

Appendix H – ICE Analysis Note to File

The following is the Indirect and Cumulative Analysis (ICE) that was prepared for the Marina Way Extension project. This document represents the Note to File and supports the ICE summary provided in the Environmental Assessment (EA). This analysis was prepared per the guidelines identified in VDOT Environmental Division's Instructional and Informational Memorandum for Indirect and Cumulative Analysis (IIM-ED-715.1) and utilizing the outline presented in the Skiffes Creek ICE Technical Report.

INDIRECT EFFECTS

Indirect effects are those that are caused by the proposed action but occur later in time or farther in distance than the direct impacts. The most common indirect effects associated with highway projects have to do with induced development, that is, development and the impacts of such development that would not otherwise occur if the project were not constructed.

Step 1: Scoping. Prince William County, in coordination with VDOT and FHWA, has coordinated with local, state, and federal agencies throughout the Marina Way Extension environmental review process. Additional details can be found in Section 4 - Coordination and Comments of the EA. This step also included reviewing the planning documents prepared by Prince William County (County). The documents included the 2019 North Woodbridge Small Area Plan which included the Illustrative Plan and a Mobility Plan, the 2005 Master Zoning Plan, and Transportation Planning Board's (TPB) Visualize 2045.

Step 2: Identify Study Area Direction and Goals. The project location shown in was the initial location used to identify boundaries of the resource-specific study areas described below. Each resource-specific study area includes the project's study area and additional lands that contain resources that are connected to the area of direct effects of the proposed project. The boundaries of the resource-specific study areas are shown in **Figure 1** and intend to be large enough to encompass regional resources of concern that were identified during the scoping phase. The following are descriptions of the resource-specific study area used for this analysis:

- **Induced Growth:** This study area includes a one-mile buffer from the proposed Marina Way extension which includes its improvements at the Marina Way and Annapolis Way, and Marina Way at Route 123 intersections. The study area also includes the major feeder roads in the area including I-95, Route 123, Horner Road, and Route 1. A 1,000 ft buffer was used along these roads as well. Please refer to **Figure 1**.
- **Social and Economic Resources, and Parks, Recreation and Open Space Easements:** This study area is defined by the North Woodbridge Small Area Plan. The study area includes the residential communities, businesses, and industrial areas within North Woodbridge, Virginia (refer to **Figures 2 and 3**). This study area accounts for the census blocks that encompass the project's study area as well as the Induced Growth study area.
- **Natural Resources:** The study area for indirect and cumulative effects to natural resources is the Occoquan Bay-Potomac River and Belmont Bay-Occoquan River 12-digit watersheds (refer to **Figure 4**). This study area includes residential and commercial areas as well as multiple state parks and wildlife refuges that provide habitat for wildlife which could potentially be indirectly affected by the Preferred Alternative.

Figure 1 – ICE Study Areas

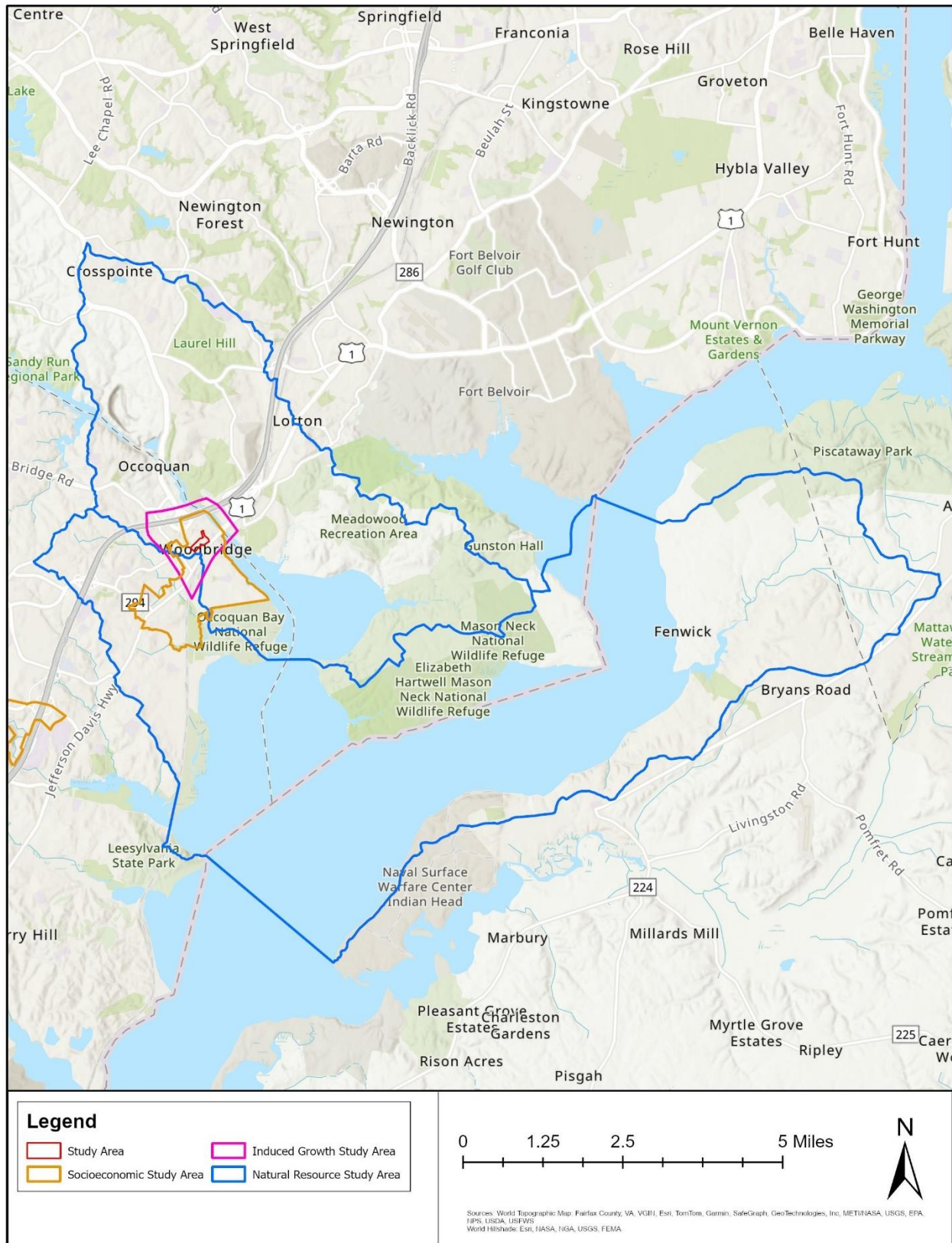


Figure 2 – Socioeconomic Study Area (Residential and Businesses)

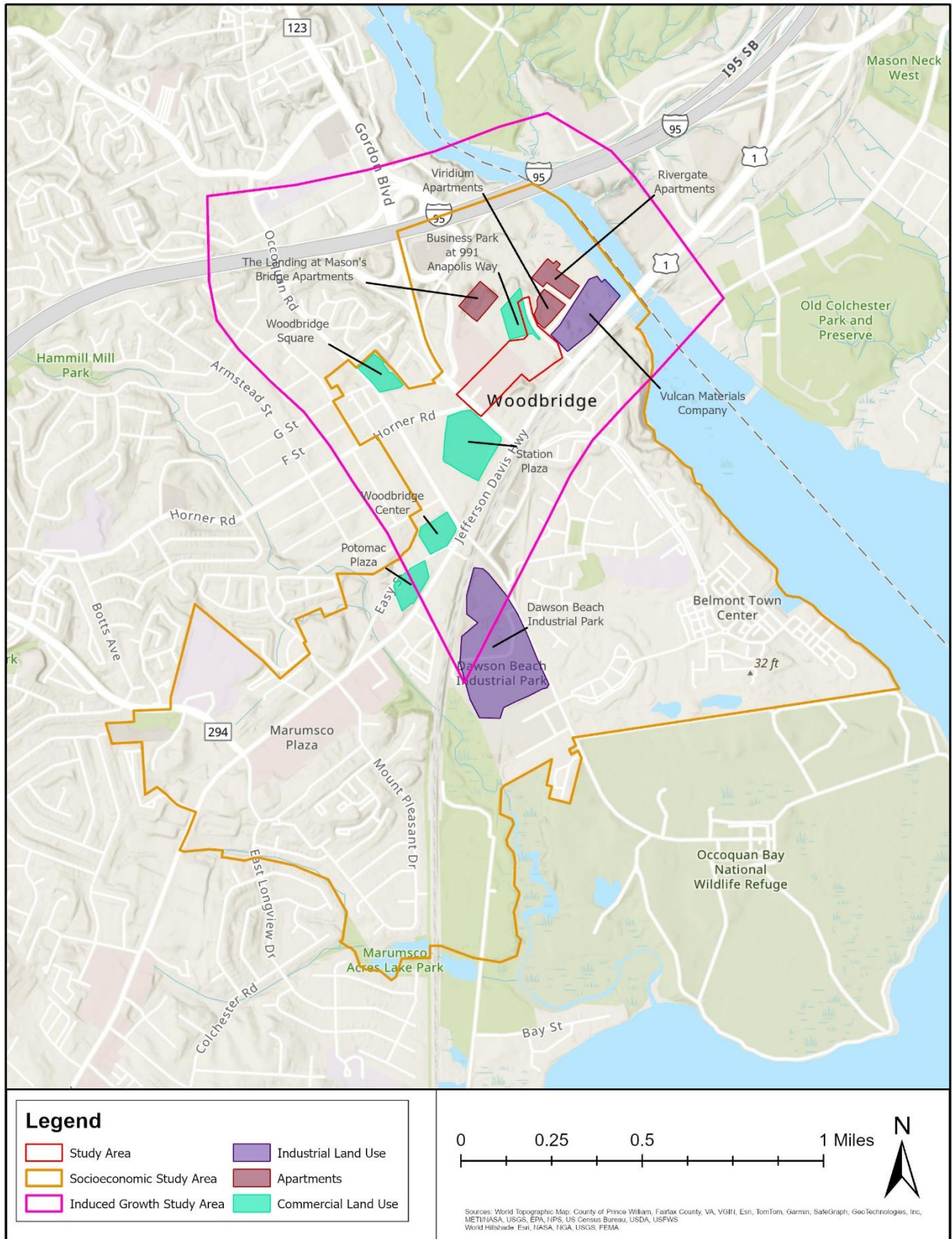


Figure 3 – Socioeconomic Study Area (Community Resources)

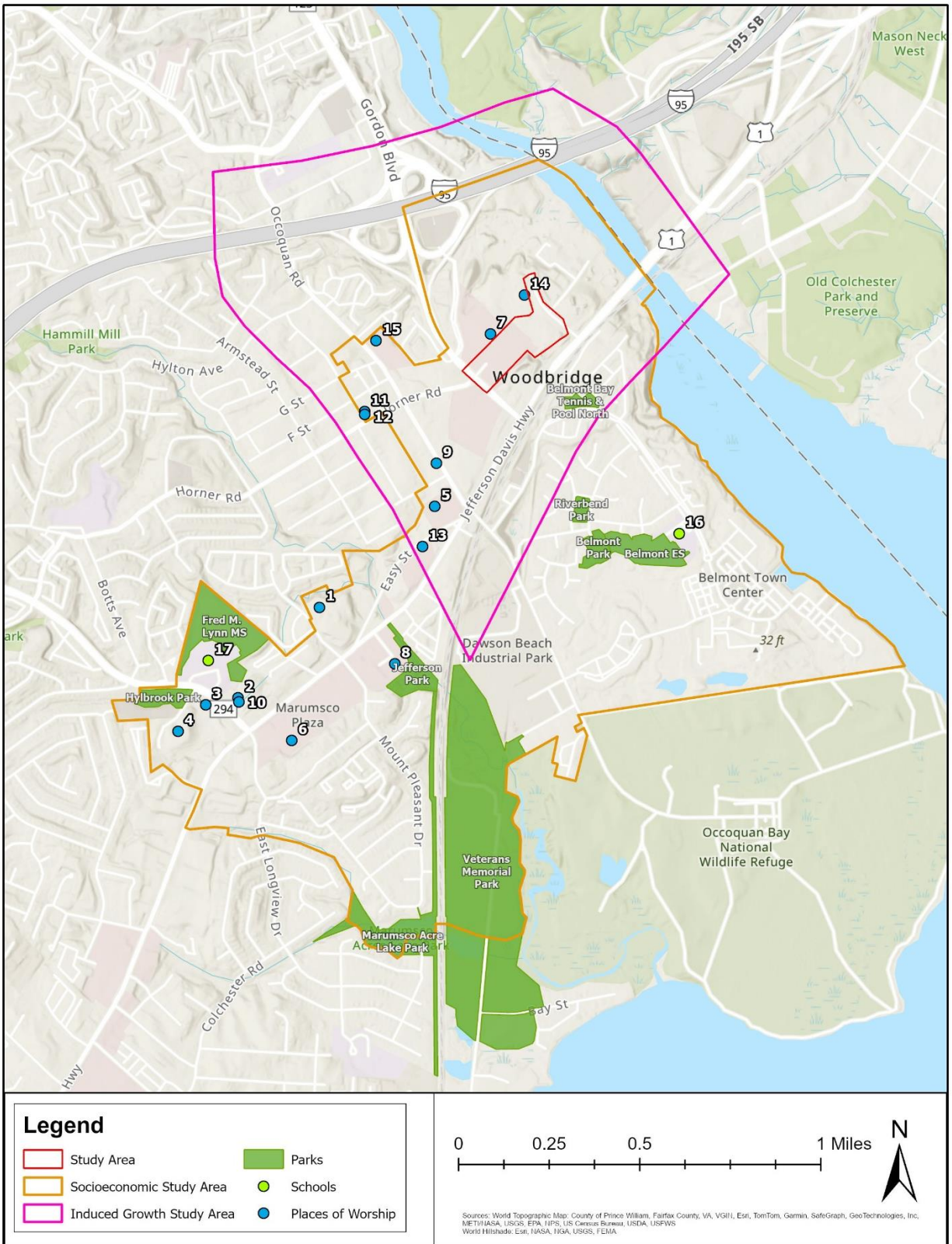


Figure 4 – Natural Resources Study Area (Forest Cover)

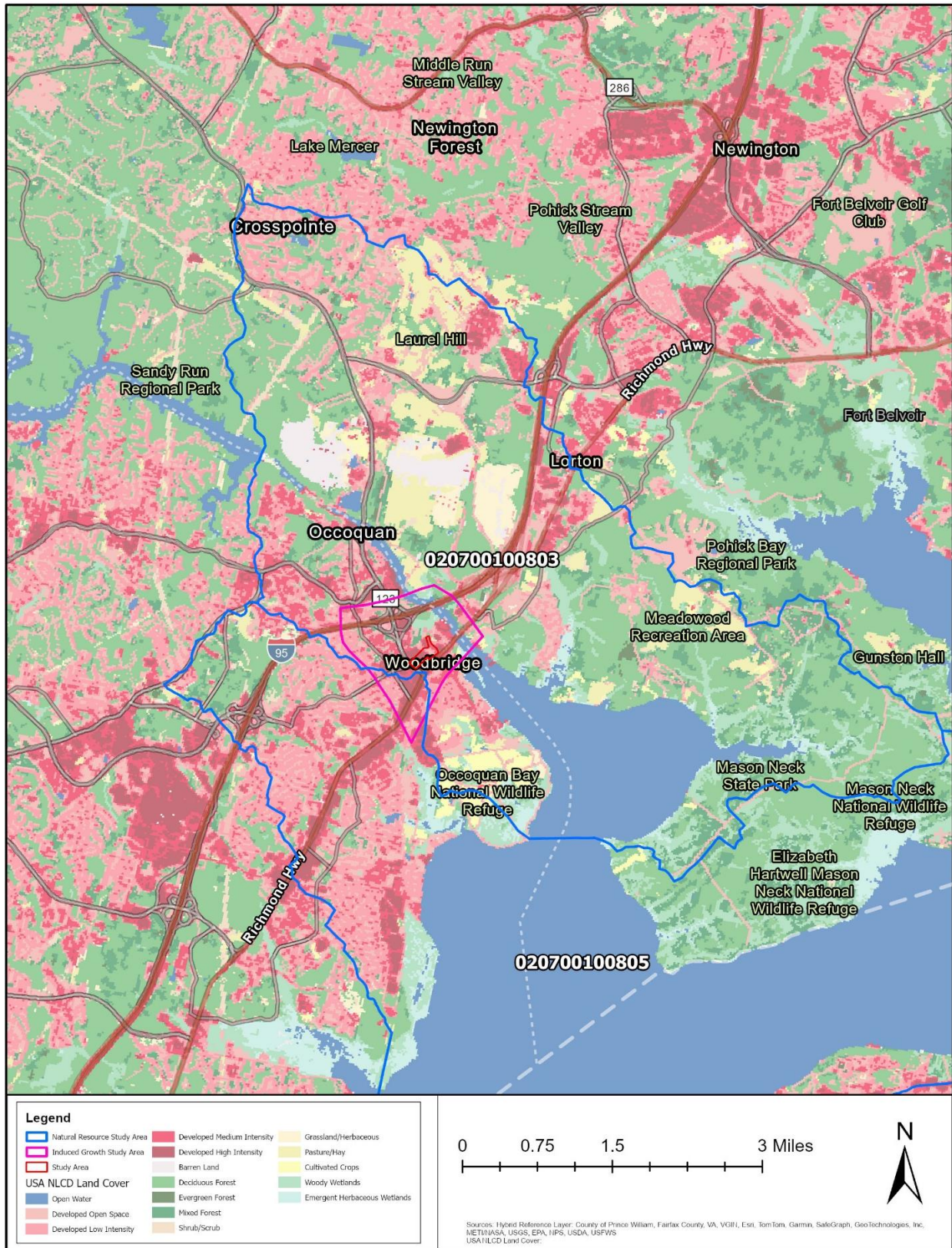


Figure 5 – Natural Resources Study Area (Water Resources)

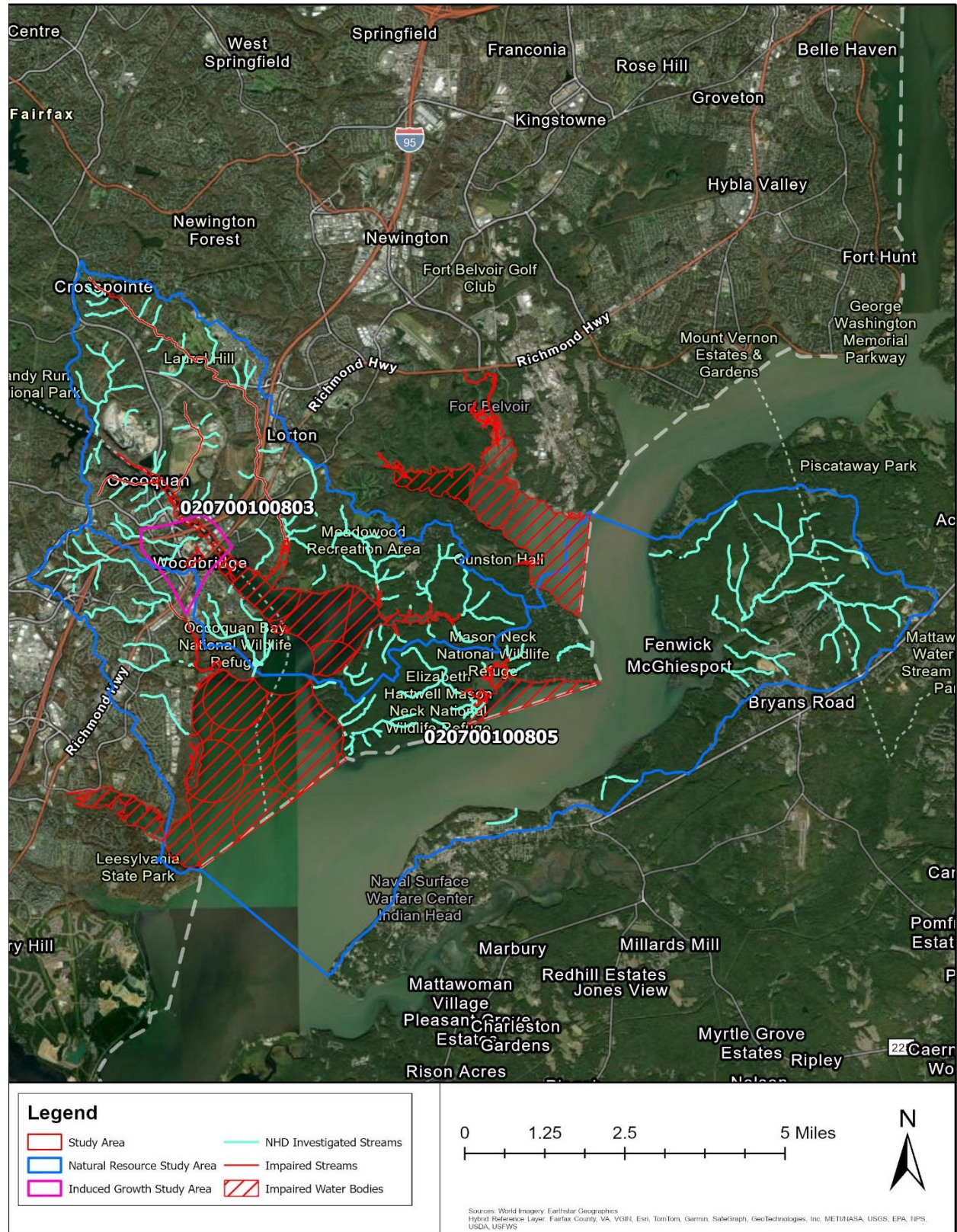
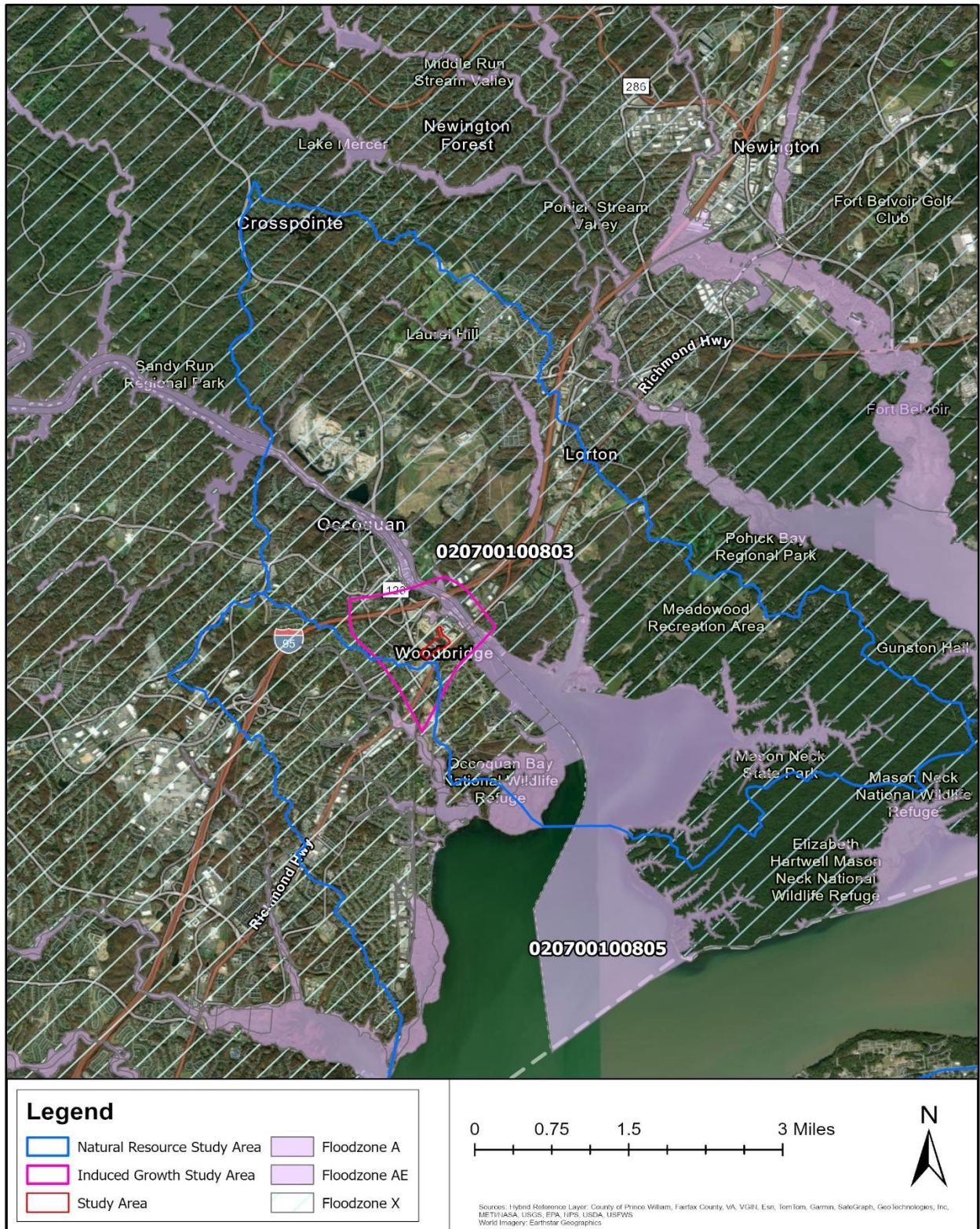


Figure 5 – Natural Resources Study Area (Floodplains)



The study areas for the socioeconomic and natural resources encompass the North Woodbridge area as well as a portion of Woodbridge and a portion of the city of Lorton in Fairfax County. A review of historical topographic and aerial maps provided by the US Geological Service (USGS) reveals that the first structures in the Woodbridge and Lorton area occurred in the 1890's. During this time, Routes 123 and 1 existed and serviced the area. Between 1890 and 1920, the Richmond to Fredericksburg railroad was constructed. By 1944, residential development expanded along the major thoroughfares including Route 1 and portions of Route 123. In 1957, Interstate-95 (I-95) opened and residential and commercial development in the area began to grow. By 1965, Marina Way was constructed and mining at the Occoquan River was occurring. Also, businesses began to move into the area now known as Gordon Plaza. By the 1990's, the area had become built-out and urbanized as it is today.

Prince William County has experienced significant growth since 1970 and, according to the Weldon Cooper Center at the University of Virginia, will continue to increase through the year 2050. (Weldon, 2014) The population in the area has grown by over 100% between 1990 and 2020. In addition to growth in population, employment in the North Woodbridge area is anticipated to increase at a similar rate. (Census, 2023)

The development of North Woodbridge is guided by the North Woodbridge Small Area Plan which is part of the County's Comprehensive Plan. North Woodbridge is part of the Washington D.C. Metropolitan area, located approximately 20 miles southwest of the city. The revival of the North Woodbridge area is centered around the development of a town center which would include Marina Way Extension as a main street. The town center would allow for mixed-use development within a small area and would promote walkability and bikeability. The Plan asserts that the North Woodbridge Town Center should include a network of streets that provides an extension of Horner Road across Route 123 to intersect Annapolis Way which provides access to the Occoquan Harbor Marina, as well as the Annapolis Way extension as it is already planned (Prince William County, 2019).

Step 3: Identify Notable Features in the Study Area. The objective of this step is to identify specific environmental issues within the study areas against which the proposed project may be assessed. This is accomplished through conducting an inventory of notable features for each resource of concern. For the purposes of this analysis, all resources included for evaluation were identified as notable features, for which indirect effects were considered.

In the Socioeconomic resources study area, notable features are included in Table 1 and Figures 2 and 3, and, Section 3.2 of the EA for additional information about these resources and communities.

Table 1- Notable Features in the Socioeconomic Resources ICE Study Area

Map ID	Facility	Facility Type
1	Our Lady of Angels Catholic Church	Place of Worship
2	Pathway Vineyard Church	Place of Worship
3	Grace Lutheran Church	Place of Worship
4	Image Church	Place of Worship
5	Hope Aglow Empowerment Church	Place of Worship
6	Woodbridge Christian Church	Place of Worship
7	Renew Life Worship Center	Place of Worship

Map ID	Facility	Facility Type
8	The Potter’s House	Place of Worship
9	Lamb of God International Church	Place of Worship
10	Woodbridge Ghanaian Seventh-Day Adventist Church	Place of Worship
11	Faith Family Ministries International Church	Place of Worship
12	Iglesia Evangelica Apostoles y Profetas Vida Enterna	Place of Worship
13	Ministerio Voz Profetica a Las Naciones	Place of Worship
14	Royalhouse Chapel International	Place of Worship
15	Woodbridge Faith Center	Place of Worship
16	Belmont Elementary School	School
17	Fred M Lynn Middle School	School

The Natural resources study area includes tracts of forest that are potential threatened and endangered species habitat and the Occoquan River. The Occoquan River has been identified as an impaired waters and as potential habitat for the Atlantic sturgeon. There are also perennial and intermittent streams that traverse the study area and flow into the Occoquan and Potomac rivers. Forests throughout the area offer potential habitat for the Northern long eared bat, the Tri color bat, and Small whorled pogonia. Please refer to Figures 4 and 5 and Section 3.7 of the EA for additional information about these species.

Step 4: Identify Impact Causing Activities of the Proposed Alternatives. To assess whether there is a potential for indirect effects, this step identifies any impact-causing activities of the alternatives to be compared with the goals and trends identified in Step 2 and the notable features identified in Step 3. Earthwork (clearing, excavation, and filling); landscaping and erosion control; changes in traffic patterns; and changes in access are all project impact-causing activities that are anticipated with this project. These activities have been considered in the direct effect analysis for each resource in Sections 3 of the EA. Indirect effects have the potential to be triggered by the direct effects of the proposed project through encroachment and alteration of the environment farther in distance or at a later point in time. Indirect effects can also occur because of induced changes in land use patterns, population density, or growth rate that would otherwise not be expected without the execution of a proposed project. General circumstances that impact the likelihood of induced development within an area undergoing urbanization include:

- Accessibility
- Extent of existing transportation infrastructure
- Attractiveness of the location
- Availability of land
- Condition of the regional economy
- Availability of utilities
- Local political/regulatory conditions
- Vacancy rates in the area
- Land use controls

There are no direct effects associated with the No Build Alternative. The Preferred Alternative would impact 1.1 acres of forest which is suitable wildlife habitat which includes the endangered Northern long eared bat and Tri color bat habitat. The Preferred Alternative would also require partial ROW acquisition from six parcels for a total of 2.5 acres.

Step 5: Identify Indirect Effects for Analysis. The objective of this step is to evaluate whether notable features identified in Step 3 would be indirectly affected by the Preferred Alternative, taking into consideration the impact-causing activities and direct effects from Step 4. The following subjects were determined to potentially experience indirect effects from the Preferred Alternative and were considered for potential indirect effects in Step 6:

- Induced Growth
- Socioeconomics and Economic Resources
- Wildlife and Threatened and Endangered Species

The influence of roadway projects on growth and development depends in part upon the extent and accessibility of the existing transportation infrastructure. Factors for growth and development include rate of growth and urbanization in the region, the project's accessibility improvements, economic conditions, and the availability of land for development.

The project is located between I-95 and Richmond Highway (US Route 1) and adjacent to Gordon Boulevard (Route 123). Route 1 intersects with Annapolis Way and Route 123 and is considered a major thoroughfare that serves the eastern portions of Prince William and Fairfax Counties. To access I-95/Route 123 Commuter Lot, VRE Station, and destinations north and south of the study area vehicles must utilize Route 1. The existing Marina Way serves as the only connection to a marina at Occoquan Harbor, Vulcan Materials Company Woodbridge sand yard, and the Rivergate apartments. The extension of Marina Way would reduce congestion on surrounding roads and provide pedestrian access to the proposed North Woodbridge Town Center. These improvements represent incremental improvements to access within an area that is already planned to be developed. Therefore, the potential for the project to induce growth due to increased accessibility is anticipated to be low.

The attractiveness of a location and the strength of the regional economy are positively correlated with the potential for growth in that area. Predictions for continued population growth in Prince William County (see Section 3.2 of the EA) support a high level of attractiveness and a strong economy. A portion of the anticipated future employment in North Woodbridge is centered around the development of the North Woodbridge Town Center (Prince William County, 2019). The Preferred Alternative would reduce congestion and improve pedestrian access and mobility in and around the Town Center.

Population growth and development rate within a locality depends upon land availability and local political conditions as well as land use controls. Most of North Woodbridge is zoned for general commercial development which allows for a wide range of commercial uses. Also, a sizable portion of the North Woodbridge area is within the Redevelopment Overlay District. The purpose of this district is to promote redevelopment and the economic viability of older commercial neighborhoods that have experienced economic decline (Prince William County, 2019).

In conclusion, it is not anticipated that the Preferred Alternative would encourage any changes in land use that are not already expected. The extension of Marina Way has been identified in the transportation section of the North Woodbridge Small Area Plan which makes the Preferred Alternative consistent with the future condition of land use that is already anticipated and planned for by Prince William County.

Construction of the Preferred Alternative would cause direct impacts from tree removal to potential wildlife habitat which includes suitable threatened and endangered species habitat. The construction of the new roadway may indirectly impact habitat. The new roadway would introduce a new noise source, potential add to pollution, and alter foraging behavior. The improved accessibility to the area slightly increases potential development to the area. This development may directly impact potential threatened and endangered species habitat during construction.

Step 6: Analyze Indirect Effects and Evaluate Analysis Results.

Social and Economic Resources

Under the No Build Alternative, the population and employment in the area is expected to continue to grow. This growth will continue to put pressure on the traffic congestion of the roadways throughout the area. Also, accessibility to local businesses and residential communities would continue to be limited in the North Woodbridge area. With the increase in traffic congestion along the major feeder roads to the area, the area would experience proximity impacts to air quality and noise. Also, the lack of direct access to the proposed North Woodbridge Town Center would require drivers to access the shopping center from Route 123 and Route 1. The increase in traffic movements along congested roadways can lead to safety issues for the travelers.

The Preferred Alternative alignment would allow for the County to construct its planned, direct access to the North Woodbridge Town Center. The proposed roadway will carry travelers directly to the businesses and avoid using the congested Route 1 and Route 123 to access the town center. This would remove future congestion from the Route 1 and 123 corridors which could improve travel reliability, safety, and emergency vehicle response times. By the time the Preferred Alternative is constructed, local businesses at the Gordon Plaza would have relocated to accommodate the roadway. The business relocations are separate from this project and have already be planned. Also, the County's North Woodbridge Small Area Plan has identified the extension of Marina Way as a priority for the economic growth of the area. The County's future land use and zoning plans are designed to accept this new roadway.

The Preferred Alternative is not expected to cause changes to current and future land use and zoning designations. Also, the County has already defined areas in North Woodbridge for growth and development. With no induced growth anticipated for the Preferred Alternative, it would not have indirect effects on socioeconomic resources.

Wildlife and Threatened and Endangered Species

Wildlife habitat within the study area is fragmented and previously disturbed by Route 1 (Richmond Highway), other roadways, and commercial and residential development. The No Build Alternative would not result in further fragmentation of wildlife habitats however, present and planned future

development and transportation projects would continue to reduce habitat areas. Under the No Build Alternative, wildlife, including threatened and endangered species, that occupy nearby forested habitats would continue to experience disturbance from degradation of habitat from soil erosion, traffic noise, collision with vehicles, and introduction of invasive plants.

The Preferred Alternative would require the removal of trees from a forested area within the proposed alignment of the roadway. These forest communities may provide summer roosting and foraging habitat for wildlife including federally listed threatened Northern long-eared bat and Tri color bat. Vehicular traffic on the proposed Marina Way is expected to introduce an additional source of noise for the remaining forest habitats adjacent to the roadway. The new roadway is expected to interfere with wildlife movements of terrestrial animals across the roadway. Although these direct impacts occur, no induced growth is expected because of the alternative. Therefore, the Preferred Alternative would have no indirect effects.

Step 7: Assess Consequence and Develop Mitigation.

The No Build Alternative has no substantial indirect impacts on socioeconomic or wildlife and threatened and endangered species. Therefore, no mitigation is recommended.

Wildlife and Threatened and Endangered Species

To minimize the potential of the establishment of invasive species during construction, the provisions in VDOT's Road and Bridge Specifications will be followed. To prevent the expansion of existing invasive species and to prevent the introduction of new invasive species, best management practices would be followed, including washing machinery before it enters the area, minimizing ground disturbance, and reseeded of disturbed area with seeds that are tested in accordance with the Virginia Seed Law and VDOT's standards and specifications that ensure that seed mixes are free of noxious species.

Cumulative Effects

Cumulative effects are the impacts on the environment resulting from the incremental impact of the action when combined with other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period. The cumulative effects analysis is based on:

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

Geographic Area and Time Span. The geographic limits of the resource specific study areas used for the cumulative effects analysis are the same as those used for the indirect effects analysis. The time span for the analysis is from the mid-1980s (when the development of eastern Prince William County began) to 2050, which is the design year for the project.

Affected Resources. The same resources identified in Section 3 of this report.

Past, Present, and Reasonably Foreseeable Actions. The past, present and reasonably foreseeable future actions that contribute to cumulative effects are described below. The focus of the discussion is North Woodbridge, which encompasses the cumulative study area for social and economic resources and natural resources.

Past Actions:

Prior to World War II, most of the land area in Woodbridge was dedicated to agriculture. The Federal Highway Act of 1956 influenced the growth of North Woodbridge's land development characterized by residential lots, strip malls, and an increased need for cars. Between 1950 and 1960, improvements were made to widen Route 1 between Richmond to Woodbridge. The construction of I-95 in eastern Prince William County, in 1964, contributed to the development of suburbs and self-contained shopping centers including the construction of Gordon Plaza in the early 1970s. Based on historic Google imagery, the park and ride located at 1100 Annapolis Way was constructed in the late 1990s.

More recently, multiple apartment buildings have been constructed in North Woodbridge close to the project area. These new developments include the Rivergate Apartments in 2017, the Viridium Apartments in 2022, and the Landing at Mason's Bridge in 2023.

Present and Reasonably Foreseeable Future Actions

Annapolis Way Extension project has secured funding through the Northern Virginia Transportation Authority in July 2020 (NVTA, 2020). The project is the extension of Annapolis Way to connect the intersections of Annapolis Way and Route 1, and Annapolis Way Route 123.

The Route 1 widening project includes widening Route 1 to six lanes from Mt. Pleasant Drive to the Occoquan River. This project included improvements to the following intersections:

- Route 1 at Occoquan Road/ Dawson Beach Road – Improvements included dual left turns from northbound and southbound Route 1.
- Route 1 at Route 123 - Improvements include the addition of two left turn lanes along Route 1 for the northbound vehicles turning left onto Route 123.
- Route 1 at Annapolis Way – Improvements include two additional left turn lanes along Annapolis Way vehicles turning left onto Route 1.

The Route 1 at Route 123 Interchange project is in the design stage and includes widening of Route 123 as well as intersection improvements to Route 1 at Annapolis Way.

No-Build Alternative

The No-Build Alternative would have a minor adverse cumulative effect on communities, businesses, and the population that lives in the area. The population is expected to grow over the next few decades. This growth is contributed partly to the ever expanding economic and residential development that the County has planned for the area. The growth in the area is expected to put stress on the local roadway network regarding traffic congestion. Under this alternative, the traffic in the North Woodbridge area would continue to worsen which would negatively affect local businesses, residential access, and

commute times. Therefore, the alternative would have negative cumulative effects communities, community cohesion, and EJ populations.

Preferred Alternative

Past and present actions have urbanized the area. Access to communities and businesses has increased through the urbanization but the traffic that has followed the growth has hindered growth in the area due to lowering accessibility and desirability due to traffic. The Preferred Alternative would extend an existing roadway and improve pedestrian facilities in this urban area which in turns improves accessibility to communities and local businesses in an area that has been designated as an EJ community. The Preferred Alternative could have short-term minor adverse effects while the roadway and associated improvements are under construction. The long-term beneficial effect is associated with accessibility and community cohesion for the area.

The Preferred Alternative's impacts to wildlife and threatened and endangered species habitat would contribute to the cumulative effects that have occurred in the past to these resources within the study area. These effects should be minimized by the implementation of best management practices such as implementation of time-of-year restrictions. Construction and post-construction of the Preferred Alternative would potentially contribute to short-term, minor, localized increases in pollutants and nutrients causing impairment to waterways. Since construction of the Preferred Alternative would upgrade and replace current stormwater management systems, implementation of the Preferred Alternative could improve roadway runoff water quality from current conditions.

Past and present actions have affected the current state of socioeconomic, natural, and historic resources within the associated ICE Study Areas, and future actions would continue to affect these resources regardless of this project. The region is already developed, therefore cumulative effects of the Preferred Alternative are expected to be minimal. In addition, current regulatory requirements and planning practices are expected to help avoid or minimize the contribution of present and future actions to adverse cumulative effects for socioeconomic, natural, and historic resources.

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- 1965 Belvoir Quadrangle, Virginia-Maryland. 7.5 Minute Series (Topographic). USGS, Washington, D.C.
- 1966 Occoquan Quadrangle, Virginia. 7.5 Minute Series (Topographic). USGS, Washington, D.C.