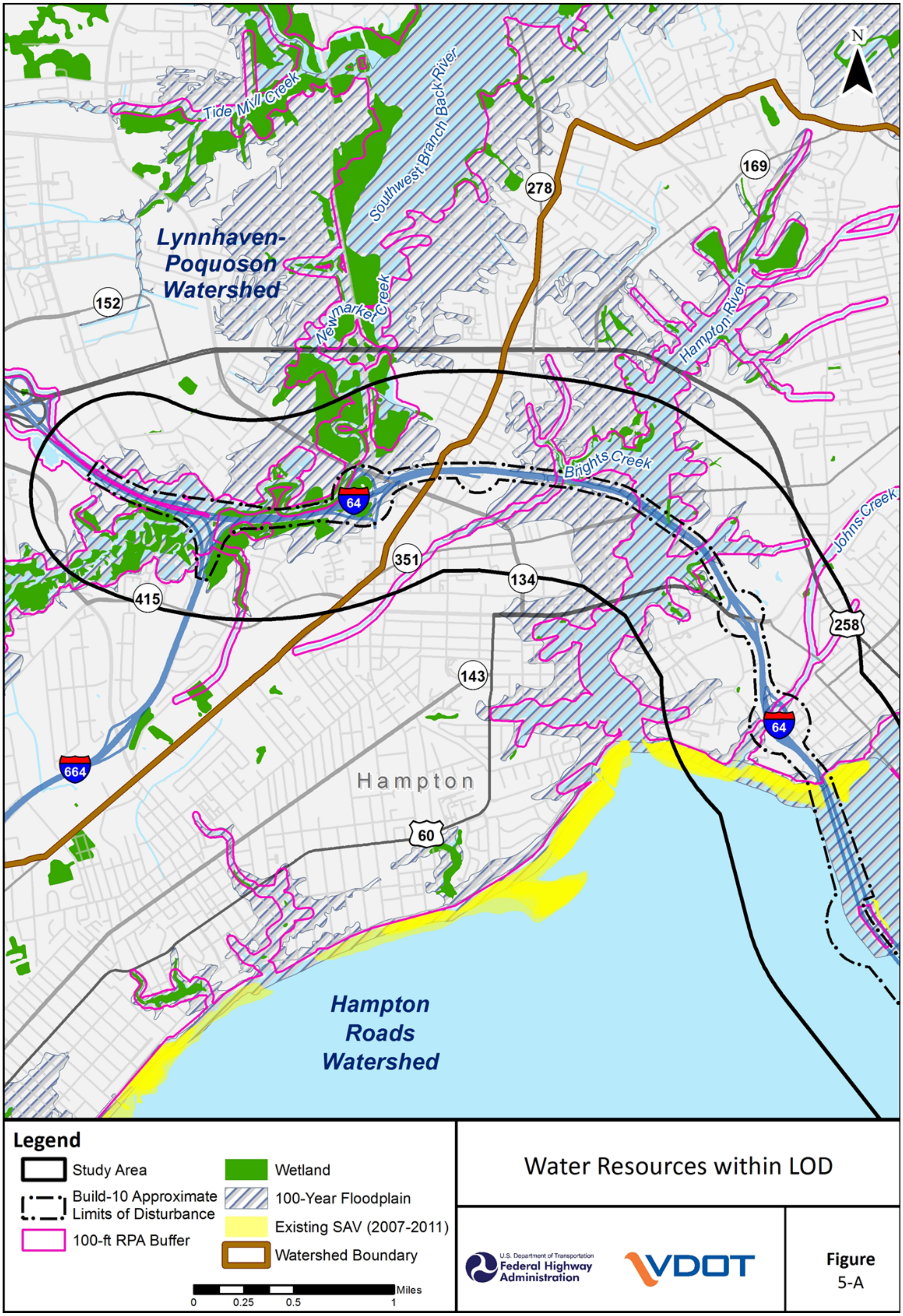
Under the No-Build Alternative, VDOT would continue maintenance and repairs of the existing I-64 mainline, tunnels, and bridges as needed. No direct impacts to streams and wetlands are anticipated with the No-Build Alternative. Existing factors that affect water quality, such as impervious pavement surfaces and pollutants washed from the existing road surface into receiving water bodies would continue with the No-Build Alternative. No changes to floodplains or hydraulic conditions are anticipated with the No-Build Alternative.

Water resources that potentially are directly impacted by the LOD of the Retained Build Alternatives are shown in Figures 5A, 5B, and 5C. Due to the large-scale nature of the maps in this section, figures have been presented showing the LOD for the Build-10 Alternative. Impacts, however, have been calculated for each of the Retained Build Alternatives. Anticipated direct impacts of the Retained Build Alternatives on streams, wetlands, water quality, and floodplains are discussed below. In addition, issues related to sediment transport, bank erosion, shoaling, hydrodynamic modeling, and dredged material disposal are addressed.

3.1.1 Streams, Navigable Waters, and Wetlands

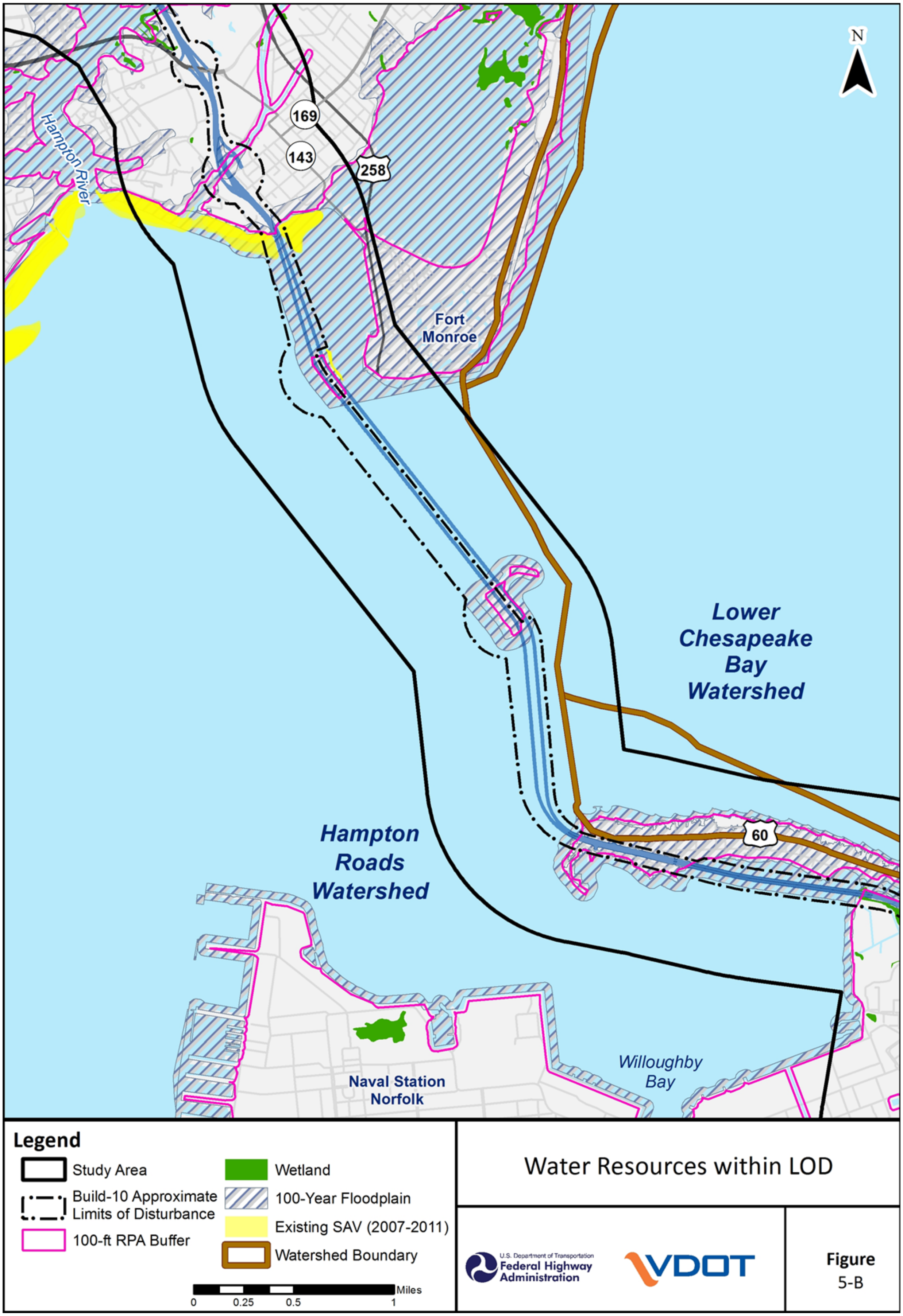
In order to accommodate facilities proposed under the Retained Build Alternatives, the mainline would be widened and proposed bridges and tunnels would be constructed parallel to the existing bridges and tunnels that cross Hampton Roads. Approximately 12 named streams or unnamed smaller tributaries would be crossed by the Retained Build Alternatives. They include: Mason Creek; Oastes Creek and an unnamed tributary; John's Creek; Hampton River and an unnamed tributary; Brights Creek and an unnamed tributary; and Newmarket Creek with 3 unnamed tributaries. The locations of each crossing and the approximate LOD for the Build 10 Alternative are shown on aerial maps in Appendix A. In addition to these stream crossings, the Retained Build Alternatives traverse the James River where it meets the Chesapeake Bay (also referred to as Hampton Roads).

Stream crossings within the mainline would require extensions of existing bridges and culverts. The proposed approach bridges would require construction of piers within the James River. The tunnel would be placed below the bottom of the James River and would require expansion of the existing islands to accommodate the tunnel portals. Channel conditions within the James River would be maintained in accordance with Virginia Port Authority requirements, including a 55-foot depth at mean low water (MLW) with a width of 1,000 feet (top of tunnel would be a minimum of 60 to 65 feet below MLW), and the preservation of existing deep water anchorages.



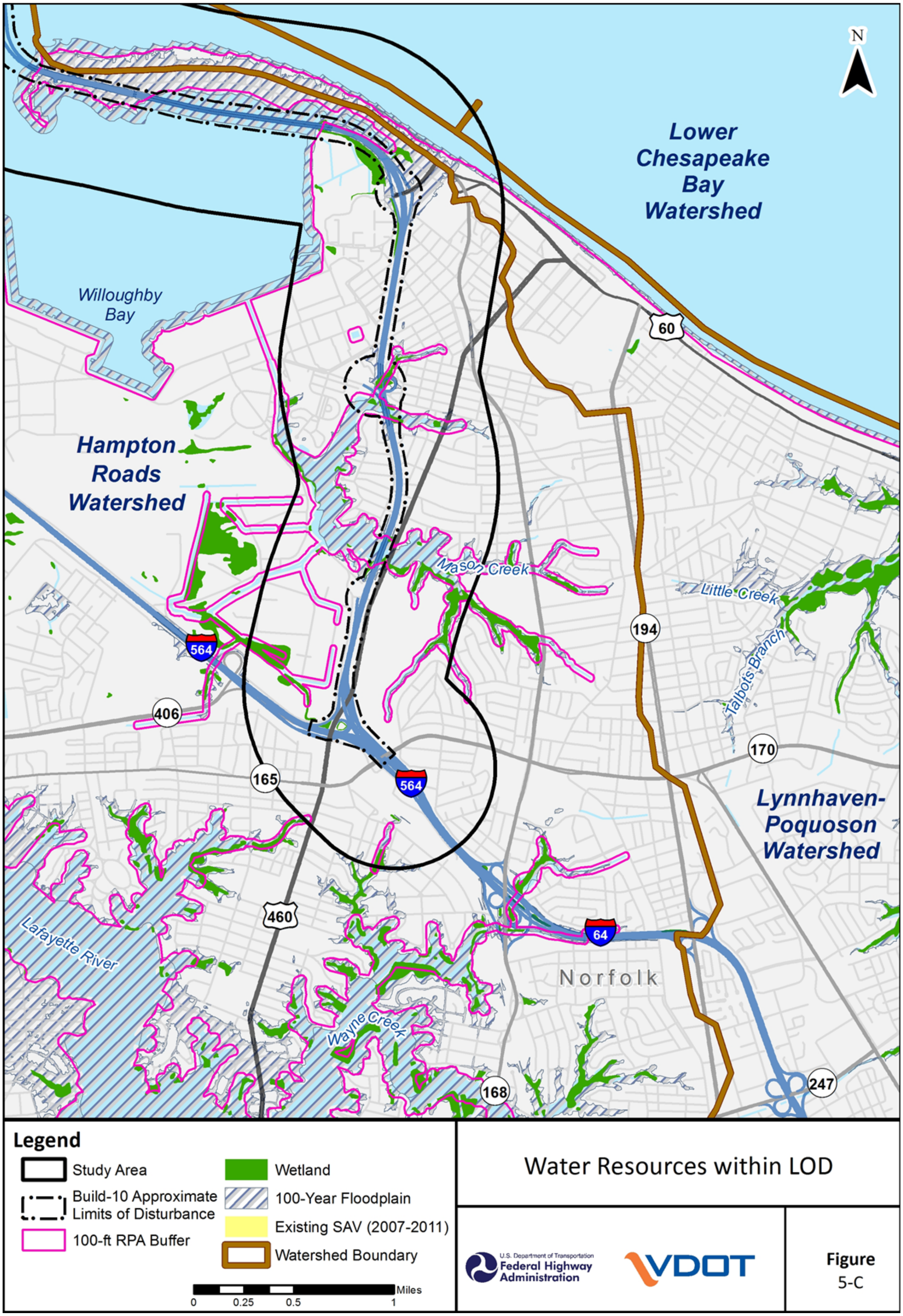
Water Resources within LOD

Figure 5-A



Water Resources within LOD

Figure 5-B



Water Resources within LOD

Figure 5-C

Estimated impacts to streams and wetlands for each of the Retained Build Alternatives at this stage of project development are presented in Table 8 As part of a worst-case assessment of impacts as described above, these estimates are based on an assumption that each stream crossing would be a permanent impact rather than spanned via a bridge. A more detailed assessment of stream and wetland impacts and avoidance and minimization efforts would be performed following a formal jurisdictional delineation and further design. As shown in Table 8, the extent of impacts to wetlands is very similar between Retained Build Alternatives. The lengths of stream crossings, however, vary with the increased width of the typical section associated with each Retained Build Alternative.

Table 8. Estimated Impacts to Water Resources from the Retained Build Alternatives

Resource	Build-8 Alternative	Build-8 Managed Alternative	Build-10 Alternative
Streams			
Number of Crossings	12	12	12
Length (Linear Feet)	18,200	18,300	18,500
Wetlands			
EEM (Acres)	36	36	38
PEM (Acres)	8	8	8
PSS (Acres)	2	2	2
PFO (Acres)	6	6	6
Total Acres	52	52	54
RPAs (Acres)	536	542	560
Floodplains (Acres)	419	436	439

Sources: NWI, NHD, FIRMs, and field reconnaissance, 2011.
**Abbreviations: estuarine emergent wetland (EEM), palustrine emergent wetland (PEM), palustrine scrub-shrub wetland (PSS), palustrine forested wetland (PFO)*

Due to the linear nature and size of this study, impacts are anticipated with each of the Retained Build Alternatives. If a build alternative were selected , efforts would be made to avoid and minimize stream and wetland impacts to the extent practicable during design. Impacts to streams and wetlands would require submittal of a Joint Permit Application (JPA) to the USACE, VDEQ, and VMRC. Mitigation for unavoidable stream and wetland impacts would be developed in coordination with these agencies during the permitting process and may include onsite or offsite creation, restoration, or enhancement activities, use of credits from an approved mitigation bank, or payments to the Virginia Aquatic Resources Trust Fund.

3.1.2 Water Quality

Under the Clean Water Act, a permit is necessary to discharge any pollutant from a point source into Waters of the United States through EPA's National Pollutant Discharge Elimination System program, including pollutants carried by stormwater discharges. The permits contain industry-specific, technology-based, and/or water quality-based limits and establish pollutant monitoring and reporting requirements. Water quality-based limits and monitoring and reporting requirements could be stricter for those streams that currently do not meet water quality standards (on the Section 303[d] list) and already have regulated total maximum daily loads of pollutants.

The Retained Build Alternatives would potentially result in short-term impacts to water quality such as increased sedimentation, increased turbidity from in-stream work, and possible spills, or non-point source pollutants entering groundwater or surface water from stormwater runoff. Dredging for tunnel and bridge construction would result in generation of suspended solids and a release of nutrients and potential contaminants within overlying waters.

To minimize these impacts, appropriate erosion and sediment control practices would be implemented in accordance with the Virginia Erosion and Sediment Control Regulations, the Virginia Stormwater Management Law and regulations, and VDOT's Road and Bridge Specifications. Implementation of best management practices, including compliance with VDOT's Erosion and Sediment Control Handbook, use of silt curtains, and the limitation of overflow from dredging equipment, would minimize increases in turbidity of waters downstream of dredging activities. Pre-construction sediment quality assessments and water quality monitoring during construction may be conducted to address potential re-suspension of contaminants and nutrients into overlying water. Further efforts to avoid and/or minimize water quality impacts would be made during final design.

These specifications also prohibit contractors from discharging any contaminant that may impact water quality. In the event of accidental spills, the contractor is required to notify immediately all appropriate local, State, and Federal agencies and to take immediate action to contain and remove the contaminant. Additionally, the requirements and special conditions of any required permits for work in and around surface waters would be incorporated into construction contract documents, so that the contractor would be required to comply with such conditions.

Minor long-term water quality impacts could occur as a result of increases in impervious surfaces, increases in traffic volumes, and consequent increases in pollutants washed from the road and bridge surface into receiving water bodies. Stormwater management measures, including detention basins, vegetative controls, and other measures, would be implemented to minimize water quality impacts. These measures would reduce or detain discharge volumes and remove pollutants, thus avoiding substantial further degradation of impaired water bodies in the study area vicinity.

Over 500 acres of Chesapeake Bay RPAs are within the LOD of the Retained Build Alternatives (see Table 8). Given that public roads and their associated structures are conditionally exempt from the Chesapeake Bay Preservation Area Designation and Management Regulations and that the Retained Build Alternatives would be constructed in accordance with the Erosion and Sediment Control Law (§10.1-560 et seq. of the Code of Virginia) and the Stormwater Management Act (§10.1-603. 1 et seq of the Code of Virginia), the Retained Build Alternatives would be consistent with the Chesapeake Bay Preservation Act and its implementing regulations.

Additionally, the Retained Build Alternatives would be designed to be consistent with the established Virginia Coastal Zone Enforceable Policies as related to fisheries management, subaqueous lands management, wetlands management, dunes management, nonpoint source pollution control, point source pollution control, shoreline sanitation, air pollution control, and coastal lands management. With implementation of proposed mitigation measures, the Retained Build Alternatives would not impair resources protected by the Policies, including wetlands, dunes, coastal lands, and aquatic animals. The Retained Build Alternatives would be designed and constructed in accordance with the Virginia Erosion and Sediment Control Law and the terms and conditions of water quality permits required by USACE, VMRC, VDEQ, and VDCR.

3.1.3 Floodplains

Executive Order 11988 (Floodplain Management) requires Federal agencies to avoid to the extent possible the long and short term adverse impacts associated with the occupancy and modification of flood plains. In accomplishing this objective, "each agency shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by flood plains in carrying out its responsibilities".

As indicated in Table 8 above, each of the Retained Build Alternatives would impact over 400 acres of 100-year floodplain. The floodplain encroachment would not be a "significant encroachment" (as defined in 23 CFR 650.105[q]) because of the following reasons:

- ***It would pose no significant potential for interruption or termination of a transportation facility which is needed for emergency vehicles or provides a community's only evacuation route***. The HRBT is one of three evacuation routes serving the Hampton Roads region. A Maintenance of Traffic Plan would be established under the Retained Build Alternatives which would avoid significant interruption of emergency vehicle access or interference with the community's evacuation route. Once built, the Retained Build Alternatives would enhance emergency vehicle access and community evacuation.
- ***It would not pose a significant flooding risk.*** The Retained Build Alternatives would be designed consistent with procedures for the location and hydraulic design of highway encroachments on floodplains contained in 23 CFR 650 Subpart A. Accordingly, the Retained Build Alternatives are not expected to increase in flood levels, the probability of flooding, or the potential for property loss and hazard to life.
- ***It would not have significant adverse impacts on natural and beneficial floodplain values.*** Avoidance and minimization efforts including spanning floodplains where practicable and minimizing wetland impacts would be made during design to avoid or minimize impacts on natural and beneficial floodplain values.

As discussed in the *Land Use Technical Memorandum*, the Retained Build Alternatives are consistent with local land use plans and are not projected to either encourage or accelerate any growth or changes in land use that are not already expected within Hampton Roads and Norfolk. Therefore, the Retained Build Alternatives would not encourage, induce, allow, serve, support, or otherwise facilitate incompatible base floodplain development.

Sections 107 and 303 of VDOT's specifications require the use of stormwater management practices to address issues such as post-development storm flows and downstream channel capacity. These standards require that stormwater management be designed to reduce stormwater flows to preconstruction conditions for up to a 10-year storm event. As a part of these regulations, the capture and treatment of the first half inch of run-off in a storm event is required, and all stormwater management facilities must be maintained in perpetuity. During final design, a detailed hydraulic survey and study would evaluate specific impacts on stormwater discharges. This evaluation would adhere to the aforementioned specifications ensuring that no substantial increases to flooding would occur.

3.1.4 Sediment Transport, Bank Erosion, Shoaling, and Hydrodynamic Modeling

The VIMS three-dimensional hydrodynamic model simulated tides, currents, circulation, salinity, and sedimentation on four test cases. One of the scenarios compares the Base Case (existing conditions) to an expansion of the I-64 HRBT, which is similar to the Retained Build Alternatives. The modeled scenario includes the addition of a third tunnel, two tunnel islands, and two bridges on pilings connecting Hampton and Norfolk across the entrance to the James River. The VIMS model shows that there is no difference between the No-Build and the I-64 HRBT expansion scenario with regard to tidal heights, tidal range, river inflow, high and low water times and heights, and currents and salinity within the James River tidal front system. Based on the model results, it is anticipated that the No-Build and Retained Build Alternatives would have no impact on tidal height or range, river inflow, currents, or salinity within the James River.

Implementation of the I-64 HRBT expansion scenario, and presumably any of the Retained Build Alternatives, would result in a negligible impact on the James River surface current curve, the Elizabeth River tidal prism and eddies, and sedimentation potential near Hampton Flats. The slight increase in residual water volume at the entrance of the Elizabeth River over the No-Build scenario could increase dissolved or suspended material transport in and out of the basin. A slight increase in sedimentation in the northeast corner of Hampton Flats could increase the necessity of dredging nearby marinas and the Hampton River Entrance Channel. The model found, however, that changes due to extremes in river inflow conditions strongly outweigh any changes due to the addition of structures into the model, so it is expected that the Retained Build Alternatives would have a negligible impact on material transport or sedimentation in the study area.

As described in Section 2.1.3, the VIMS model remains valid. The model indicates that no substantial changes would occur to hydrodynamic conditions within Hampton Roads. Thus, update of the model is not required for this EIS. Should a build alternative be selected, an update to the model may be appropriate to identify impacts of the selected alternative based on future hydrodynamic conditions in Hampton Roads and design of the HRBT bridges and tunnel. For more details regarding the VIMS model, see Appendix B.

As a part of the EPA and NOAA Joint Climate Change Science Program, studies of historic tidal data for the Mid-Atlantic Region have noted that sea level rise has occurred in the past from both the increase in the volume of sea water due to ocean warming and transfer of water from land reservoirs of ice and water to oceans. When combined with subsidence of some coastal regions, the total rise can be higher, such as in Hampton Roads where the total sea level rise between 1927 and 1999 has been 4.42 millimeters per year. The Climate Change Science Program has recommended that a total of 1 meter in sea level rise by the year 2100 should be considered for long-term planning purposes, such as major infrastructure.

3.1.5 Dredging and Disposal of Dredged Material

The No-Build Alternative would require no dredging of Hampton Roads, Willoughby Bay, or Hampton River. The Retained Build Alternatives would require dredging of these waterways for rehabilitation or reconstruction of the existing bridges, construction of new approach bridges, and construction of a new tunnel. Based on readily available bathymetric data from NOAA navigation charts, the Build-8 and Build-8 Managed Alternatives would potentially require approximately 400 acres of dredge area and removal of 3.4 million cubic yards of bottom material. The Build 10 Alternative would potentially require approximately 415 acres of dredge area and removal of 4.1 million cubic yards of bottom material.

Dredging would result in permanent changes to the morphology (i.e., form and structure) of the river bottom and bathymetry (i.e., water depths) in the study area. As described in Section 3.1.2, dredging would also impact water quality resulting from increased turbidity and potential release of nutrients and sediments. Loss of bottom substrate (benthic) habitat would occur from dredging, as described in Section 3.2.2.

Any dredged material would be appropriately disposed of through close coordination with EPA and USACE. Should a Retained Build Alternative be selected, a site search of potential disposal sites will be conducted. Aerial imagery will be used to identify sites that are large enough to handle the anticipated volume of dredged material. Beneficial uses of the dredged material would also be considered, including beach nourishment and creation of reefs or berms to enhance fisheries. Potential sites will be evaluated using criteria such as:

- Size and capacity for stockpiling material and dewatering prior to upland disposal;
- Logistics of transporting the material to the site;

- Treatment requirements at the site;
- Environmental impacts associated with the use of the site; and
- Costs.

For the Downtown Tunnel/Midtown Tunnel/MLK Extension Project in the South Hampton Roads area, a project which is similar to the Retained Build Alternatives, it is anticipated that the majority of dredged materials would be deposited within the approved offshore Norfolk Ocean Dredged Material Deposit Site (Norfolk ODMDS) managed jointly by the EPA and USACE, with the remaining material placed in an approved upland disposal site. The Norfolk ODMDS has an area of approximately 50 square nautical miles (EPA and USACE, 2009) and may be suitable to receive material from the Retained Build Alternatives. A determination of dredged material suitability for ocean disposal would be considered in the site evaluation. Should an ocean disposal site be preferred, disposal would be documented in a Marine Protection, Research, and Sanctuaries Act (MPRSA) Section 103 evaluation, which requires approval by EPA Region III.

3.2 Wildlife and Habitat

No direct impacts to upland or aquatic habitats, including water bird nesting areas, benthic communities, EFH, HAPC, Anadromous Fish Use Areas, and SAV are anticipated under the No-Build Alternative.

Table 9 summarizes the direct impacts to general habitat types within the LOD of each of the Retained Build Alternatives. The majority of the LOD for all of the Retained Build Alternatives includes either developed lands or aquatic habitats. A very limited amount of vegetated upland habitat would be disturbed by the Retained Build Alternatives. Disturbance or loss of these upland habitats would not result in substantial impacts to wildlife due to the widespread availability of such habitats within the study area and the region. Anticipated direct impacts of the Retained Build Alternatives on water bird nesting and aquatic habitats are discussed below.

Table 9. Acres of Habitat Impacted

Habitat	Build-8 Alternative	Build-8 Managed Alternative	Build-10 Alternative
Water	491*	497*	514*
Urban Field	18	18	20
Urban Shrub Area	2	2	2
Urban Forest	54	55	58
Developed Land and Roads	216	220	232
Total	**781**	**793**	**826**

Sources: City of Hampton and City of Norfolk Land Use GIS databases, aerial imagery, and field verification.
Note: Discrepancy between acreage compared with Table 4-1 Land Use Impacts due to difference in analysis methodology.
**The LOD includes the total width of Retained Build Alternative bridges and tunnels, including areas of permanent and temporary disturbance. A more detailed estimate and breakdown of areas of permanent versus temporary disturbance would be provided during final design and permitting.*

3.2.1 Water Bird Nesting

Proposed expansion of the islands to accommodate the proposed tunnel portals under each of the Retained Build Alternatives would require direct disturbance of beaches used as nesting areas by water birds. While fill material to be placed on the existing beaches may make these areas temporarily unsuitable for nesting water birds, the total beach area would be increased with expansion of the island providing an opportunity to increase the amount of suitable nesting habitat on the islands.

Construction activities for the expansion of the islands and installation of the proposed tunnel would be conducted outside of the nesting season for these species to avoid potential destruction of nests or noise disturbance to nesting birds. Construction of new beach areas would include materials, e.g. sand and stones, which provide suitable conditions for water bird nesting habitat. Specific time restrictions and the appropriate materials for beach construction would be developed in coordination with VDGIF.

3.2.2 Benthic Communities

The Retained Build Alternatives would involve disturbance of benthic communities; however, no substantial permanent or long term impacts on these communities are anticipated because of the limited footprint of the bridge piers and because the tunnels would be submerged below the bottom of Hampton Roads. While benthic communities would be impacted by laying down rock and sediment for expansion of the islands for the proposed tunnel portals, the availability of tidal habitat would ultimately increase with expansion of the islands. As discussed in Section 3.1.4, no substantial changes in hydrodynamic and hydrologic conditions are anticipated with implementation of the Retained Build Alternatives.

Dredging for tunnel installation and within potential aquatic borrow sites would temporarily result in the loss of benthic communities and generation of suspended solids and release of nutrients and potential contaminants within overlying waters. The loss of benthic communities for construction of the Retained Build Alternatives is not expected to impact the sustainability of commercially important species including oysters, blue crabs, or clams within Hampton Roads. No harvestable oyster populations are present within the LOD for the Retained Build Alternatives. The Retained Build Alternatives would result in minimal permanent loss and temporary disturbance of SAV beds which provide important nursery habitat for blue crabs. The potential temporary impact to benthic communities within the LOD is approximately 400 acres for both Build-8 Alternatives and 415 acres for the Build 10 Alternative. Mitigation measures for SAV impacts described in Section 3.2.4 would restore impacted blue crab nursery habitat. Hardshell clam would be the most vulnerable of the three species to dredging impacts; however, clams would be expected to re-establish following construction due to the extensive presence of benthic habitat within the study area (approximately 3,150 acres).

Suspended solids may be deposited within benthic communities downstream of dredging activities. The aerial extent of suspended solids is expected to be limited due to the coarse sandy texture of sediments within Hampton Roads. Implementation of best management practices, including compliance with VDOT's Erosion and Sediment Control Handbook, use of silt curtains, and limiting overflow from dredging equipment, would minimize increases in turbidity of waters downstream of dredging activities. Pre-construction sediment quality assessments and water quality monitoring during construction may be conducted to address potential re-suspension of contaminants and nutrients into overlying water.

3.2.3 Essential Fish Habitat, Habitat Areas of Particular Concern, and Anadromous Fish Use Areas

The Retained Build Alternatives would potentially impact EFH, HAPC, and Anadromous Fish Use Areas. Much of the impact would be temporary given the limited footprint of the bridge piers and because the tunnels would be submerged below the bottom of Hampton Roads. The potential impact to Anadromous Fish Use Areas is approximately 345 acres for both Build-8 Alternatives and 360 acres for the Build-10 Alternative; detailed information on EFH and HAPCs is not available to quantify. The potential impact (temporary and permanent) to overall estuarine habitat is approximately 400 acres for both Build-8 Alternatives and 415 acres for the Build-10 Alternative. The total area of estuarine habitat within the study area is 3,150 acres. As discussed in Section 3.1.4, no substantial changes in hydrodynamic and hydrologic conditions are anticipated with implementation of the Retained Build Alternatives.

As discussed in Section 3.2.2, dredging required for Retained Build Alternatives for bridge and tunnel installation would temporarily result in the loss of benthic communities which provide food sources for fish. The temporary and localized loss of benthic communities would have minimal impacts on prey availability given the limited area of disturbance and widespread availability of benthic habitat within the study area and foraging habitat throughout Hampton Roads and the southern Chesapeake Bay.

Temporary increases in turbidity and releases of nutrients and potential contaminants from dredging activities are not expected to substantially impact juvenile or adult fish because of their mobility and because construction would be spread out over time and would occur within discrete areas. Eggs and larvae, however, would be more vulnerable to these impacts.

Time-of-year restrictions would be considered to avoid or minimize impacts on fish during early life stages. VDGIF typically recommends restrictions on all in-stream work within Anadromous Fish Use Areas and their tributaries between February 15 and June 30. Exact restrictions may vary depending on the species, type of work, and location. In addition, erosion and sediment control measures described in Section 3.1.2 would minimize potential impacts to water quality during construction. Specific measures for avoidance, minimization, and mitigation of impacts to aquatic wildlife would be developed in consultation with VDGIF and NMFS.

3.2.4 Submerged Aquatic Vegetation

Construction of the proposed bridge approaches at Hampton would require temporary disturbance of and very minimal permanent removal of SAV under each of the Retained Build Alternatives. Temporary disturbance of SAV would be required to construct the bridge approaches. Permanent loss of SAV would be limited to the footprint of the bridge piers. The estimated total acreage of temporary and permanent SAV impacts is:

- 5.6 acres for the Build-8 Alternative,
- 5.7 acres for the Build-8 Managed Alternative, and
- 6.2 acres for the Build-10 Alternative.

The amount of SAV foraging habitat impacted by the Retained Build Alternatives represents approximately 10 percent of total SAV foraging habitat within the mile-wide study area. Furthermore, additional SAV beds are present upstream of the study area. Areas of temporary disturbance to SAV would be replanted. A request to remove SAV from or plant SAV upon State bottom shall be submitted with a JPA to the VMRC. The application must include specific information which is critical to evaluate properly the probabilities of transplantation success, while minimizing impacts to established donor bed populations. In determining whether or not to grant approval for SAV removal or planting, the VMRC shall be guided by the 4 VAC 20-337-10 et seq. SAV Transplantation Guidelines, or any new and improved methodologies as approved by the VMRC. Permits would be valid for a period of three years, but may be revoked upon a finding by the VMRC that the Permittee failed to meet the monitoring and/or reporting requirements, or deviated from the specific activities authorized by permit. (VMRC, 2000).

Erosion and sediment control measures described in Section 3.1.2 and the use of silt curtains would minimize potential impacts to water quality within adjacent SAV areas. Construction within or adjacent to SAV areas would avoid the growing season for representative plant species to the extent practicable. Further efforts to avoid and/or minimize disturbance and removal of SAV would be made during final design. Mitigation for SAV loss would be developed in coordination with VMRC and may include enhancement or restoration of SAV beds.

3.2.5 Invasive Species

The Retained Build Alternatives could increase the spread of invasive species. Construction equipment used in the study area could carry seeds or propagative plant parts from other construction projects or infested areas. Removal of sediment and soil to offsite locations could spread invasive species and placement of fill from borrow sites could introduce invasive species to the study area. Exposed soil also allows invasive species to spread, which could contribute to encroachment of invasive species on vegetation communities adjacent to the LOD.

In accordance with Executive Order 13112, Invasive Species, the potential for the establishment of invasive animal or plant species during construction of any of the Retained Build Alternatives would be minimized by following provisions in VDOT's Road and Bridge Specifications. These provisions require prompt seeding of disturbed areas with seeds that are tested in accordance with the Virginia Seed Law and VDOT's standards and specifications to ensure that seed mixes are free of noxious species. In addition, in order to prevent the introduction of new invasive species and to prevent the spread of existing populations, best management practices would be followed, including washing machinery before it enters the area, minimizing ground disturbance, and reseeding of disturbed areas. While the right-of-way is vulnerable to colonization by invasive plant species from adjacent properties, implementation of the stated provisions would reduce the potential for the establishment and proliferation of invasive species within highway right-of-way.

3.3 Threatened and Endangered Species

No impacts on Federally or State listed threatened or endangered species that may be present within the study area are anticipated for the No-Build Alternative.

Information regarding sensitive resources that may be impacted by the Retained Build Alternatives was requested from the USFWS via the Information, Planning, and Conservation (IPaC) system. The IPaC system is an online conservation planning tool used by the USFWS to streamline the environmental review process associated with Section 7 of the Endangered Species Act, as amended (ESA). The system provides lists of Federally protected species in defined study areas, as well as links to information about identified species. The IPaC results indicated that one species, the Federally threatened Piping Plover, may be impacted by the Retained Build Alternatives. Based on additional research and agency input regarding threatened and endangered species that may be present within the study area, the Retained Build Alternatives could also potentially impact five species of Federally endangered and/or threatened turtles, and two species of Federally endangered fish. Additional coordination information is located in Appendix C. Potential direct impacts of the Retained Build Alternatives are discussed below for each of these three groups of species. Coordination with the USFWS and NMFS pursuant to Section 7 of the Endangered Species Act of 1973, as amended, for potential impacts to Federally listed species would be conducted.

3.3.1 Sea Turtles

The Retained Build Alternatives would have potential impacts to sea turtle habitat within Hampton Roads, including both benthic (bottom) and estuarine (water) habitat. However, much of the impact would be temporary given the limited footprint of the bridge piers and because the tunnels would be submerged below the bottom of Hampton Roads. Permanent impact would be limited to expansion of the islands for the proposed tunnel portals and the installation of bridge piers for each of the Retained Build Alternatives. The total (permanent and temporary) potential impact to sea turtle habitat would be approximately 400 acres for both the Build-8 Alternatives and 415 acres for the Build-10 Alternative. The potential total sea turtle habitat within the study area is 3,150 acres.

The temporary and localized disruption of benthic communities would have minimal impacts on the availability of turtle habitat given potential for recolonization of benthic habitat and the widespread availability of foraging habitat throughout Hampton Roads. For example, less than 415 acres of benthic habitat could potentially be impacted temporarily by the Retained Build Alternatives, which is less than 15 percent of the habitat within the study area (approximately 3,150 acres), not including the additional habitat in the greater Hampton Roads and Chesapeake Bay regions.

SAV areas also provide foraging habitat for turtles. As discussed in Section 3.2.4, temporary and permanent loss of SAV areas would potentially result from the construction of the proposed bridge approaches at Hampton and expansion of the northernmost tunnel portal island under each of the Retained Build Alternatives. The amount of SAV foraging habitat impacted by the Retained Build Alternatives represents approximately 10 percent of total SAV foraging habitat within the mile-wide study area. Temporary increases in turbidity and release of nutrients and potential contaminants from dredging activities are not expected to substantially impact sea turtles because of their mobility and because construction would be spread out over time and would occur within discrete areas. Erosion and sediment control measures described in Section 3.1.2 would minimize potential impacts to water quality within sea turtle foraging habitat.

Construction of any of the Retained Build Alternatives would require direct disturbance of beaches that are potential nesting areas for loggerhead turtles. While fill material to be placed on the existing beaches may make these areas unsuitable for nesting turtles, the total beach area would be increased with expansion of the island providing an opportunity to increase the amount of suitable nesting habitat on the islands.

Construction activities would be conducted outside of the nesting season for these species to avoid potential direct impacts on nesting turtles. Specific time restrictions for beach construction would be developed in coordination with USFWS and NMFS.

3.3.2 Sturgeon

The Retained Build Alternatives would have potential impacts (temporary and permanent) to sturgeon habitat, which, because sturgeon are anadromous, consists of Anadromous Fish Use Areas. Much of the impact would be temporary given the limited footprint of the bridge piers and because the tunnels would be submerged below the bottom of Hampton Roads. Permanent impact would be limited to expansion of the islands for the proposed tunnel portals and the installation of bridge piers for each of the Retained Build Alternatives. The potential impact to Anadromous Fish Use Areas is approximately 345 acres for both the Build-8 Alternatives and 360 acres for the Build-10 Alternative. The area impacted by these proposed facilities is small in relation to the total Anadromous Fish Use Area within the study area, which is 2,015 acres.

As indicated in Sections 3.1.4 and Section 3.2.3, construction of proposed facilities under the Retained Build Alternatives would involve minimal permanent loss of aquatic habitats within Hampton Roads; and no long-term changes in hydrodynamic and hydrologic conditions are anticipated.

Temporary increases in turbidity and release of nutrients and potential contaminants from dredging activities are not expected to substantially impact juvenile or adult sturgeon because of their mobility and because construction would be spread out over time and would occur in discrete areas. Eggs and larvae, however, would be more vulnerable to these impacts.

Time of year restrictions would be considered to avoid or minimize impacts on sturgeon during early life stages. VDGIF typically recommends restrictions on all in-stream work within Anadromous Fish Use Areas and their tributaries between February 15 and June 30. Exact restrictions may vary depending on the species, type of work, and location. In addition, erosion and sediment control measures described in Section 3.1.2 would minimize potential impacts to water quality within sturgeon foraging and spawning habitat. Further efforts to avoid and/or minimize disturbance and removal of sturgeon habitat would be made during final design. Specific measures for avoidance, minimization, and mitigation of impacts to sturgeon would be developed in consultation with VDGIF and NMFS.

3.3.3 Piping Plover

Piping plovers are uncommon breeders in the lower Chesapeake Bay and have been absent from typical nesting sites within the Hampton Roads vicinity (i.e. Craney Island in Portsmouth and Grandview Beach in Hampton) for over a decade. (VDOT, 2001; USACE, 2006). These areas are believed to be no longer suitable for nesting piping plovers due to the presence of predators and human disturbance.

Because no suitable piping plover nesting habitat occurs within or adjacent to the LOD of the Retained Build Alternatives, no impacts to this species are anticipated.

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APPENDIX A

Aerial Exhibits with Stream Crossings and Build-10 Limits of Disturbance


Streams and Wetlands
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Brights Creek
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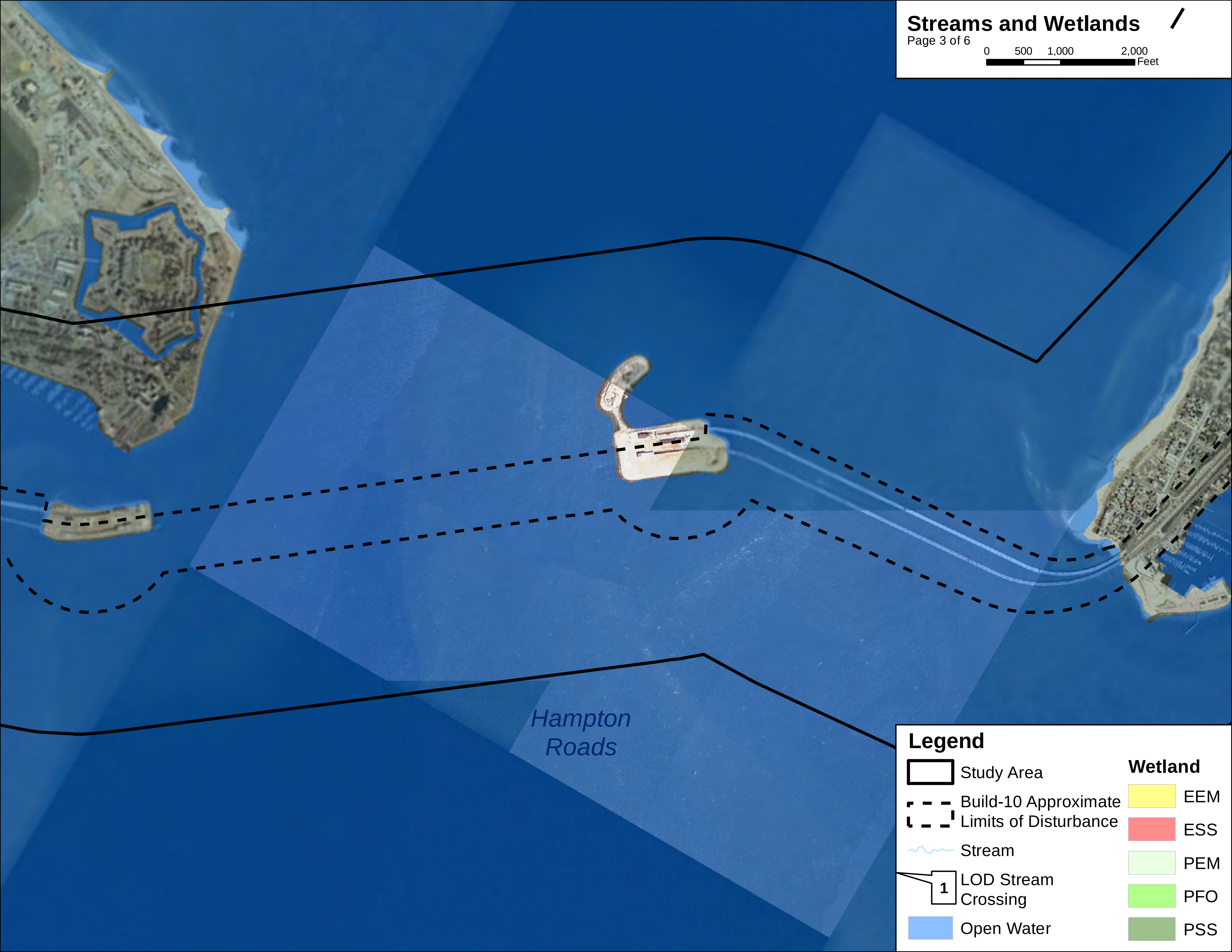
Streams and Wetlands

Page 2 of 6



Streams and Wetlands
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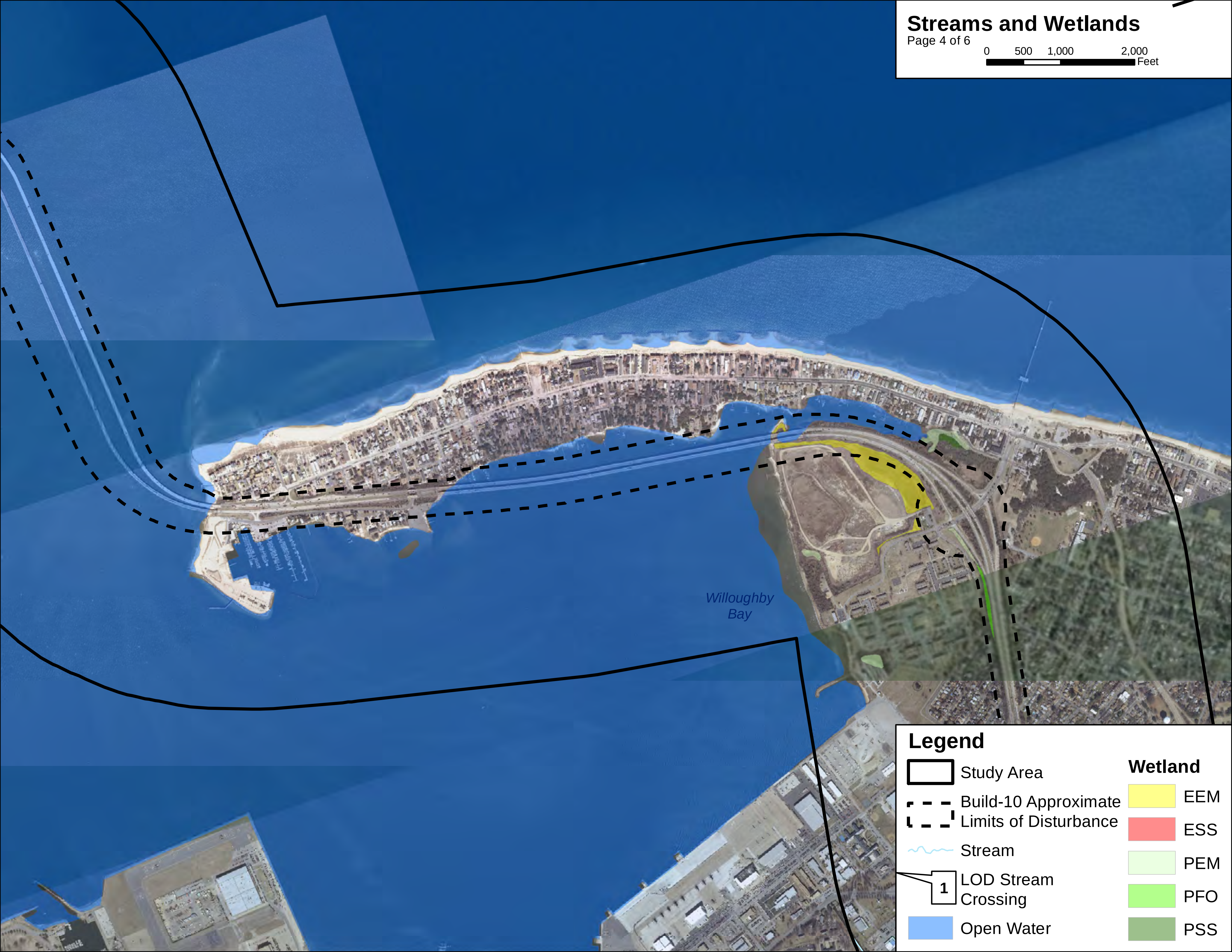
Streams and Wetlands
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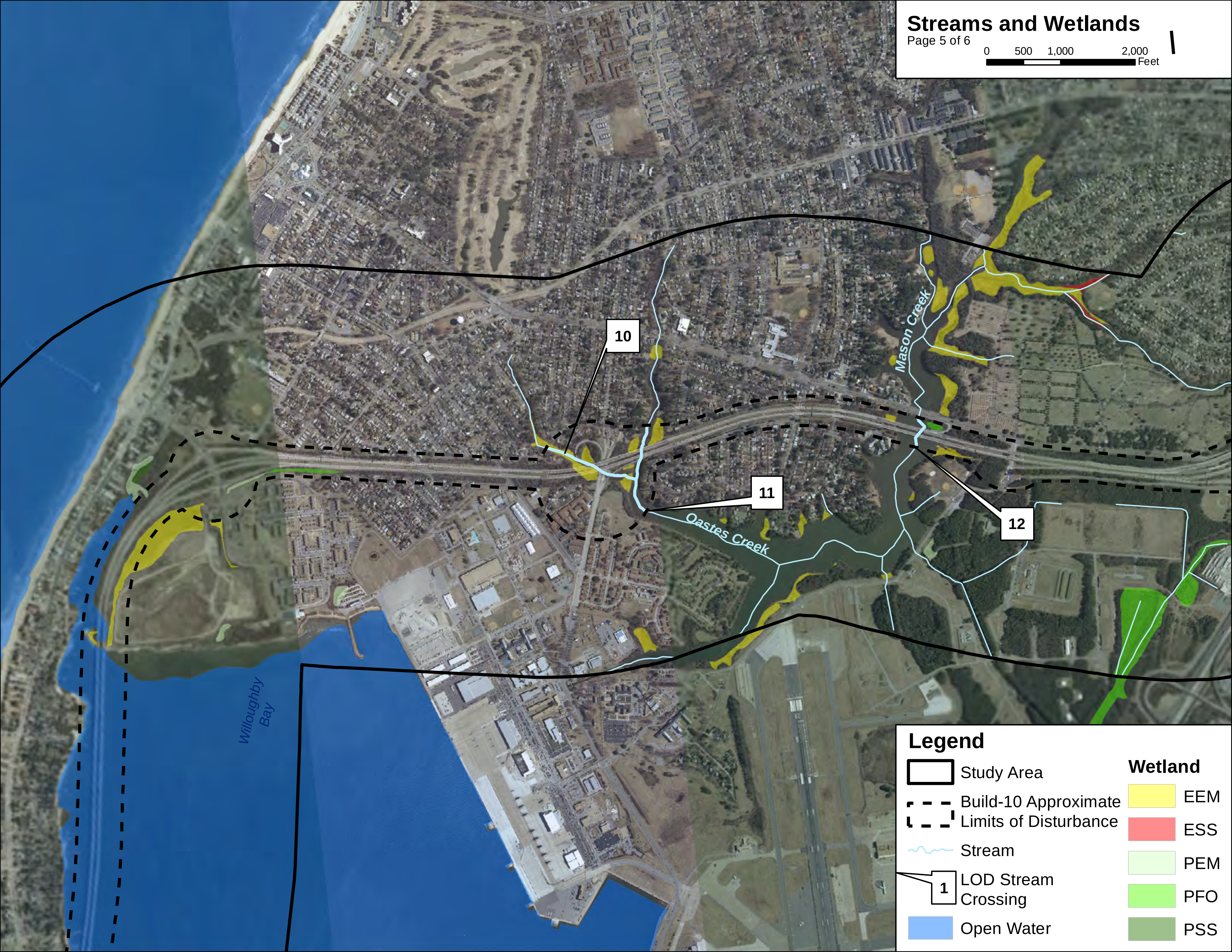

Streams and Wetlands
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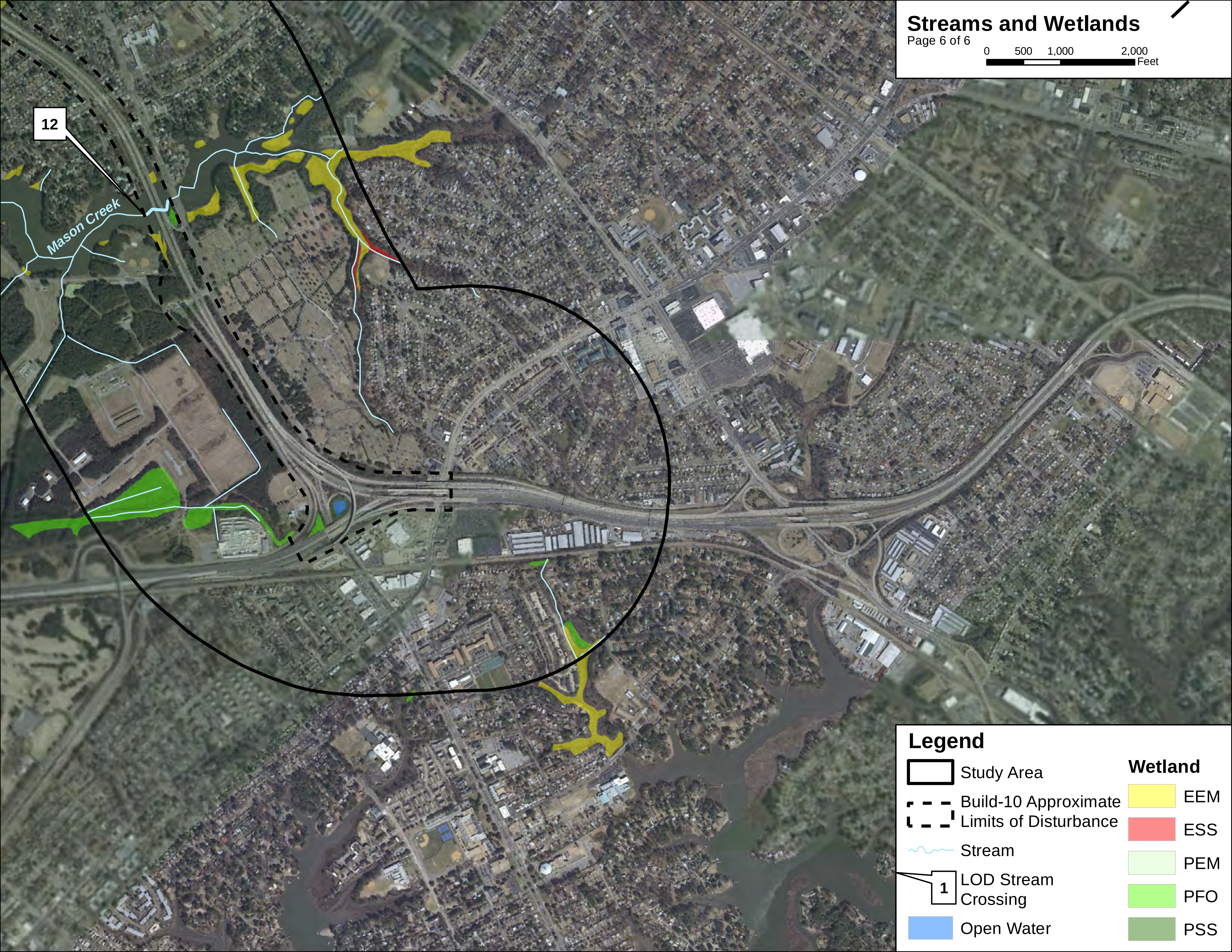

Streams and Wetlands
Page 6 of 6
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APPENDIX B

Summary of Hydrodynamics Modeling

1.0 EXISTING CONDITIONS

A three-dimensional hydrodynamic-sedimentation model was developed in the late 1990's by the Virginia Institute of Marine Science (VIMS). This model/program was custom built using the HYSED-3D program to model the impacts of proposed bridge-tunnel infrastructure on tides, currents, circulation, salinity, and sedimentation. Simulations produced by the model were verified through field observations of tides and currents. Below is a summary of the existing conditions, or base case, used in the model.

1.1.1 Tidal Heights

Tidal amplitude data for Hampton Roads (Sewell Point-8638610) was obtained from the National Ocean Service. Tide ranges from -0.5 meters to .5 meters above mean water level. The following tidal datums for the 1983-2001 tidal epoch were obtained from the NOAA benchmark sheet for Sewells Point:

Table 1. NOAA Benchmark Data Sewells Point (8638610)

Mean Lower Low Water	-0.501 m (NAVD 88)
Mean Low Water	-0.463 m (NAVD 88)
Mean Tide Level	-0.093 m (NAVD 88)
Mean Sea Level	-0.089 m (NAVD 88)
Mean High Water	0.277 m (NAVD 88)
Mean Higher High Water	0.340 m (NAVD 88)
Mean Range	0.74 m
Diurnal Range	0.841 m

Tidal simulations were run near Fort Wool, west of I-64 (T2) and north of Willoughby spit, east of Fort Wool (T1, see **Figure 1**). T2 high water ranged from 40.2 to 42.4 cm and low water ranged from -41.4 to -38.8 cm for a tidal range of 80.4 to 81.6 cm. T1's range is larger, with high water ranging from 40.6 to 42.0 cm and low water ranging from -43.7 to -42.0 cm for a tidal range of 83.5 to 84.6 cm.

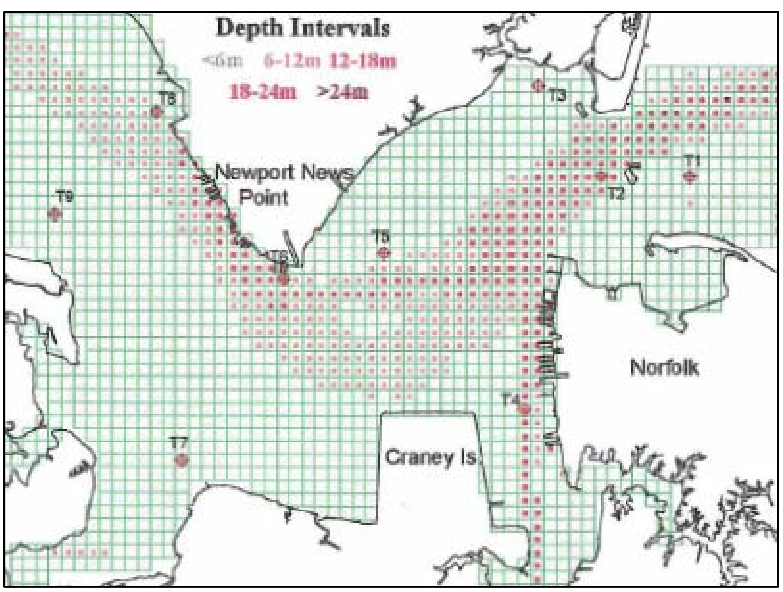


Figure 1. Location of Tide Simulation Stations (VIMS 1999)

1.1.2 Tidal Currents

Surface currents near Newport News Point range from -75 to 100 cm/s and bottom currents range from -40 to 40 cm/s. Tidal currents were simulated south of the northern entrance/exit to the I-64 tunnel (C1, see **Figure 2**). Tidal currents at mean tidal range and low inflow were -45 to 50 cm/s for surface flow, and -15 to 15 cm/s for bottom flow. Currents at mean tidal range and mean river inflow were -50 to 50 cm/s for surface flow and -15 to 15 cm/s for bottom flow.

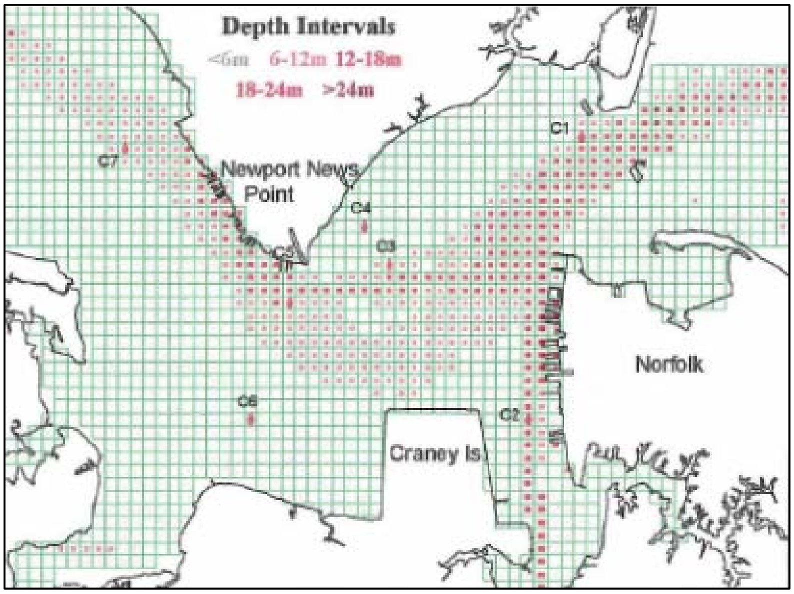


Figure 2. Location of Tidal Current Simulation Stations (VIMS 1999)

A tidal front also exists in the area, located just below Newport News Point (see **Figure 3**). The system develops during the early flood stage of each tide as higher salinity (higher density) bay water flows westward across Hampton Flats and converges with lower salinity (lower density) river water still ebbing to the southeast in the channel. This has been associated with enhanced upstream transport and higher rates of larval recruitment of seed oysters. The front is located mostly in the deep channel.

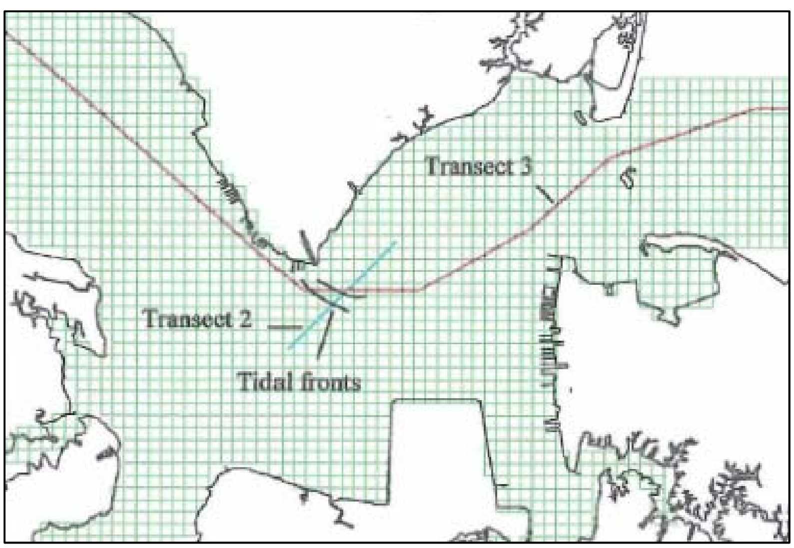


Figure 3. Location Map Showing the Surface Position of an Observed Tidal Front

1.1.3 Tidal Prism and Residual Currents

The Elizabeth River is a semi-enclosed tidal basin that has been designated one of three Chesapeake Bay Regions of Concern. Since this river receives no freshwater or estuarine inflow from any source other than the James River, it is important to understand potential impacts construction could have on the nearby tidal prism and residual currents.

The river's tidal prism (volume of flood or ebb flow entering or leaving an enclosed region) was modeled to identify the volume of water entering and leaving the basin over the tidal cycle. Discharge flood volumes range from 17.5 to 18.5 x 10^6 m^3(mean inflow and low inflow, respectively) and ebb volumes range from -18.7 to -18.1 x 10^6 m^3(high inflow and mean inflow, respectively).

A clockwise surface eddy also appears at the entrance of the Elizabeth River, which is a simple vortex generated in the lee of Craney Island's northeast corner during apogean-neap tides (see **Figure 4**). During perigean-spring tides, the eddy disappears.

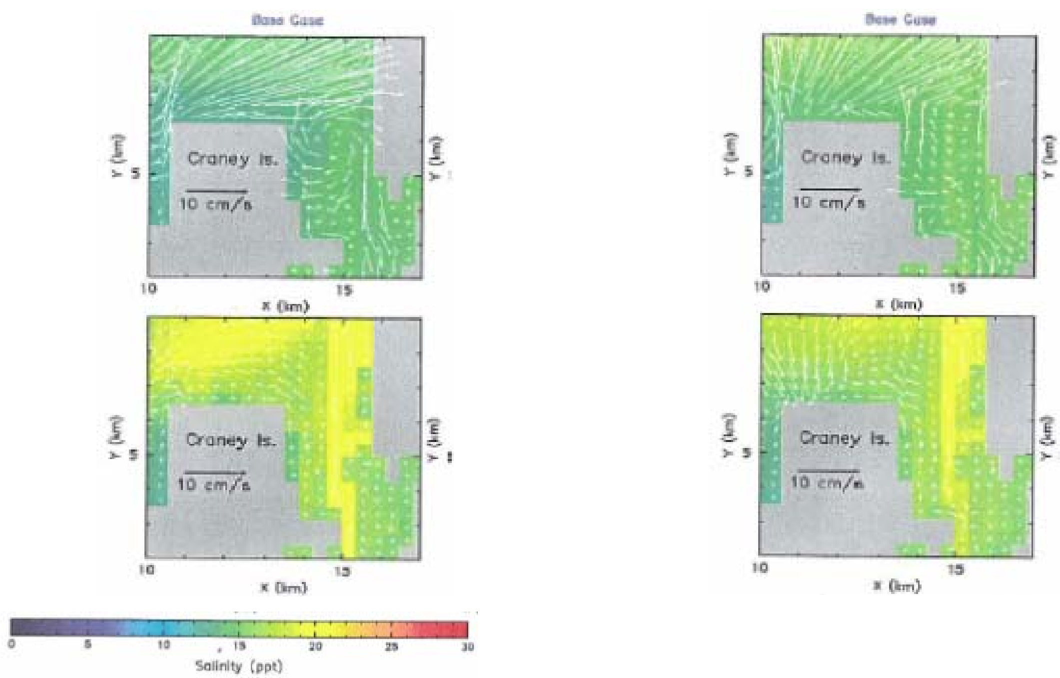


Figure 4. Tidally-averaged Current and Salinity: Apogean-neap Tide (Left) and Perigean-spring Tide (Right), Elizabeth River Entrance (adapted from VIMS 1999)

Another large eddy (counterclockwise) appears in residual (non-tidal) surface currents at the southwest end of Hampton Flats, especially during apogean-neap tide (see **Figure 5**). It is not evident in the bottom layer during any phase of the tide. During perigean-spring tide, the surface eddy is weaker and shifts to the east away from Hampton flats.

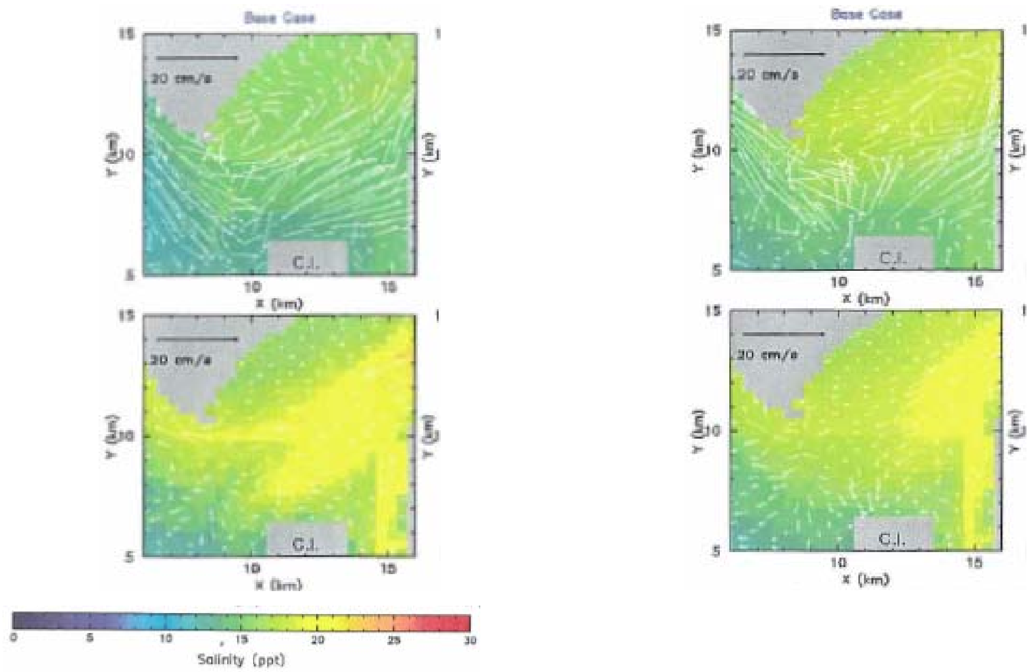


Figure 5. Tidally-averaged Current and Salinity: Apogean-neap Tide (Left) and Perigean-spring Tide (Right), Hampton Roads (adapted from VIMS 1999)

1.1.5 Salinity

Fresh water inflow was characterized using the USGS stream gauge station at Richmond, Virginia, resulting in low inflow at 20.4 m^3/s, mean inflow at 226 m^3/s, and high inflow at 650 m^3/s.

Salinity values used for the downstream boundary condition at the entrance of the James River were based on VIMS field measurement data. Surface salinity was set at 28.5 ppt at low inflow, 19.8 ppt at mean inflow, and 15.9 ppt at high inflow. Bottom salinity was set at 29.5 ppt at low inflow, 25.7 ppt at mean inflow, and 14.0 ppt at high inflow.

Model results found salinity ranges from 23 to 30 ppt during low river inflow. The low inflow results in a decreased stratification (higher salinity, higher density water overlain by lower salinity, lower density water) that occurs with a higher tidal range and stronger vertical mixing. Salinity ranges from 13 to 23 ppt during mean river flow and from 6 to 22 ppt during high river inflow. Figure 5 shows an average salinity of 14 to 22 ppt during apogean-neap tide and perigean spring tide near I-64.

1.1.6 Sedimentation

The James River has coarser sandy bottom sediments in the channel and northern flank near Hampton Flats and finer muddy bottom sediments in the southern flank near Craney Island (**Figure 6**). Areas of high sedimentation potential are located along the south shore of the James with relatively little along the north shore.

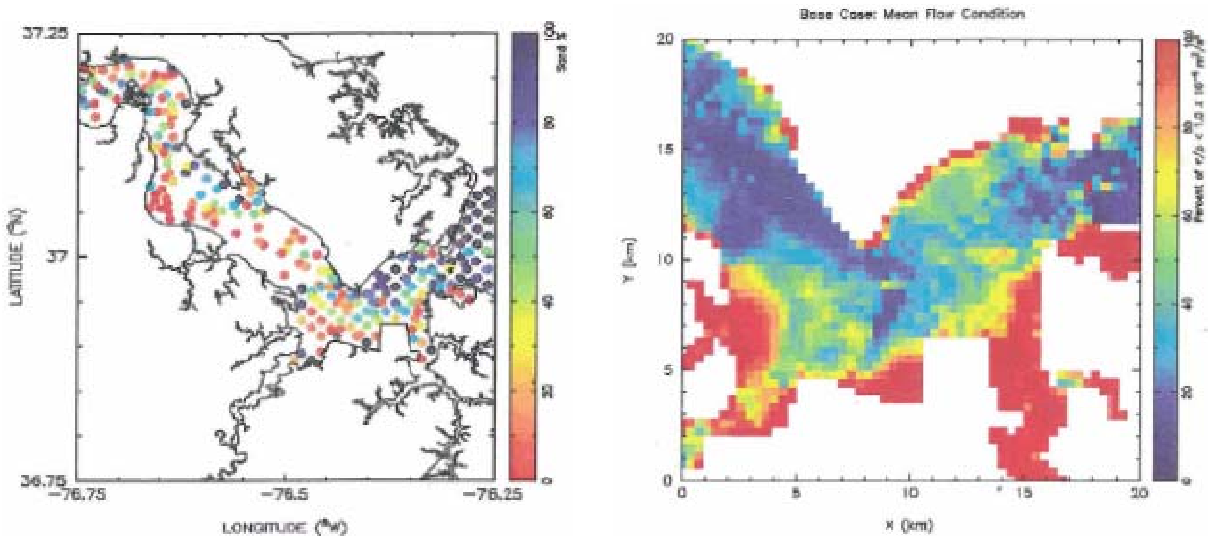


Figure 4. Bottom Sediment Grain Size Distribution and Sedimentation Potential (adapted from VIMS 1999)

2.0 ENVIRONMENTAL CONSEQUENCES

The Virginia Institute of Marine Science (VIMS) model simulated tides, currents, circulation, salinity, and sedimentation on four test cases. The study compares the Base Case (existing conditions) to Alternative 1, which is an expansion of the I-64 crossing. The modeled expansion consists of the addition of a third tunnel, two tunnel islands, and two bridges on pilings connecting Hampton and Norfolk across the entrance to the James River. The results are laid out below and then analyzed for application to the current alternatives under consideration. It is assumed that if there is no change in hydrodynamics between the Base Case and Alternative 1, there will then be no differences between the Build Alternatives discussed in this Draft EIS.

There was no discernible change in simulated tidal heights at any of the tide stations selected for comparison of the Base Case with Alternative 1. There also was no evidence of any structure-induced change in tidal height related to variations in tidal range or river inflow or of perceptible changes in high and low water times and heights. Therefore, the proposed Build Alternatives will have no impact on tidal heights, tidal range, river inflow, or high and low water times and heights.

The model showed a slight difference in simulated currents for the Base Case and Alternative 1 for tides of mean range in combination with low river inflow. The change, however, was only in the form of surface current curve and did not affect time or speed of the flood and ebb current maxima. Since changes in surface current curve between the Base Case and Alternative 1 are barely discernible, it is assumed that differences between proposed Build Alternatives also will be negligible.

Alternative 1 shows no effect on the direction or magnitude of the horizontal currents within the James River tidal front system. Therefore, the proposed Build Alternatives will have no impact on the tidal front system or horizontal currents within the James River.

Simulation comparisons of the flow through the entrance of the Elizabeth River showed no measurable evidence of a reduction in tidal prism from Alternative 1. Residual currents for Alternative 1 also are nearly identical to the Base Case scenario and show a slight increase in residual water volume. An increase is residual water volume could increase dissolved or suspended material transport in and out of the basin. It is expected that the proposed Build Alternatives will have a negligible impact on the Elizabeth River tidal prism and eddies.

Model results for salinity field at depth are similar between Alternative 1 and the Base Case. There also is no change in the longitudinal limit of salt intrusion in the James River between the Base Case and Alternative 1. Therefore, the proposed Build Alternatives will have no impact on salinity within the James River tidal front system.

Alternative 1 shows little change from the Base Case with the exception of a slight increase in the sedimentation of medium silt and sedimentation potential in the northeast corner of Hampton Flats during mean freshwater inflow. Water depth at the northeast corner of Hampton Flats ranges from 1 to 12 feet. The Hampton River Entrance Channel is dredged to a depth of 12 feet (NOAA chart 12245). This could lead to the need for increased dredging of the Hampton River Entrance Channel and nearby marinas. Since changes in sedimentation potential between the Base Case and Alternative 1 are barely discernible, it is assumed that differences between the proposed Build Alternatives will be negligible.

3.0 SUMMARY

There is no difference between the No Build and Build Alternative impacts on tidal heights, tidal range, river inflow, high and low water times and heights, and currents and salinity within the James River tidal front system.

There is a negligible impact on the James River surface current curve, the Elizabeth River tidal prism and eddies, and sedimentation potential near Hampton Flats due to the Build Alternatives. The slight increase in residual water volume at the entrance of the Elizabeth River over the Base Case scenario from Alternative 1 could increase dissolved or suspended material transport in and out of the basin. A slight increase in sedimentation in the northeast corner of Hampton Flats could increase the necessity of dredging nearby marinas and the Hampton River Entrance Channel. These changes, however, are minimal and not considered a significant difference between the Build and No-Build Alternatives. These impacts also are not expected to be significantly different between the Build Alternatives themselves.

APPENDIX C

Rare, Threatened, and Endangered Species Coordination

United States Department of the Interior

FISH AND WILDLIFE SERVICE
VIRGINIA ECOLOGICAL SERVICES FIELD OFFICE
6669 SHORT LANE
GLOUCESTER, VA 23061
PHONE: (804)693-6694 FAX: (804)693-9032
URL: www.fws.gov/northeast/virginiafield/

Consultation Tracking Number: 05E2VA00-2012-SLI-2012 September 17, 2012
Project Name: HRBT EIS

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project.

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, and proposed species, designated critical habitat, and candidate species that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment

United States Department of Interior
Fish and Wildlife Service

Project name: HRBT EIS

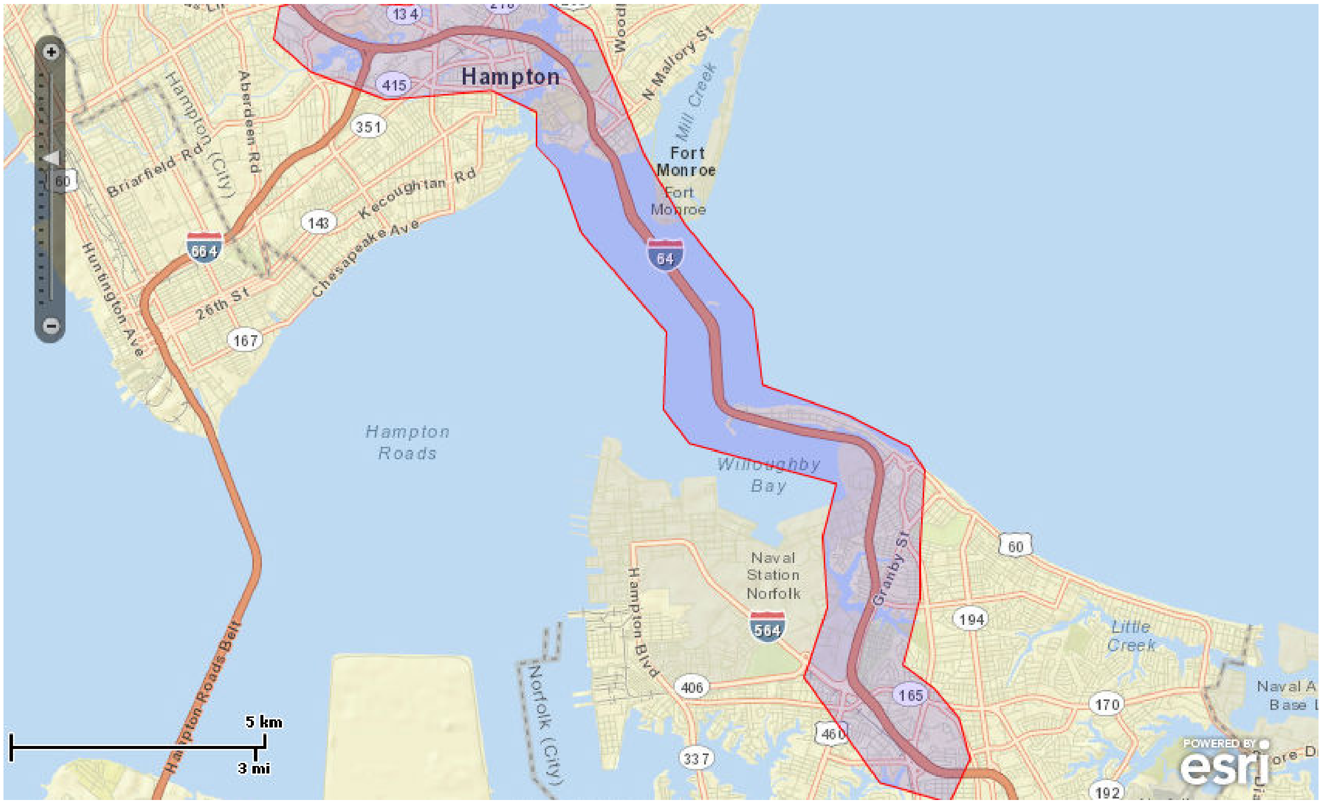
Official Species List

Provided by:

VIRGINIA ECOLOGICAL SERVICES FIELD OFFICE
6669 SHORT LANE
GLOUCESTER, VA 23061
(804) 693-6694
http://www.fws.gov/northeast/virginiafield/

Consultation Tracking Number: 05E2VA00-2012-SLI-2012
Project Type: Transportation
Project Description: The purpose of the I-64 HRBT study is to find a solution to existing and future traffic congestion on the 12-mile section of I-64 between I-664 in the City of Hampton and I-564 in the City of Norfolk.

Project Location Map:



Project Coordinates: MULTIPOLYGON (((-76.373274 37.0229255, -76.3900968 37.0278456, -76.3983365 37.033615, -76.3969632 37.0393565, -76.3894101 37.0412748, -76.3808271 37.0410007, -76.3746472 37.0399046, -76.3681241 37.0396305, -76.361601 37.0415488, -76.3526746 37.0429327, -76.3475248 37.0423846, -76.338255 37.0404664, -76.327612 37.0352593, -76.3231488 37.027037, -76.3159391 37.013057, -76.307356 37.001268, -76.2919065 36.9859121, -76.2898465 36.9724731, -76.2706205 36.9669871, -76.2572309 36.9615007, -76.2538061 36.9573737, -76.254836 36.9439296, -76.254836 36.9345998, -76.2586126 36.9227985, -76.2517461 36.9186814, -76.246253 36.9134661, -76.2436712 36.9062247, -76.2483129 36.898367, -76.2637624 36.9019361, -76.2806299 36.920636, -76.2754354 36.9329532, -76.2764654 36.945576, -76.2733755 36.9549045, -76.3059911 36.9620374, -76.3118348 36.9680762, -76.3111481 36.9817902, -76.3300309 36.9993405, -76.3351807 37.0105815, -76.3399872 37.0146937, -76.3399872 37.0207245, -76.3499436 37.024562, -76.373274 37.0229255)))

Project Counties: Hampton, VA | Norfolk, VA

Endangered Species Act Species List

Species lists are not entirely based upon the current range of a species but may also take into consideration actions that affect a species that exists in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Please contact the designated FWS office if you have questions.

Piping Plover *(Charadrius melodus)*

Population: except Great Lakes watershed

Listing Status: Threatened

Species Conclusions Table

Project Name: I-64 Hampton Roads Bridge Tunnel Environmental Impact Statement, City of Hampton and City of Norfolk, Virginia, State Project Number: 0064-965-004, P101; UPC 99037

Date: 9/27/2012

Listed Species

Species / Resource Name	Conclusion	ESA Section 7 / Eagle Act Determination	Notes / Documentation
Atlantic Sturgeon (*Acipenser oxyrinchus*) Endangered	suitable habitat present, species known to occur in these waters	May adversely effect	10-2011 VFWIS –VDGIF geographic search 5-2012 NOAA indicated species (Vaccaro) VDOT GIS layer - 2009 Endangerd Species GIS data
Green Sea Turtle (*Chelonia mydas*) Threatened	suitable habitat present, species known to occur in these waters	May adversely effect	5-2012 NOAA indicated species (Vaccaro) VDOT GIS layer - 2009 Endangerd Species GIS data
Hawksbill/Carey Sea Turtle (*Eretmochelys imbricate*) Endangered	no suitable habitat present*	No effect	10-2011 VFWIS –VDGIF geographic search
Kemp's/Atlantic Ridley Sea Turtle (*Lepidochelys kempii*) Endangered	suitable habitat present, species known to occur in these waters	May adversely effect	5-2012 NOAA indicated species (Vaccaro) VDOT GIS layer - 2009 Endangerd Species GIS data
Leatherback Sea Turtle (*Dermochelys coriacea*) Endangered	suitable habitat present, species known to occur in these waters	May adversely effect	5-2012 NOAA indicated species (Vaccaro) VDOT GIS layer - 2009 Endangerd Species GIS data
Loggerhead Sea Turtle (*Caretta caretta*) Threatened	suitable habitat present, species known to occur in these waters	May adversely effect	5-2012 NOAA indicated species (Vaccaro) VDOT GIS layer - 2009 Endangerd Species GIS data
Northeastern Beach Tiger Beetle (*Cicindela dorsalis dorsalis*) Threatened	no suitable habitat present **	No effect	10-2011 VDCR-NHD
Piping Plover (*Charadrius melodus*) Threatened	potential habitat present and no current survey conducted	May adversely effect	9-2012 FWS – Official Species List 10-2011 VDCR-NHD VDOT GIS layer - 2009 Endangerd Species GIS data
Red-cockaded Woodpecker (*Picoides borealis*) Endangered	no suitable habitat present	No effect	10-2011 VFWIS –VDGIF geographic search

Roseate Tern (*Sterna dougallii dougallii*) Endangered	potential habitat present and no current survey conducted	Not likely to adversely affect	10-2011 VFWIS –VDGIF geographic search
Shortnose Sturgeon (*Acipenser brevirostrum*) Endangered	potential habitat present and no current survey conducted	May adversely effect	5-2012 NOAA indicated species (Vaccaro)
Critical Habitat	no critical habitat present	No effect	
Bald Eagle (*Haliaeetus leucocephalus*) Species of Concern	unlikely to disturb nesting bald eagles*** does not intersect with an eagle concentration area	No Eagle Act permit required	VDOT GIS layer - 2009 Endangerd Species GIS data

*Although this is not the normal range for the Hawksbill turtles, and the few turtles found are considered strays from the tropical waters they normally inhabit, a nest hatched on Virginia Beach in 2012.

** Beaches are present in the study area, however this species is not known to occur in the vicinity of the project area, and beaches are located in a highly populated area and receive enough traffic that a population would not be likely to survive. According to a letter from VDCR, this 'activity will activity will not affect any documented state-listed plants or insects' (Baird, 2011).

***All documented nests are over 660 ft away (2011 data)

REFERENCES

USFWS (United States Fish and Wildlife Service)

2012 Official Species List - List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project. Consultation Tracking Number: 05E2VA00-2012-SLI-2012. Virginia Ecological Serviced Field Office, 6669 Short Lane, Gloucester, VA 23061. September 17, 2012.

Vaccaro, Chris

2012 Personal Communication. Email from Chris Vaccaro – Fisheries Biologist, Protected Resources Division, NOAA Fisheries/NERO to Rebecca Chojnacki Environmental - Planner, Parsons Transportation Group. Dated 5/14/2012 10:11 AM.

VDCR (Virginia Department of Conservation and Recreation)

2011. Natural Heritage Resources by County: City of Hampton, City of Norfolk. Publically Available Natural Heritage Resource Information. http://www.dcr.virginia.gov/natural_heritage/infoservices.shtml. Accessed 10/14/2011.

VDGIF (Virginia Department of Game and Inland Fisheries)

2011. The Virginia Fish and Wildlife Information Service (VAFWIS) – online Geographic Search. http://vafwis.org/fwis/?Title=VaFWIS+Geographic+Search+By+Map&vUT=Visitor. Accessed 10/14/2011.

VDOT (Virginia Department of Transportation)

2012. GIS layer - 2009 Endangered Species GIS data databases including VDGIF biologists and permittees, USFWS/USGS/Audubon Society monitoring programs, trained volunteers, surveys from the Center for Conservation Biology at William and Mary, university researchers, and others.